NAHDA UNIVERSITY
IN BENI SUEF
جامعة النهضة - ببني سويف

# دليل الطالب باللغة العربية لائحة 144 ساعة

## كلية الهندسة - جامعة النهضة

## (2026-2025)



# كلمة مدير وحدة الجودة

## أبنائي طلاب كلية الهندسة – جامعة النهضة

**يسرني أن أرحب بكم في كليتكم، وأتمنى لكم مسيرة جامعية موفقة مليئة بالنجاح والتميز.**

**تحرص كلية الهندسة بجامعة النهضة على تطبيق منظومة متكاملة لضمان الجودة والاعتماد، انطلاقًا من إيمانها الراسخ بأن الطالب هو محور العملية التعليمية، وأن جودة التعليم والتعلم هي الأساس لإعداد خريج قادر على المنافسة في سوق العمل المحلي والإقليمي، ومواكبة التطور العلمي والتكنولوجي المستمر.**

**ويأتي هذا دليل الطالب كأحد الأدوات المهمة التي تهدف إلى تعريفكم بحقوقكم وواجباتكم، ونظم الدراسة والتقويم، ولوائح الكلية، والخدمات التعليمية والداعمة المقدمة لكم، بما يساعدكم على الاندماج الإيجابي في البيئة الجامعية، واتخاذ قرارات واعية خلال رحلتكم الأكاديمية.**

**وتعمل وحدة ضمان الجودة بالكلية بالتعاون مع جميع قطاعات الكلية على المتابعة المستمرة لأداء البرامج الأكاديمية، وتطوير المقررات، وتحسين أساليب التعليم والتعلم والتقييم، بما يحقق رسالة الكلية ورؤيتها، ويتسق مع المعايير القومية المرجعية للجودة، ورؤية مصر 2030. وقد كانت وحدة الجودة حريصة بالتعاون مع جميع إدارات ووحدات وبرامج الكلية وأعضاء هيئة التدريس كانوا ومازالوا حريصين على تطوير برامج الكلية والمقررات الدراسية وفق المنظومة التعليمية المرتبطة بالذكاء الإصطناعي والتنمية المستدامة (144 ساعة معتمدة – 4 سنوات دراسية) والمذكورة للعام الجامعي 2026/2025 وهي الهندسة المدنية للذكاء والتنمية المستدامة والهندسة المعمارية الرقمية وهندسة القوى الكهربائية والطاقة المتجددة وهندسة الميكاترونيكس والآلات الذكية وهندسة الاتصالات والحاسبات.**

**ونؤكد دائمًا أن مشاركتكم الفعالة، وإبداء آرائكم ومقترحاتكم، والالتزام بقيم النزاهة والانضباط، تمثل ركيزة أساسية في نجاح منظومة الجودة وتحقيق التحسين المستمر.**

**وفي الختام، أتمنى لكم عامًا جامعيًا ناجحًا، وأن يكون هذا الدليل مرشدًا لكم خلال سنوات الدراسة، متمنيًا لكم دوام التوفيق والتميز.**

**مدير وحدة ضمان الجودة**

**كلية الهندسة – جامعة النهضة**

# تشكيل مجلس إدارة وحدة ضمان الجودة للعام الجامعى 2026/2025

| م | العضو | الصفة |
|---|---|---|
| 1 | أ.د / سالم محمود الخضري | عميد الكلية رئيس مجلس إدارة وحدة ضمان الجودة |
| 2 | أ.د/ سيد عبد القادر احمد | وكيل الكلية نائب رئيس مجلس إدارة وحدة الجودة |
| 3 | د/ريهام ماجد حسين | مدير وحدة ضمان الجودة |
| 4 | د/ فاطمة رمضان محمود | نائب مدير وحدة ضمان الجودة |
| 5 | أ.د/ رجب رياض السقا | رئيس قسم العلوم الأساسية ولجنة الإعلام – مراجع معتمد بالهيئة |
| 6 | د/ محمد قرني سعد | رئيس قسم ومنسق برنامج الهندسة الكهربية والطاقة المتجددة |
| 7 | أ.م.د./ أمير علي كامل | رئيس قسم هندسة الميكاترونيكس |
| 8 | د/رشوان تحسين المشهور | رئيس قسم ومنسق برنامج هندسة العمارة الرقمية |
| 9 | د/ محمد مراد سلامة | منسق الجودة لبرنامج هندسة الاتصالات والحاسبات |
| 10 | أ.د/ نجلاء جلال الدين فهمي | منسق الجودة برنامج الهندسة المدنية الذكية والتنمية المستدامة |
| 11 | د/ أحمد عبد الحميد زكي | منسق الجودة لبرنامج هندسة الميكاترونكس والآلات الذكية. |
| 12 | أ.د.سمية إسماعيل أحمد قايد | رئيس لجنة الأنشطة الطلابية والثقافات |
| 13 | د.إيمان مجدى شمس الدين | مدرس بقسم هندسة الميكاترونكس والآلات الذكية. |
| 14 | أ.د/ خالد محمد مظهر | خبير التخطيط الاستراتيجي - أطراف مجتمعية |
| 15 | د/ محمد حسين جاد الله | مدير مكتب رعاية الخريجين وريادة الأعمال بالكلية |
| 16 | م.م/ليلى أسامة عبد اللطيف | مدرس مساعد بقسمالهندسة الكهربية والطاقة المتجددة |
| 17 | م.م/رضوى ماجد محمد | مدرس مساعد بقسم الاتصالات والحاسبات |
| 18 | م.م/ اندرو عياد سيف | مدرس مساعد بقسم الهندسة المدنية |
| 19 | م.م/ريهام محمد لطفي | مدرس مساعد بقسم العمارة الرقمية |
| 20 | م/ روان عبد الجواد محمد | معيد بقسم هندسة الميكاترونيكس |
| 21 | مروان شافعي | رئيس اتحاد طلاب كلية الهندسة |
| 22 | أ/ شهاب رمضان ياسين | اداري |
| 23 | أ/ هاجر يسن جمعه | إداري |

## كلمة السيد المهندس / رئيس مجلس أمناء الجامعة :



**بارك الله في مصر وشبابنا الطموح الذي يبذل أقصى جهد ممكن من أجل تنمية أمتنا وازدهار شعبنا.**

**خلال سنوات خبرتي العديدة والمناصب المختلفة التي شغلتها وتدبرتها، أي في مجالات التعليم والبحث، وإنشاء الجامعات، أو تنظيم الأعمال، كنت دائماً حريصاً على دعم الأعمال الجادة والمشاريع الإنتاجية التي تضيف إلى سجل مصر من التميز وتزيد من رفع مكانتها بين الدول الأخرى.**

**وجامعة النهضة في بني سويف هي أحد هذه المشاريع التي أعمل عليها لأنها تحمل رسالة مبتكرة في أساليب التعليم التي تتبناها والبحث العلمي الذي تستهدفه. في جامعة النهضة، نطمح إلى بناء جيل جديد قادر على مواجهة التحديات التي يطرحها المستقبل. لذلك، التزمنا بالعمل الشاق والفعال، وتقديم برامج متخصصة تنمي عقول شبابنا وتثري خبرتهم التعليمية.**

**رئيس مجلس الأمناء**
**المهندس / محمد الرشيدي**

## كلمة السيد الأستاذ الدكتور / رئيس الجامعة:



**لم تدخر جامعة النهضة في بني سويف، وهي جامعة خاصة مصرية، بموجب القرار الجمهوري رقم 253/2006 ، جهدا لشق طريقها نحو التميز المرغوب بخطى ثابتة، وبهذا فإنها تحتل مكانة مرموقة في الصعيد من خلال تذليل كافة الصعوبات والتحديات التي يواجهها قطاع التعليم في هذه المرحلة التي نعيشها. وقد اتخذت جامعة النهضة في بني سويف خطوات من أجل الحصول على اعتماد كافة برامجها الدراسية المتنوعة والشاملة، مثل برامج الجامعة في الطب وطب الأسنان والصيدلة والهندسة وعلوم الكمبيوتر والإعلام والتسويق وإدارة الأعمال والعلاج الطبيعي والفنون الجميلة والتمريض والتي تلبي احتياجات المجتمع المحلي والإقليمي وكذلك متطلبات سوق العمل، مع الحصول على الاعتمادات الدولية لبعض البرامج والدرجات التي تمنحها الجامعة.**

**بالإضافة إلى ذلك فقد بدأت جامعة النهضة في بني سويف الاتصال بالكثير من ا لجامعات في مختلف التخصصات العلمية إيمانا بأنه من الضروري التعاون مع الجامعات المحلية والإقليمية والعالمية في مختلف مجالات التعليم من أجل ضمان جودة التعليم .**

**وقد واصلت الجامعة سعيها لتطوير البرامج الأكاديمية في مختلف مجالات المعرفة والتي شكلت أرض خصبة كاملة ورافدة لكليات الجامعة السبعة، بالإضافة إلى حرص الجامعة على تطوير مهارات هيئة التدريس وفقا للمعايير الدولية وجذب المعلمين البارزين وتشجيع التدريس والبحث العلمي مع الالتزام بالمعايير المحلية والإقليمية والعالمية. وفي هذا الإطار لم تدخر الجامعة جهدا من أجل تحقيق هذه الرؤية والرسالة لكي تصبح واقعا. وقد وفرت معامل علمية متطورة وجهزتها لتناسب متطلبات التعليم العالي ومؤسساته بناء على أحدث التقنيات والنظم التعليمية وكذلك إثراءهم بمختلف قواعد البيانات التعليمية لخدمة عملية التعلم والتدريس بالإضافة إلى البحث العلمي. بالإضافة إلى تشجع جامعة النهضة في بني سويف الأنشطة الطلابية مثل الاهتمام بأندية الطلاب والمنشآت الرياضية من الصالات والملاعب وعقد المقررات التدريبية لإثراء الخبرة التعليمية ولمحاكاة المواهب والتنقيح كجزء من الإعداد للدراسات العليا. وتقدم الجامعة أيضا خدمة المجتمع ذات الأهمية الملموسة من خلال تقديم الخدمات الطبية المتميزة للمجتمع المحلي المحيط وتقديم الخبرة والاستشارات في مختلف المجالات الطبية والصحية والتطبيقية وكذلك استضافة الكثير من الأنشطة المحلية والإقليمية داخل الحرام الجامعي. وبالفعل فإن هذه الإنجازات الكبرى من قبل جامعة النهضة في بني سويف هي خطوات واثقة نحو العالمية.**

**الاستاذ الدكتور/ حسام الملاحي**

**رئيس جامعة النهضة**

## كلمة السيد الأستاذ الدكتور / عميد كلية الهندسة:



**أبنائي وبناتي طلاب كلية الهندسة** ...انتهز فرصة بداية العام الدراسي الجديد 2026/2025 لأهنئ كل طلاب وطالبات الكلية القدامى والجدد بالعام الدراسي الجديد أعادة الله عليكم وعلى أسركم بالخير والصحة والسعادة ومزيد من العلم.
ولأبنائنا الطلاب الجدد يسعدني أن أهنئكم بصفة خاصة بالعام الجامعي الأول فيحياتكم، كما أثنى على اختياركم لمهنة الهندسة العريقة لتكونوا مهندسي المستقبلالذين يتحملون مسئولية النهوض بالوطن.فأنتم أحفاد بناة الاهرام وحضارات عظيمة، وأنتم مطالبون بالسير على الدرب لتصلوا بمصرنا الحبيبة إلى الصدارة بين أمم الحضارات الحديثة. إنكم في انتقالكم من المرحلة الثانوية التي حققتم فيها تفوقاً مشرفاً إلىالمرحلة الجامعية، التي نتمنى لكم فيها استمرار التفوق والرقى، تمرون بأكثر من تحولهام -إنكم أولا تنتقلون من مرحلة اتسمت بالرقابة والإشراف والتوجيه في البيتوالمدرسة بشكل أو بآخر، إلى المرحلة التي تتاح لكم فيها مساحة أكبر من الحرية. وهذه الحرية يجب أن يصاحبها من جانبكم إحساس أكبر بالمسئولية ليتحقق بها المرجومنها - من تنمية قدراتكم على الخلق والإبداع ولا تكون لا قدر الله، طريقاً إلى خللأو ضياع. كما إنكم في الانتقال من المرحلة الثانوية إلى المرحلة الجامعية سوف تجدونأن دور الجامعة ليس هو تلقينكم المتاح من معلومات، فهذه المعلومات تتغير حالياً بدرجة متسارعة، ولكن دور الجامعة هو إكسابكم مهارات البحث عن المعلومة وتطويعهاللاستفادة منها. إن دور الجامعة ليس إمدادك بالمعلومات بقدر ما هو إكسابك القدرةوالمهارات والفكر اللازم لتحصيل المعرفة طوال حياتك العملية الممتدة والناجحة بإذنالله.
إنني أؤكد لكم أن الفرصة مواتية أمامكم للاستفادة بهذه التحولات والتأقلم، فكليتكم تذخر وتفخر بأساتذة يمثلون صفوة أعضاء هيئة التدريس في مصر، بل وفى الشرق الأوسط وعلى مستوى العالم ايضاً. وهم الذين قدموا لمصر والوطن العربي أعظم المشروعات الهندسية. وشاركوا في خطط التنمية منذ نشأة الكلية عام 2012 ومن المهم أن تستفيدوا من علمهم وخبرتهم الطويلة. وقد قامت الكلية بتحديث البرامج الدراسية و فيما يلي موجز عن البرامج الهندسية الجديدة ويوجد ملحق خاص تفصيلي للبرامج وهى المرتبطة بالذكاء الإصطناعى والتنمية المستدامة **(بكالوريوس الهندسة 144 ساعة معتمدة – 4 سنوات دراسية)** والمذكورة للعام الجامعي 2026/2025 وهي الهندسة المدنية للذكاء والتنمية المستدامة للتركيز على تصميم وبناء البنية التحتية من طرق، جسور، مباني، سدود والهندسة المعمارية الرقمية ودمج الفن والهندسة لتصميم مباني وظيفية وجمالية ومستدامة والتصميم والتخطيط العمراني والعمارة الخضراء وهندسة القوى الكهربائية والطاقة المتجددة والتركيز على إستغلال مصادر الطاقة النظيفة مثل الشمس، الرياح، والهيدروجين الأخضر وهندسة الميكاترونيكس والآلات الذكية والتركيز على مزيج من الهندسة الميكانيكية والكهربائية والبرمجة لتصميم أنظمة ذكية وهندسة الاتصالات والحاسبات للتركيزعلى نقل البيانات وتصميم الشبكات السلكية واللاسلكي وشبكات الجيل السادس والألياف الضوئية والأقمار الصناعية ليختار كل منكم من هذه التخصصات ما يلائم ميوله وقدراته.أدعو الله أن يكلل جهد الجميع بالنجاح، وأن تكون دراستكم مثمرة وناجحة وذاخرة بالذكريات السعيدة
. والله خير موفق،،،

***الأستاذ الدكتور/ سالم محمود سالم الخضري***

**عميد الكلية**

**كلمة السيد الأستاذ الدكتور / وكيل الكلية لشئون التعليم والطلاب:**



**بداية يسرني أن أرحب بكم أبنائي الطلاب والطالبات في رحاب كلية الهندسة بجامعة النهضة ببني سويف وأتمنى لكم حياة جامعية موفقة ملؤها الجد والاجتهاد والمثابرة لنيل ما تصبون اليه.**

**مع إشراقة عام دراسي جديد يطيب لي أن أتقدم لكم بأصدق التهاني وأطيب الأمنيات بعام دراسي موفق حافلاً بالعطاء ومكللاً بالنجاح يحمل في طياته الأمل بمستقبل مشرقبفضل مجهودكم وحرصكم على العمل الجاد، وانتظامكمفي حضور المحاضرات، والاطلاع الدائم على المصادر المتنوعة لتحصيل المادة العلمية مع تأكيدي على اهتمام وحرص الكلية الدائم على توفير كل ما من شأنه أن يحقق التفوق والتميز لطلاب الكلية**

**تشرفكلية الهندسة بانتمائكم لها وتحتاج منكم إلى بذل المزيد من الجهد لرفع شأنها، فكليتنا العزيزة والتي لابد من استغلال محرابها العلمي لصقل المهارات المعرفية والتطبيقية الخاصة بكم لكي ت صبحوا خريجين نافعين للمجتمع المصري والعربي والاقليمي بجميع المؤسساتوالشركات والمصانع.**

**يعتبر كتاب دليل الطالب الوسيلة التي يتعرف من خلالها الطالب على الجامعة ولوائحها،وبرامجها،وأدواتها التعليمية، وخدماتها. ستجدون في هذا الدليل كل ما يهم الطلاب عن الكلية ونظام الدراسة والبرامج الدراسية الهندسية المختلفة التي تقدمهاً بالإضافة الي الخدمات والأنشطة الطلابية التي لا غني عنهارل كل طالب . للطالب الجامعي حقوق وعليه واجبات، تضمّنتها الأنظمة واللوائح المعمول بها في الجامعة، ويمكن للطالب مراجعة هذه الحقوق والواجبات في هذا الدليل . وإن كليتكم إذ تدرك أهمية دور الشباب في المجتمع، فإنها تحرص على أن توفر للشباب ما يلزم لبناء شخصية متوازنة تعمل على الاستزادة من العلوم الهندسية كما تسعى إلى المشاركة في مختلف الأنشطة الأخرى وبما يتفق مع الميول الشخصية لكل منكم. ولذا فإنني أدعوكم إلى التعرفعلى مختلف الأنشطة بالكلية والجامعة لتختاروا منها ما يناسبكم.**

**خالص تمنياتي لكم أبنائي وبناتي الطلاب والطالبات بقضاء فترة الدارسة بالكلية بكل سعادة ومحبة وأن تتذكروا بعد التخرج تلك الأيام الجميلة التي قضيتموها في رحاب كلية الهندسة جامعة النهضة.**

**ونفتخر أن نراكم خريجين متميزين تشغلون أرقي المناصب لتفيدوا وطنكم و تعلوا من شأنه بإذن الله.**

***الأستاذ الدكتور / سيد عبد القادر أحمد***

**وكيل الكلية لشئون التعليم والطلاب**

# الباب الأول - جامعة النهضة

## نبذة عن جامعة النهضة

تم إنشاء جامعة النهضة بقوار رئيس الجمهورية رقم253 لسنة 2006 — بتاريخ 15 / 7 / 2006 في وسط مدينة شرق بني سويف الجديدة ، على طريق القاهرة – بني سويف. اللحظة التي أدركنا فيها مدى الاهتمام الذي يحتاجه التعليم، خاصة في صعيد مصر ، هي نفس اللحظة التي أدركنا فيها أن حلمنا في بناء جامعة النهضة يمكن تحقيقه. الجامعة مكان لرعاية الشباب وإعداد أجيال مثقفة نؤتمن عليها تنمية وطننا الحبيب. من خلال اعتماد منهجيات التعليم الأكثر تقدمًا لبناء أجيال منفتحة يمكنها التنافس في أسواق العمل المختلفة، تقدم جامعة النهضة حقًا نموذجًا يحتذى به. تقدم جامعة النهضة دراسات متنوعة تغطي أهم قطاعات العمل الفنية والأكاديمية والمتخصصة. طاقمنا الأكاديمي من العلماء البارزين الذين يطبقون أساليب تعليم علمية وأكاديمية حديثة تمكن الطلاب من فهم مواضيعهم بشكل كامل وتطبيق دروسهم بشكل فعال في العمل. إن جامعة النهضة ليس مجرد مكان للدراسات الأكاديمية، بل هو مركز للتنمية حيث ننمي المهارات الفكرية للطلاب ونمكنهم من التفوق في البحث والأوساط الأكاديمية والعمل الاجتماعي. تزود جامعة النهضة طلابها بأحدث أدوات التعليم وتعدهم لمهمتهم كقادة تنمية من خلال البرامج التي تعزز إبداعهم وتبني على مهاراتهم وتثري عقولهم.

## رؤية الجامعة

**أن تكون جامعة النهضة متميزة عربيا وإفريقيا وأن تتسم بالإبداع والإبتكار في تقديم الخدمات التعليمية والبحث العلمي بمعايير دولية وأن تكون مبادرة في خدمة المجتمع بما يحقق خطط التنمية المستدامة المحلية والوطنية.**

## رسالة الجامعة

**تلتزم جامعة النهضة بتقديم برامج أكاديمية معاصرة تنمي الجوانب المعرفية والمهارية والسلوكية للطلاب بما يؤهلهم لسوق العمل الوطنية والعربية والإفريقية وبما يكرس فكر ريادة الأعمال لديهم وأن توفر المناخ الملائم كمركز فكري وبحثي واستشاري على المستوى المحلي والوطني والإقليمي وأن تطبق معايير الجودة الدولية في كافة أنشطتها الأكاديمية والخدمية.**

## هدف الجامعة

مهمتنا هي المساهمة بشكل فعال في إعداد الشباب علمياً وأخلاقياً ليكونوا قادرين على المنافسة في المجالات البحثية والوظيفية، والقيام بأدوار قيادية وتنويرية في نهضة المجتمع من خلال تقديم خدمات تعليمية وبحثية ومجتمعية ممتازة.

## لماذا جامعة النهضة؟

تأسست جامعة النهضة بطموح وآمال كبيرة في المنطقة الصحراوية الواقعة شرق بني سويف. لم يتخيل الكثيرون أننا سننشئ الركيزة الأولى في مدينة شرق بني سويف المتكاملة. نضع بني سويف على خريطة النمو والتقدم من خلال تجديد المدينة وخلق فرص العمل وتغيير وجه الحياة.

# الباب الثاني - كلية الهندسة

بدأت الدراسة بالكلية بالقرار الوزاري رقم 4830 بتاريخ 2012/11/4 بالعام الجامعي 2013/2012م، وبدأت الكلية بثلاثة أقسام علمية هي قسم الهندسة المدنية، قسم الهندسة المعمارية، قسم هندسة الاتصالات والحاسبات بالإضافة الي قسم العلوم الأساسية. ونظرا لمواكبة الكلية للتطور العلمي والتكنولوجي في مجالات الهندسة المختلفة داخليا وخارجيا فقد قامت الكلية بجهود كبيرة لإضافة تخصصات جديدة لتواكب أحدث التخصصات الهندسية وعليه فقد قامت الكلية بإنشاء أقسام جديدة ومتميزة وهي: قسم هندسة الميكاترونيات، قسم هندسة الطاقة الكهربية والمتجددة لتصبح بذلك أكبر كلية هندسة خاصة من حيث عدد الأقسام بصعيد مصر وتحقق التنوع المطلوب لتحقيق رغبات الطلاب في الاختيار بين عدد كبير من التخصصات الهندسية المختلفة.

**رؤية الكلية:** **تتطلع كلية الهندسة بجامعة النهضة إلى تعزيز الريادة والتميز محلياً وإقليمياً ودولياً فى التعليم الهندسى والبحث العلمى وخدمة المجتمع، ومواكبة التطورات التكنولوجية.**

**رسالة الكلية:** **تلتزم كلية الهندسة بجامعة النهضة بإعداد مهندسين متميزين وقادرين على المنافسة فى سوق العمل محلياً وإقليمياً ودولياً، مع تقديم برامج تعليمية متطورة تدعم التحول الرقمى والتنمية المستدامة، وتحقيق التميز فى البحث العلمى وخدمة المجتمع، وتطبيق معايير الجودة فى إطار من القيم الإنسانية والمسئولية المجتمعية.**

## الغايات والأهداف الاستراتيجية للكلية:

**ولتحقيق رؤية ورسالة الكلية، تم تحديث الغايات والأهداف الإستراتيجية للكلية على النحو التالى:**

**الغاية الأولى: التميز فى التعليم الهندسى وإعداد خريجين ذى مهارات تنافسية محلياً وإقليمياً ودولياً**

**أهداف الغاية الاولى:**
- **1-1- تطوير البرامج الأكاديمية بما يتوافق مع المعايير المرجعية ويواكب التطورات التكنولوجية وسوق العمل**
- **1-2- تطوير نظم التعليم والتعلم والتقييم**
- **1-3- تنمية قدرات أعضاء هيئة التدريس والهيئة المعاونة**
- **1-4- تعزيز رضا الطلاب والخريجين وأصحاب المصلحة عن الخدمات المقدمة لهم**

**الغاية الثانية: تحقيق إنتاج بحثى متميز ومبتكر**

**أهداف الغاية الثانية:**
- **2-1 -دعم وتشجيع الأنشطة البحثية**
- **2-2 -ربط مخرجات البحث العلمى بالتحديات المجتمعية والاقتصادية**

**الغاية الثالثة: تعزيز خدمة المجتمع وتنمية البيئة**

**أهداف الغاية الثالثة:**
- **3-1 -تقديم خدمات مجتمعية ملائمة لإحتياجات المجتمع والبيئة المحيطة**
- **3-2 -تعزيز الشراكات المهنية والمجتمعية**

**الغاية الرابعة: تحقيق التميز المؤسسي وتفعيل نظم الجودة والتطوير المستمر**

**أهداف الغاية الرابعة:**
- **4-1تطبيق نظم ضمان الجودة وتقييم الأداء والتحسين المستمر فى جميع مجالات العمل بالكلية**
- **4-2 -دعم الحوكمة المؤسسية للكلية**

**الغاية الخامسة: تنمية الموارد الذاتية وتعظيم الاستفادة منها**

**أهداف الغاية الخامسة:**
- **5-1- تنويع مصادر التمويل من خلال الشراكات والمشروعات البحثية والاستشارية**
- **5-2-تطوير منتجات وحلول هندسية قابلة للتسويق من خلال مشروعات التخرج والبحث العلمى**

# الباب الثالث: تعريف بعض المصطلحات الأساسية

## 1. الساعة المعتمدة: Credit Hour

وحدة دراسية [نظرية أو عملية/ تطبيقية] يحصل عليها الطالب في حالة نجاحه في المقرر الذي يدرسه ، وهى بمعدل ساعة واحدة للمحاضرات النظرية للمقرر أسبوعيا ، وساعتين إلى ثلاث ساعات للقاءات العملية أو التطبيقية أسبوعياً ، وذلك طيلة الفصل الدراسي.

### ماذا يعني نظام الساعات المعتمدة و ما يحققه من مزايا ؟

يقوم نظام الساعات المعتمدة علي أساس دراسة الطالب مجموعة من المقررات محددة بساعات معتمدة وفقاً للائحة يحصل بها علي الشهادة الجامعية في تخصصه و يحقق هذا النظام المزايا التالية:-

1. حرية الطالب في اختيار المواد التي يرغب في دراستها في كل فصل دراسي بمساعدة مرشدة الأكاديمي.
2. حرية الطالب في تخفيض عدد المواد التي يتم دراستها في الفصل الدراسي إذا وجدت لديه ظروف تستدعي ذلك.
3. إمكانية أن يزيد الطالب من عدد الساعات المعتمدة التي يسجل ها في فصل دراسي إذا حصل على معدل تراكمي مرتفع وفقاً للائحة. الكلية
4. يستطيع الطالب خلال الفصل الدراسي الصيفي دراسة بعض المواد من الفصل الدراسي التالي أو من المواد التي لم يوفق فيها في فصول دراسية سابقة للتخفيف من العبء الدراسي من ناحية، ولتحسين معدلة التراكمي من ناحية أخرى.
5. يستطيع الطالب التحويل الي أي جامعة أجنبية بسهولة لتطبيق ذات النظام وتحسب له جميع المواد التي درسها بنجاح، التي تدرس في الجامعة المحول اليها، وكذلك يمكن للطلاب الذين يدرسون في جامعات تطبق نظام الساعات المعتمدة أن يحولوا إلى جامعة النهضة واحتساب جميع المقررات التي سبق دراستها واجتازوها بنجاح ولها مقررات مشابهة في برنامج الدراسة بجامعة النهضة .
6. يمكن للطالب أن ينهي دراسته في أقل من المدة النمطية للكليات الحكومية وفي حدود ما تسمح به قواعد المجلس الأعلى للجامعات الخاصة.

## 2. ساعة الاتصال الدراسية: Contact Hour

هي ساعة زمنية يمضيها الطالب في تلقي محاضرة ، حصة تمارين أو درس عملي أو ورشة ويتراوح زمن ساعة الاتصال ما بين 40-50 دقيقة.

## 3. العلاقة بين عدد ساعات الاتصال الأسبوعية وعدد الساعات المعتمدة المناظرة:

**في الفصل الدراسي الواحد [16أسبوع (تتحدد وفقا للأجندة السنوية للجامعة)] تكون العلاقة كما يلي:**

- ساعة محاضرة = 1 ساعة معتمدة
- من 2 – 3 ساعة معمل / عملي / تمارين = 1 ساعة معتمدة

4. **البرنامج الدراسي:**
هو البرنامج المتضمن لجميع المقررات الإجبارية والاختيارية التي يجب على الطالب اجتيازها بنجاح حتى يتمكن من الحصول على درجة البكالوريوس في تخصص محدد.

5. **متطلبات الجامعة:**
هي المقررات الإجبارية التي يجب علي جميع طلاب جامعة النهضة اجتيازها بنجاح قبل التخرج ، وهي تشكل الملامح التي ترغب جامعة النهضة في غرسها بالخريجين.

6. **متطلبات الكلية:**
هي المقررات الإجبارية والاختيارية المطلوب اجتيازها من جميع طلاب الكلية في جميع التخصصات، وهي تشكل القاعدة العلمية الضرورية لجميع طلاب كلية الهندسة.

7. **متطلبات التخصص(البرنامج الدراسي):**
هي المقررات الإجبارية والاختيارية المقيدة المطلوب اجتيازها من جميع طلاب تخصص معين، لتشكيل المهارات الأساسية اللازمة لخريج التخصص أو البرنامج الدراسي.

8. **المقرر الإجباري:**
هو مقرر في البرنامج الأكاديمي للكلية يلتزم الطالب بدراسته والنجاح فيه لاستيفاء متطلبات الحصول على الدرجة العلمية.

9. **المقرر الاختياري المقيد:**
هو مقرر في البرنامج الأكاديمي للكلية ضمن مجموعة من المقررات يكون للطالب حرية الاختيار من بينها لاستكمال متطلبات الحصول على الدرجة العلمية.

# الباب الرابع: القواعد المنظمة للدراسة بالجامعة

## [1]: شروط القبول:
تقبل الكلية الحاصلين على شهادة الثانوية العامة المصرية (القسم العلمي / رياضيات) أو ما يعادلها، وفقاً للقواعد التي يضعها المجلس الأعلى للجامعات ويقرها الوزير المختص بالتعليم العالي وعلى أن يثبت الكشف الطبي صلاحية الطالب لمتابعة الدراسة.

## [2]: تحويل الطلاب ونقل قيدهم:
يجوز تحويل ونقل الطلاب إلى الكلية من كليات جامعية أو معاهد عليا مناظرة أو غير مناظرة بشرط الحصول على الحد الأدنى لمجموع الدرجات الذي قبلته الكلية في سنة حصول الطالب على الثانوية العامة أو ما يعادلها أو في عام التحاقه بالكلية أيهما أفضل له، وبما لا يتعارض مع القواعد والضوابط التي يقرها مجلس الجامعة والمجلس الأعلى للجامعات الخاصة والأهلية.

## [3]: النقل من كلية مناظرة أو غير مناظرة:
يجوز نقل قيد الطالب إلى الكلية من الكليات الجامعية المناظرة أو غير المناظرة بشرط أن يكون حاصلاً على الحد الأدنى لمجموع الدرجات الذي قبلته الكلية في سنة حصوله على الثانوية العامة أو ما يعادلها أو في عام

التحاقه بالكلية أيهما أفضل له، وذلك بموافقة عميد الكلية ، وفي هذه الحالة يكون قيد الطالب في المستوى الدراسي الذي يتناسب مع عدد الساعات المعتمدة التي تم اعتمادها ضمن خطته الدراسية الجديدة.

## [4]: قبول مستنفدي مرات الرسوب:

يجوز أن يقبل بالكلية الطلاب الذين استنفدوا مرات الرسوب في الكليات والمعاهد العليا وفقاً للقواعد التالية:

1. أن يكون الطالب مقيداً بالكلية أو المعهد العالي في السنة الدراسية السابقة عن السنة التي يلتحق بها في الكلية.
2. أن يكون الطالب حاصلاً في شهادة الثانوية العامة أو ما يعادلها على مجموع الدرجات الذي قبلته الكلية في سنة حصوله على الثانوية العامة أو ما يعادلها أو في عام التحاقه بالكلية أيهما أفضل للطالب.
3. يكون التحاق هؤلاء الطلاب بالمستوى الأول مستجدين مع إمكانية إعفائهم من إعادة دراسة المقررات السابق نجاحهم فيها بتقدير C على الأقل والمعادلة لمقررات ضمن البرنامج الملتحق به، ويكون ذلك بقرار من المجلس الأكاديمي بناء على اقتراح عميد الكلية.

## [5]: القيد وإعادة القيد:

**يجوز قيد وإعادة قيد الطالب في الحالات التالية:**

1. الطالب المستجد الذي لم يستكمل إجراءات قيده لعذر مقبول.
2. الطالب الذي سحب أوراقه وهو مقيد بالكلية وقدم عذراً مقبولاً.
3. الطالب الذي لم يتقدم لمكتب التنسيق في سنة حصوله على الثانوية العامة أو ما يعادلها بعذر مقبول.

## [5- أ]: إعادة قيد الطالب بالكلية:

1. يمكن بموافقة مجلس الكلية، بعد أخذ رأي المرشد الأكاديمي ومجلس القسم، إعادة قيد الطالب المفصول من الكلية بصفته طالب من الخارج مع حضور التمارين العملية والتطبيقية.
2. يسدد الطالب رسم إعادة القيد الذي يحدده مجلس الجامعة على أن يتحول إلى طالب نظامي مرة أخرى عند انتفاء سبب فصله من الكلية.
3. لا يجوز أن يزيد العبء الدراسي للطالب من الخارج المعاد قيده عن الحد الأدنى للعبء الدراسي وعن المواد التي رسب فيها.

**[5- ب]:**يجوز للطالب التسجيل وإعادة القيد في الحالات التالية:

1. الطالب المستجد الذي لم يستكمل إجراءات التسجيل بعذر مقبول.
2. الطالب الذي سحب أوراقه ويقتصر على الكلية وأعطى عذراً مقبولاً.
3. الطالب الذي لم يتقدم لمكتب التنسيق سنة حصوله على الثانوية العامة أو ما يعادلها بعذر مقبول.

## [6]: طالب حالات خاصة:

يجوز اعتبار شخص ما طالب حالات خاصة وذلك للسماح له بتنمية مهاراته ومعارفه المهنية أو الخاصة أو العامة بدراسة مقررات تطرحها الكلية أو لدراسة مقررات بهدف تحويلها إلى برنامجه الدراسي في كلية أو معهد علمي عالٍ مقيداً فيه خارج الجامعة وبموافقة الجهة المقيد بها للدراسة.

ولا يعتبر طالب الحالات الخاصة طالباً مقيداً بالجامعة ولا يسمح له بدراسة جميع متطلبات برنامج دراسي تطرحه الجامعة، ولكن عدد محدد من المقررات.

ويحدد مجلس الجامعة شروط السماح بوضع طالب حالات خاصة ونظام الدراسة الذي يسرى عليه والرسوم والمصروفات الدراسية وغيرها من الأمور التنظيمية.

### [7]: المنح الدراسية:

تقدم الجامعة منحاً دراسية للطلبة المتفوقين والطلبة الذين يواجهون ظروفاً خاصة طارئة وفقاً للنظام الذي يحدده مجلس الجامعة ويعتمده مجلس الأمناء.

### [8]: تأديب الطلاب:

ينطبق في شأن تأديب الطلاب الأحكام الواردة في قانون تنظيم الجامعات رقم 49 لسنة 1972 ولائحته التنفيذية وقرارات مجلس الجامعة.

### [9]: الانسحاب من الكلية:

يمكن للطالب ترك الكلية لأي سبب من الأسباب وسحب ملفه منها، ويحدد مجلس الجامعة قواعد التعامل مع الرسوم والمصروفات الدراسية المتعلقة بهذا الشأن.

## الباب الخامس: القواعد المنظمة للدراسة بالكلية

### [1]: الأقسام العلمية / التخصصات بالكلية والدرجات العلمية التي تمنحها الكلية:

- **تتضمن الكلية عدد من الأقسام العلمية وتمنح جامعة النهضة بناءً على توصية مجلس الكلية وموافقة مجلس الجامعة درجة البكالوريوس في الهندسة في أحد التخصصات الاتية:**

1. **الهندسة المدنية للذكاء والتنمية المستدامة**
2. **الهندسة المعمارية الرقمية**
3. **هندسة القوى الكهربائية والطاقة المتجددة**
4. **هندسة الميكاترونيكس والآلات الذكية**
5. **هندسة الاتصالات والحاسبات**

يقوم كل قسم من الأقسام العلمية للكلية بتدريس المقررات وإجراء الأبحاث التي تقع في مجال تخصصه،ويحدد مجلس الكلية الأقسام التي تقوم بتدريس المقررات البينية إن وجدت وعلي أن يتم تدريس المقررات الهندسية التي تقع خارج نطاق الأقسام العلمية بالكلية ، ومقررات الإنسانيات والعلوم الاجتماعية والثقافية العامة من أعضاء هيئة تدريس متخصصين من خارج الكلية من الجامعات والمراكز البحثية المعترف بها.

## [2]: الهيكل العام للبرنامج الدراسي:

يتكون الهيكل العام لبرنامج البكالوريوس من مجموعات من المقررات لكل منها عدد معين من الساعات المعتمدة وعددها **144 ساعةمعتمدة وعلى الطالب مراجعة القسم العلمي.**

## [3]: تغيير التخصص:

يمكن للطالب تغيير تخصصه بناء على رغبته أو بقرار من الجامعة طالما لم ينجز بنجاح الساعات المعتمدة المطلوبة للانتهاء من المستوى الثالث. ويتطلب التغيير موافقة كلا من مجلس القسم الذي يطرح التخصص الجديد المرغوب فيه ومجلس الكلية ويطبق على الطالب متطلبات الدرجة العلمية المبينة في اللائحة في سنة الموافقة على تغيير التخصص. وفي حالات خاصة وعند الضرورة يمكن تغيير التخصص في بداية المستوى الرابع للطالب وبموافقة رئيس الجامعة.

## [4]: الفصل من الكلية أو التخصص:

1. يفصل الطالب من الكلية أو التخصص إذا أخفق في رفع الإنذار الأكاديمي خلال المدة المحددة لذلك ويستثنى من ذلك الطالب المقيد في المستوى الأخير من برنامجه الدراسي.

2. يجوز للطالب المفصول من الكلية أو التخصص انتقاله إلى كلية أخرى أو تخصص آخر في نفس الكلية وفقاً لشروط الانتقال المعمول بها، و إذا لم يتم قبوله حسب شروط الانتقال يفصل من الجامعة.

3. تتولى الكلية أو القسم العلمي المشرف على التخصص المنتقل إليه حساب الساعات المعتمدة التي درسها في تخصصه السابق التي تدخل ضمن برنامج الدراسة في تخصصه الجديد ويعد له سجل دراسي جديد مع الاحتفاظ بالسجل السابق.

## [5]: نظام الدراسة:

1. تتم الدراسة بالكلية بنظام الساعات المعتمدة وتبين اللائحة مقررات الدراسة وتوزيعها على المستويات الدراسية المختلفة وعدد الساعات المعتمدة لكل مقرر وكذلك توزيع المقررات على مستويات الدراسة المختلفة وكذلك الوصف المختصر لمحتوى كل مقرر.

2. تحدد مجالس الأقسام العلمية المختصة المحتوى العلمي لكل مقرر ويصدر باعتماده قرار من مجلس الكلية وذلك في ضوء التطور المستمر للمقررات الدراسية طبقاً للإضافات العلمية والتكنولوجية الجديدة، وتتم مراجعة المحتوى العلمي بواسطة لجان متخصصة على فترات يحددها مجلس الكلية.

## [6]: مدة الدراسة:

مدة الدراسة النمطية خمس سنوات جامعية مقسمة إلى تسعة فصول دراسية، وذلك للحصول على درجة البكالوريوس وفقاً لنظام الساعات المعتمدة، ويمكن للطالب ذي الظروف الخاصة إنهاء برنامج دراسته في مدة لا تتعدى ضعف المدة النمطية. كما يجوز التخرج قبل مرور خمس سنوات إذا أتم الطالب اجتياز المقررات وعدد الساعات المعتمدة المطلوبة للتخرج.

## [7]: أدوار التخرج:

يمكن أن يتخرج الطالب في أحد الأدوار الثلاثةخلال السنة الواحدة على النحو التالي:

*1* - دور يونيو 2- دور سبتمبر 3- دور يناير

## [8]: لغة الدراسة:

لغة الدراسة هي اللغة الانجليزية.

## [9]: العام الدراسي والفصول الدراسية

**- يتكون العام الدراسي من الفصول الدراسيةالتالية:**

- الفصل الدراسي الأول.
- الفصل الدراسي الثاني.
- الفصل الدراسي الصيفي (الثالث ) وهو اختياري للطالب والكلية علي حد سواء بمعنى أنه يجوز في بعض الأحوال عدم طرح أي مقررات في الفصل الصيفي كما يجوز ألا يدرس الطالب أي مقرر في الفصل الصيفي .

تكون مدة كل من الفصلين الأول والثاني (16) أسبوعا دراسياً بما فيها الامتحانات. أما الفصل الصيفي فتكون مدته (8) أسابيع دراسية بساعات مضاعفة بما فيها الامتحانات.

## [10]: المستوى الدراسي للطالب:

يصنف الطلاب المقيدون بالكلية إلى مستويات دراسية (المستوى الأول، المستوى الثاني، المستوي الثالث، المستوى الرابع وغيرها) على أساس مجموع عدد الساعات المعتمدة التي أنجزها الطالب بنجاح.

## [11]: الإرشاد الأكاديمي:

يكون لكل طالب مرشد أكاديمي يتولى تخطيط برنامجه الدراسي والإشراف على تنفيذه ومتابعة أدائه ومساعدته في حل مشاكله الدراسية وذلك من بدء التحاقهبالكلية حتى تخرجه.

**ويرتبط نظام الساعات المعتمدة بنظام الإرشاد الأكاديمي الذي يحقق للطالب:-**

1. مساعدته في اختيار المواد في التخصصات المختلفة.
2. وضع خطة تعليمية للطالب في حدود إمكانياته.
3. إيضاح مدي تقدم الطالب طبقاً للخطة الدراسية.
4. مساعدة الطالب في تخطي أي صعوبات أو مشاكل.
5. توجيه الطالب إلي الاتجاهات المناسبة لإمكانياته.

## [12]: العبء الدراسي:

العبء الدراسي هو مجموع الساعات المعتمدة التي يسمح للطالب بتسجيلها في الفصل الدراسي الواحد بحيث يكون:

1. الحد الأدنى للساعات المعتمدة التي يدرسها الطالب في كل من الفصل الدراسي الأول والثاني هو 9 ساعة معتمدة ويزاد هذا الحد إلى 12 ساعات معتمدة لحالات التخرج فقطوبموافقة المجلس الأكاديمي بناء على توصية المرشد الأكاديمي وموافقة رئيس مجلس القسم وعميد الكلية.
2. يسمح للطالب بتسجيل 18 ساعة معتمدة في كل من الفصل الدراسي الأول والثاني.
3. الحد الأقصى للساعات المعتمدة التي يدرسها الطالب في كل من الفصل الدراسي الأول والثاني 21 ساعة معتمدة وذلك للطلاب الذين يحققون معدلاً تراكمياً عالياً لا يقل عن 3.3

4. يجوز للطالب أن يسجل ثلاث ساعات معتمدة إضافية عن الحد الأقصى في الحالات التالية:
   - إذا كان معدله التراكمي (3.50 أو أعلى).
   - أن يكون الطالب في المستوى الدراسي الثاني أو أعلى.
   - إذا كان تخرجه يتوقف على ذلك.
5. بالنسبة للفصل الصيفي يكون الحد الأقصى لعدد الساعات التي يسمح للطالب بتسجيلها 12 ساعات معتمدة ويزاد هذا الحد إلى 15 ساعات معتمدة لحالات التخرج فقط.

## [13]: التسجيل:

على الطالب أن يقوم بالتسجيل للفصل الدراسي وفقاً للتقويم الجامعي وبموافقة المرشد الأكاديمي.
وتعد الجامعة التقويم الجامعي السنوي وتعلنه للطلاب والجهات المختلفة بالجامعة وكذلك على الموقع الالكتروني للجامعة على شبكة الانترنت.

## [14]: التسجيل المتأخر:

يحدد التقويم السنوي للجامعة بداية تسجيل الطلاب للمقررات الدراسية قبل بداية الفصل الدراسي، ويجوز أن يسجل الطلاب خلال الأسبوع الأول من بدء الدراسة بشرط موافقة المرشد الأكاديمي وعميد الكلية.
كما يجوز لعميد الكلية الموافقة على تسجيل الطالب قبل نهاية الأسبوع الثاني من الدراسة إذا ما قبل عذر الطالب عن التأخير وبعد موافقة المرشد الأكاديمي.
وفي حالة تقدم الطالب للتسجيل بعد بداية الفصل الدراسي يوقع على الطالب رسم التسجيل المتأخر الذي يحدده مجلس الجامعة.

## [15]: المتطلب السابق: PREREQUISITE

المتطلب السابق هو مقرر يشترط استكماله لدراسة مقرر لاحق وتنطبق عليه الشروط التالية:

أ. لا يجوز للطالب أن يدرس مقرراً ما قبل أن يدرس متطلبه السابق.

يجوز للطالب تسجيل مقرر واحد بالتوازي مع متطلباته المسبقة بعد موافقة المحاضر أو القسم إذا كان في الفصل النهائي للتخرج.

## [16]: الإضافة والحذف:

1. بعد موافقة المرشد الأكاديمي، يمكن للطالب إضافة مقرر أو أكثر خلال الأسبوع الأول والثاني من بدء الدراسة مع مراعاة الحد الأقصى للعبء الدراسي الفصلي.

2. يجوز للطالب أن ينسحب من التسجيل في مقرر أو أكثر بعد موافقة المرشد الأكاديمي وأستاذ المقرر خلال فترة لا تتعدى نهاية الأسبوع الرابع من بدء الدراسة مع مراعاة الحد الأدنى للعبء الدراسي الفصلي وفي هذه الحالة لا تسجل المقررات التي حذفها في السجل الدراسي للطالب.
3. يجوز للطالب أن ينسحب من التسجيل في مقرر أو أكثر بعذر يقبله مجلس الكلية بعد الأسبوع الرابع وحتى نهاية الأسبوع الثاني عشر مع مراعاة الحد الأدنى للعبء الدراسي الفصلي وفي هذه الحالة تسجل المقررات التي تم الانسحاب منها في السجل الدراسي للطالب وبتقدير منسحب.

### [17]: الانقطاع عن الدراسة:

1. يعتبر الطالب منقطعا عن الدراسة إذا لم يسجل في فصل دراسي أو انسحب من جميع المقررات التي سجلها خلال الفصل الدراسي. ويمكن للطالب الانقطاع عن الدراسة لمدة لا تزيد عن ثلاثة فصول دراسية بعذر يقدم قبل أو خلال الفصل الدراسي يقبله مجلس الكلية يواصل بعده الدراسة.

2. إذا انقطع الطالب أربعة فصول بدون عذر يقبله مجلس الكلية يفصل من الكلية بناء على موافقة مجلس الكلية واعتماد رئيس الجامعة. وفى جميع الأحوال يسدد الطالب رسم وقف قيد يحدده مجلس الجامعة.

## الباب السادس: أحكام المقررات والامتحانات

### [18]: كيفية حساب تقدير المقررات عند إعادتها:

1. **يسمح للطالب أن يعيد المادة في الحالات الآتية:**
   - إذا رسب في المادة.
   - لتحسين الدرجة
   - لتحسين المعدل التراكميحتى يتمكن من التخرج.

### بند [19]: مقرر الاستماع:

يجوز للطالب وبموافقة المرشد الأكاديمي وعميد الكلية إن يدرس مقرراً او أكثر مستمعا. وفى هذه الحالة تدخل الساعات المعتمدة للمقرر في حساب العبء الدراسي ويمنح درجة "مستمع" ولا يدخل المقرر في حساب معدله الفصلي أو التراكمي.

### [20]: قواعد الحضور والغياب:

لا يجب أن تقل نسبة مرات حضور الطالب في أي مقرر عن 75% من عدد الساعات النظرية والعملية أو التطبيقية للمقرر خلال الفصل الدراسي. وفى حالة تجاوز الطالب لنسبة غياب 25% من إجمالي ساعات المقرر، يعتبر راسباً فيه إلا إذا كان هذا التغيب بعذر يقبله مجلس الكلية بعد أخذ رأى مجلس القسم العلمي المختص وفي هذه الحالة يعتبر الطالب منسحبا من المقرر ويتعين عليه إعادة تسجيله.

### [21]: إجراءات الامتحانات:

تجرى الاختبارات في ضوء القواعد والإجراءات العامة التي يحددها مجلس الجامعة لكافة مراحل الاختبار ، وتعد الكلية إجراءاتها بما يتناسب مع طبيعة الدراسة بها على أن تعتمد من مجلس الجامعة بناء على موافقة المجلس الأكاديمي.

### [22]: التغيب عن الاختبارات

1. إذا تغيب الطالب عن اختبار منتصف الفصل الدراسي بعذر يقبله عميد الكلية بناء على ما قدمه من مستندات تثبت عذره خلال أسبوع من تاريخ الاختبار يجوز بموافقة العميد إجراء اختبار تعويضي للطالب وفقا لما تحدده الجامعة من اجراءات.

2. كل طالب يتغيب عن اختبار نهاية الفصل الدراسي بعذر يقبله مجلس الكلية تعدل درجته من غائب إلى غير مكتمل على أن يكون تقديم العذر خلال أسبوع من تاريخ الاختبار وتطبق أحكام استكمال متطلبات المقرر الخاصة بتقدير غير مكتمل في هذه اللائحة وبشرط إقرار أستاذ المقرر بجدية الطالب وحصوله على الدرجة اللازمة للنجاح في الأعمال الفصلية وعدم تجاوزه نسبة الغياب المسموح بها.

## الباب السابع: نظام حساب الدرجات والتخرج من الجامعة

### [23]: نظام تقويم الطالب في المقرر:

1. الدرجة النهائية لكل مقرر هي مجموع درجات الطلاب في الفصل الدراسي بما في ذلك الاختبارات العملية وامتحانات منتصف الفصل واختبار نهاية الفصل الدراسي ، حيث يتم تقييم عمل الطالب بشكل مستمر خلال الفصل الدراسي.
2. تتكون الدرجة النهائية لكل مقرر من تقييم الطالب في الفصل ، والاختبارات الدورية ، والتمارين النظرية والعملية ، والبحث ، بينما تتراوح درجة اختبار الفصل الدراسي النهائي من 40٪ إلى 60٪ من علامة المقرر النهائي.
3. يمكن تقويم تقدير الطالب في المقررات التطبيقية مثل مقررات المشروع والبحث دون اختبار كتابي في نهاية الفصل الدراسي. سيتم إجراء اختبار شفهي يتضمن تقييم التقرير المقدم من الطالب والعمل العلمي المنفذ من خلال لجنة مناقشة مكونة من عضوين من أعضاء هيئة التدريس أحدهما على الأقل من خارج الجامعة بالإضافة إلى مشرف المشروع.
4. يجب أن يحصل الطالب على 60٪ على الأقل من مجموع الدرجات لاجتياز المقرر على أن ينجح في الامتحان النهائي بحصوله على 40٪ من علامة الامتحان النهائي كحد أدنى للنجاح في المقرر.

## [24]: نظام التقديرات والدرجات والنسب المئوية: GRADING SYSTEM

- يحسب نظام احتساب النسبة المئوية للمقررات والنقاط المئوية وفق الجدول التالي:

| GPA | Percentage | Grade | GPA | Percentage | Grade |
|---|---|---|---|---|---|
| 2.3 | 73% to less than 76% | C + | 4.0 | 97% and higher | A + |
| 2.0 | 70% to less than 73% | C | 4.0 | 93% to less than 97% | A |
| 1.7 | 67% to less than 70% | C- | 3.7 | 89% to less than 93% | A- |
| 1.3 | 64% to less than 67% | D + | 3.3 | 84% to less than 89% | B + |
| 1.0 | 60% to less than 64% | D | 3.0 | 80% to less than 84% | B |
| 0.0 | Less than 60% | F | 2.7 | 76% to less than 80% | B- |

### 1. متوسط نقاط التقدير: GPA

أ. يتم حساب متوسط نقاط التقدير GPA للفصل الدراسي الواحد عن طريق الحصول علي حاصل ضرب نقاط التقدير في عدد الساعات المعتمدة لكل مقرر لينتج ما يسمي بالنقاط النوعية (نقاط الجودة)، ثم يتم قسمة مجموع النقاط النوعية علي اجمالي عدد الساعات المعتمدة للمقررات التي تدخل نقاطها في حساب المعدل التراكمي.
متوسط نقاط التقدير = مجموع النقاط النوعية ÷ مجموع الساعات المعتمدة للمقررات التي تدخل نقاطها في حساب المعدل التراكمي.

ب. للحصول على متوسط نقاط التقدير التراكمي CGPA، يتم قسمة مجموع النقاط النوعية (نقاط الجودة)علي مجموع الساعات المعتمدة للمقررات التي تدخل نقاطها في حساب متوسط نقاط التقدير التراكمي وذلك لجميع الفصول الدراسية. ويتم تحديد العبء الدراسي للطالب في أي فصل دراسي (باستثناء الفصل الدراسي الصيفي) بناءً على قيمة متوسط نقاط التقدير التراكمي CGPA وليس علي قيمة متوسط نقاط التقدير GPA للفصل الدراسي السابق.

**ملحوظة:** يتم تقريب الرقم العشري الثالث لمتوسط نقاط التقدير التراكمي لتشمل رقمين عشريين فقط وفقاً للقواعد الحسابية للمتعارف عليها أو وفقاً لما تحدده اللوائح المعتمدة للجامعات.

**مثال لحساب المعدل التراكمي**

| اسم المقرر | نتيجة الطالب X | المقابل بالنقاط | عدد الساعات المعتمدة | نتيجة الضرب |
|---|---|---|---|---|
| رياضيات 1 | A | 4 | 3 | 12 |
| برمجة الحاسب | C | 2 | 3 | 6 |
| فيزياء 1 | B | 3 | 3 | 9 |
| اللغة الإنجليزية | D | 1 | 2 | 2 |
| رسم هندسي | B | 3 | 4 | 12 |
| الإجمالي | | | 15 | 41 |

**المعدل التراكمي GPA = 41 ÷ 15 = 2.73**

**ماذا يترتب على هذه التقديرات من آثار :**

**أولاً :**

- يوضع اسم الطالب في قائمة شرف الكلية إذا حصل على معدل تراكمي لا يقل عن 3.3 ويكون قد سجل الحد الأقصى للعبء الدراسي دون الرسوب في أي مقرر.
- يحصل الطالب على مرتبة الشرف الأولى إذا تخرج بمعدل تراكمي لا يقل عن 3.7 نقطة وعلى مرتبة الشرف الثانية إذا حصل على معدل تراكمي لا يقل 3.3 نقطة.

**ثانياً :**

- إذا حصل الطالب على معدل تراكمي من 3.3 فأكثر يجوز له تسجيل ثلاث ساعات معتمدة زائدة عن الحد الأقصى للفصل مقابل سداد رسوم إضافية. أما إذا زاد المعدل التراكمي عن 3.75 فيسمح للطالب بتسجيل مادة إضافية دون رسومإضافية.

**ثالثاً :**

- إذا كان المعدل التراكمي للطالب أقل من نقطتين يوضع تحت الإنذار الأكاديمي ويتم إخطار الطالب رسمياً بذلك.

## [25]: تقديرات لا تدخل في حساب المعدل التراكمي للطالب:

| الوصف | التقدير |
|---|---|
| **Pass ناجح** | **P** |
| **Fail راسب** | **F** |
| **Incomplete غير مكتمل** | **I** |
| **Withdraw منسحب** | **W** |
| **Audit استماع** | **AU** |
| **Forbidden محروم** | **FW** |
| **absence without excuse غياب بدون عذر** | **FX** |

## درجات مقرر متطلبات الجامعة

يتم احتساب درجات مقرر متطلبات الجامعة وفقًا للوائح الجامعة المعمول بها.

## [26]: المقرر غير المكتمل(I):

1. إذا لم يستطع الطالب، وفي أضيق الحدود ، استكمال المتطلبات الدراسية لمقرر معين بنهاية الفصل الدراسي يعطى الطالب درجة "غير مكتمل" ويقوم القائم بتدريس المقرر بتعبئة نموذج غير مكتمل محدداً فيه سبب أو أسباب إعطائه لهذه الدرجة والتكليفات التي لم يستكملها الطالب والواجبات المطلوبة من الطالب لاستكمال المقرر وتعديل الدرجة بعد أسبوع من أداء الامتحان النهائي.
2. على الطالب أن يستكمل ما طلب منه قبل انتهاء فترة التسجيل المتأخر للفصل الدراسي التالي (الأول أو الثاني) وإلا حصل على تقدير راسب في المقرر.

إذا توقف تخرج طالب على مقرر غير مطروح في الفصل الدراسي الذي يتخرج فيه أو تعارض مع مقرر إجباري مطروح في نفس الفصل ، يجوز دراسته مع محاضر المقرر بعد موافقة المرشد الأكاديمي ورئيس مجلس القسم وعميد الكلية ويتم تطبيق نظام التقويم لأداء الطالب في المقرر المعتمد من رئيس مجلس القسم والمشتمل على إجراء الاختبارات وغيرها من الواجبات والتكليفات المعمول بها والمطلوبة لاجتياز المقرر بنجاح.

## [27]: اعتماد نتائج الاختبار النهائي:

يعتمد مجلس الجامعة نتائج الامتحانات النهائية للحصول على درجة البكالوريوس أو الليسانس أو درجة أعلى بناءً على اقتراح مجلس الكلية.

## [28]: قائمة الشرف:

1. يوضع اسم الطالب في قائمة شرف عميد الكلية (Dean's List)إذا لم يقل معدله في الفصل الدراسي السابق عن 3.3 ويكون قد سجل الحد الأقصى للعبء الدراسي ودون الرسوب في أي مقرر.
2. يحصل الطالب على مرتبة الشرف إذا تخرج بمعدل تراكمي عام لا يقل عن 3 نقاط.

## [29]: الإنذار الأكاديمي :

1. الطالب الذي يحصل على معدل تراكمي إجمالي CGPA أقل من 2.00 في أي فصل دراسي يوضع على قائمة الإنذار الأكاديمي، ولا يحتسب الفصل الدراسي الأول لالتحاقه بالجامعة والفصل الصيفي ضمن الفصول التي ينذر عليها الطالب.
2. يخطر الطالب بوضعه على قائمة الإنذار الأكاديمي بخطاب مسجل على عنوان إقامته المسجل بملفه موضحاً فيه موقفه الأكاديمي وما يجب عليه أن يفعله بالتشاور مع عميد شئون الطلاب ومرشده الأكاديمي.
3. على الطالب إزالة مفعول الإنذار الأكاديمي في مدة أقصاها فصلان دراسيان من تاريخ الإنذار وذلك برفع معدله التراكمي إلى (2.00) فأعلى، فإذا استمر على قائمة الإنذار يوضع على قائمة الغير مؤهلين.

4. يسمح للطالب المنذر أكاديمياً أن يسجل:
   - **إذا كان المعدل التراكمي < 1,5 = (9 ساعات معتمدة).**
   - **إذا كان المعدل التراكمي = 1,5 إلى < 1,75 (12 ساعة معتمدة).**
   - **إذا كان المعدل التراكمي = 1,75 إلى< 2 (15 ساعة معتمدة).**
   - **إذا كان المعدل التراكمي = 2 إلى < 3,3 (18 ساعة معتمدة).**
   - **إذا كان المعدل التراكمي =3,3 فأكثر (21 ساعة معتمدة).**
5. يتولى وكيل الكلية لشئون التعليم والطلاب بالتنسيق مع المرشد الأكاديمي تحديد العبء الدراسي المناسب للطلاب الموضوعين على قائمة الإنذار الأكاديمي وتنظيم أسلوب متابعة تقدمهم الدراسي أثناء الفصل الدراسي واتخاذ ما يلزم لإرشادهم لإزالة مفعول الإنذار الأكاديمي.

6. في حالة الطالب الذي وضع تحت الإنذار الأكاديمي لانخفاض معدله التراكمي وحصل على تقدير غير مكتمل في مقرر أو أكثر فلا يسمح له بالتسجيل في مقررات أخرى في الفصل الدراسي التالي إلا إذا تمكن من استكمال المقرر أو المقررات غير المكتملة قبل نهاية فترة التسجيل المتأخر لهذا الفصل الدراسي.

## [30]: قائمة الغير مؤهلين:

إذا استمر الطالب على الانذار الأكاديمي فصلان متتاليان (ليس من بينهم الفصل الصيفي) يوضع على هذه القائمة ويصبح استمراره في الكلية بقرار من المجلس الأكاديمي بناءً على أداء الطالب لمدة فصلين وإذا لم يتحسن أداؤه يتم فصله.

## [31]: أحكام عامة:

1. لا يجوز لأي طالب بأن يدعى بعدم علمه بما ورد في المواد السابقة الذكر أو بعدم اطلاعه على النشرات الصادرة عن الجامعة فيما يخصه.
2. مجلس الجامعة هو الجهة المعنية بتفسير هذه المواد.
3. تسري هذه اللائحة على الطلاب المقبولين الجدد بعد اعتمادها ويجوز أن تسوى حالات كل أو بعض الطلاب القدامى والذين يمكن انطباق اللائحة المعدلة عليهم وذلك بعد إجراء المقاصة بناءً على قرار من مجلس الكلية ويعتمد من مجلس الجامعة.

# الأقسام العلمية ـ التخصصات الرئيسية ـ شروط التخرج

**[32]:اختصاص الأقسام العلمية**

تختص الأقسام العلمية بتدريس المقررات التي تقع ضمن اختصاصاتها، طبقا للائحة ، وعلى أن يتم تدريس المقررات الهندسية التي تقع خارج نطاق هذه الأقسام ومقررات الإنسانيات والعلوم الاجتماعية من أعضاء هيئة تدريس متخصصين من خارج الكلية من الجامعات والمعاهد العليا والمراكز البحثية المعترف بها.

**[33]: شروط التخرج والحصول على المؤهل الدراسي**

**وقد أصدر المجلس الأعلى للجامعات الخاصة والأهلية بجلسته رقم ( 85) بتاريخ 2020/11/30 في اشتراط التخرج الطلاب ما يلي:**

1 - أن يكون الطالب قد أنهى جميع الفصول الدراسية المقررة للتخرج في ذات التخصص بحد أدنى تسعة فصول دراسية بكلية الهندسة مع عدم احتساب الفصل الدراسي الصيفي ضمن الفصول الدراسية اللازمة للتخرج.

2 - أن يكون الطالب قد أنهى جميع الساعات الدراسية اللازمة للتخرج في ذات التخصص.

3 - استيفاء باقي شروط التخرج الأخرى مثل التربية العسكرية للطلاب الذكور وغيرها.

# نظام دعم التعلّم الالكتروني LMS

- قامت جامعة النهضة بالاشتراك في نظام دعم التعلم الإلكتروني عبر منصة **Moodle** وذلك لمساعدة الطالب على المعرفة التعليميةوالتواصل الفعال بين الأساتذة والطلاب يومياً عبر شبكة الانترنت وتم إنشاء مواقع للمقررات على الرابط الخاص بالنظام LMSعلى موقع الجامعة في شبكة الانترنت.

- وتتجه الجامعة إلى التركيز على الاستخدام الأمثل للنظام ليكون أحد ركائز العملية التعليمية بالجامعة وعنصراً رئيسياً في زيادة الفاعلية التعليمية , والتحول الرقمي . وتؤكد الجامعة على أهمية تكاتف كل الجهود من أجل تحقيق هذا الهدف والذي يضع الجامعة في مقدمة الجامعات الخاصة الهادفة إلى التوظيف الفعال للتكنولوجيا للارتقاء بالعملية التعليمية.

**أولا : مزايا نظام LMS للطلاب:**

1. التعرف الكامل على كافة عناصر المقرر الدراسي والتي تشمل ما يلي:
   1.1. أهداف المقرر.
   1.2. وصف المقرر (Course Description)
   1.3. جدول المحاضرات (Agenda)
   1.4. المادة العلمية سواء في شكل محاضرات أو فصول من الكتاب المستخدم أو عروض توضيحية Power Pointأو فيديوهات للشرح و غيرها من أشكال ووسائل توضيحية.
   1.5. الواجبات Assignments التي يكلف الأستاذ طلابه بها وإمكانية تقديمها مباشرة عبر البريد الإلكتروني لأستاذ المادة ومعرفة تقييمه لها والدرجة التي حصل عليها الطالب.
   1.6. التدريبات Exercises التييتيحها الأستاذ للطلاب للتدرب على بعض موضوعات وتقنيات يقدمها المقرر
   1.7. يمكن النظام من عمل امتحانات مباشرة للطلاب وتصحيح الكتروني فور انتهاء الامتحان واعلان النتائج.
   1.8. اعلان درجات التكليفات والامتحانات الصغيرة و أعمال السنة و منتصف الفصل والعملي وغيرها
2. إتاحة الفرصة للطلاب للتواصل مع أعضاء هيئة التدريس بصفة مستمرة ومباشرة عبر المواقع الإلكترونية للمقررات التي يدرسونها في كل فصل دراسي.
3. إمكانية التعرف على المواد التعليمية والمساعدات التوضيحية التي سبق استخدامها في الفصول السابقة.
4. تواصل أستاذ المقرر باستمرار مع الطلاب وتوجيهه لهم في ضوء متابعته لمستويات أداءهم الأكاديمي وعمل اعلان (Announcement) للطلاب فيما يخص المادة.
5. استثمار موقع كل مقرر دراسي ليكون معبراً عن النشاط التعليمي للطلاب المسجلين بالمقرر.

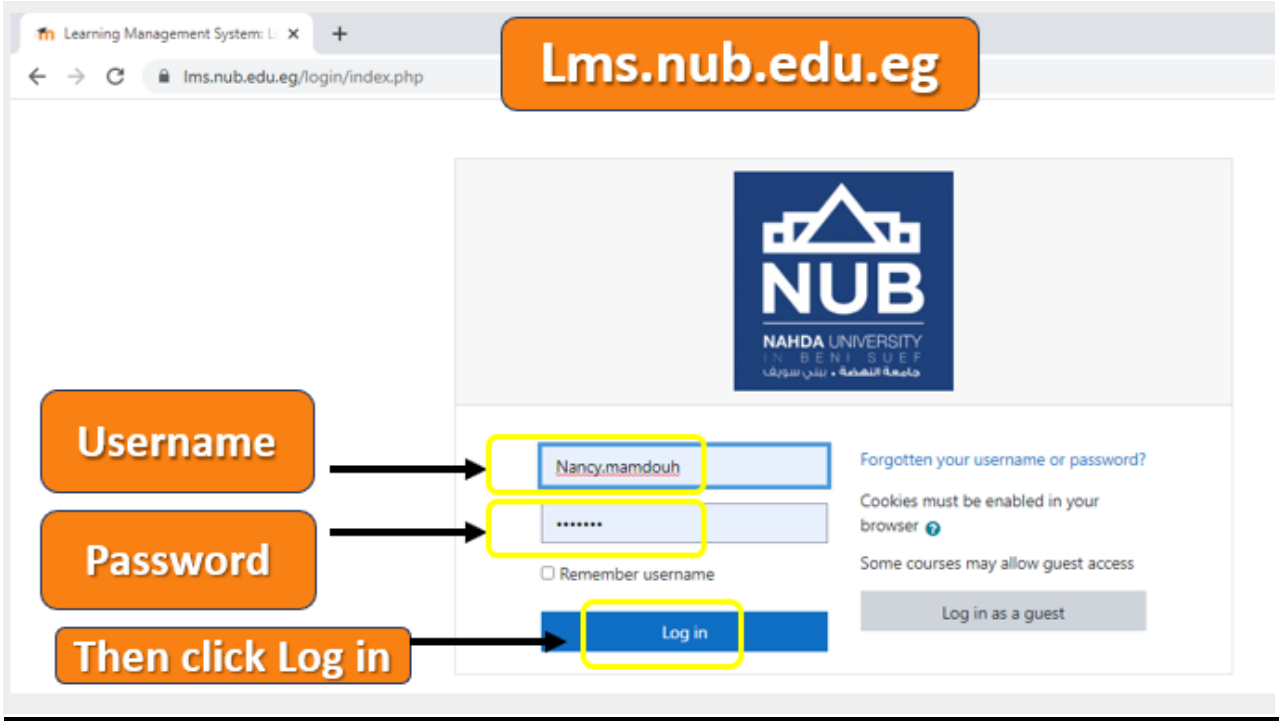
**ثانيا: واجبات الطالب بالنسبة لنظام LMS**

1. زيارة موقع الجامعة على شبكة الإنترنت والدخول علي موقع LMS والتعرف على النظام وكيفية التعامل معه والاطلاع على دليل استخدام النظام User Guide.
2. الاتصال بإدارة تكنولوجيا المعلومات بالجامعة للحصول على أسم المستخدم وكلمة المرور للدخول على موقع المقرر/المقررات التي تم التسجيل فيها.
3. تسجيل نفسه في موقع المقرر باستخدام أسم المستخدم Usernameوكلمة السر Password .
4. التوجه إلى إدارة الدعم الفني في حالة وجود أي مشاكل في الدخول إلى الموقع والتسجيل في أي مقرر.
5. التواصل مع المقرر من خلال القيام بما يلي:
   - إرسال رسالة بالبريد الإلكتروني لأستاذ المقرر.

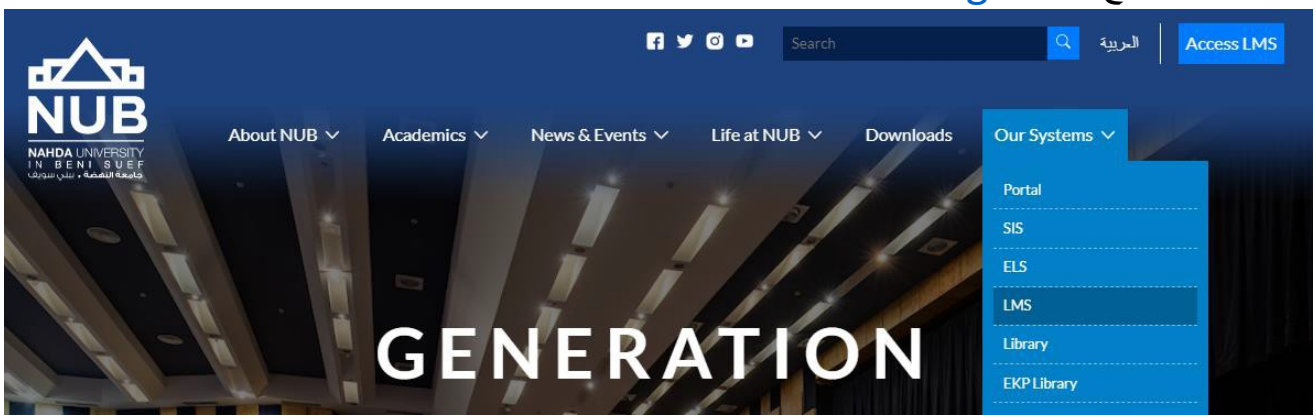
- تنزيل المحاضرات .
- حل التكليفلت وإرسالها من خلال موقع المقرر .

## ثالثا: كيفية الدخول على النظام (LMS)

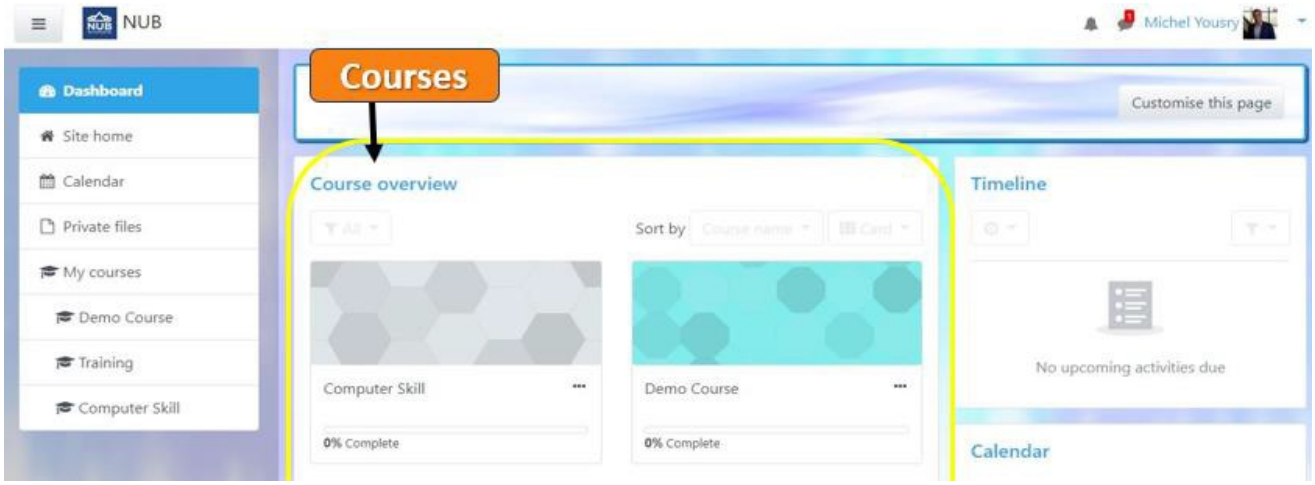
الدخولعلىنظامدعمالتعلّمالالكتروني Moodleمنخلالالموقع Lms.nub.edu.egكالتالي:




أومن خلال موقع الجامعة www.nub.edu.egواختيار LMSمن أنظمة الجامعة




**سيفتح الموقع على المقررات المسجلة في الجدول الدراسي:**




يقوم الطالب بعمل click علي المقرر ثم يختار علامة التبويب المناسبة لما يريد الحصول عليه من الاتي:

Topic 1 Course Specifications & Agenda

Topic 2 Lectures

Topic 3 Meetings & Links

Topic 4 Assignments

Topic 5 Official Exams & Results

Topic 6 Practical (If needed in the course)

- **للتعرف علي كل ما هو جديد في نظام Moodle التعليمي يمكن زيارة موقع المنصة الاتي:**

–

## اتحاد الطلبة وواجبات الطلاب ومسئوليتهم التأديبية

**أولاً: اتحاد الطلبة**

يشكل اتحاد الطلبة من طلبة الكلية في الاقسام المختلفة .

**اتحاد الطلبة هو التنظيم الشرعي الممثل لطلاب الكلية ويهدف إلى تحقيق ما يلي :**

1. تنمية القيم الروحية والأخلاقية وترسيخ الوعي الوطني والقومي وإعلاء قيمة الانتماء والولاء وتعميق أسس الديمقراطية وحقوق الإنسان والمواطنة لدى الطلاب والعمل بروح الفريق مع كفالة التعبير عن آرائهم في الإطار التقاليد والأعراف الجامعية.
2. صقل مواهب الطلاب وتنمية قدراتهم ومهاراتهم وتوظيفها بما يعود بالفائدة على الطالب والجامعة والوطن.

3. تكوين الأسر والجمعيات والنوادي العلمية مع تنظيم أسلوب الاستفادة من طاقات ومهارات الطلاب والعمل على دعم أنشطتهم.
4. تنظيم الأنشطة الطلابية الرياضية والاجتماعية والكشفية والفنية والثقافية والتكنولوجية وغيرها وتوسيع قاعدة المشاركة وتحفيز وتشجيع المتميزين فيها .
5. تنظيم أنشطة خدمة المجتمع .

## 1. شروط العضوية

تشكيل اتحاد الطلبة من الطلاب المقيدين بالكلية ويشترط فيمن يتقدم للترشيح لعضوية لجان مجلس الاتحاد أن يكون :

1. متمتعاً بجنسية جمهورية مصر العربية .
2. متصفاً بالخلق القويم والسمعة الحسنة .
3. طالباً مستجداً في فرقته .
4. مسدداً الرسوم الدراسية .
5. له نشاط مؤكد ومستمر في مجال عمل اللجنة التي يرشح نفسه فيها .
6. لم يسبق أن وقعت عليه أي من الجزاءات المنصوص عليها في المادة 183 من اللائحة التنفيذية رقم 49 لسنة 1972 بشأن تنظيم الجامعات، ولم يسبق إسقاط أو وقف عضويته بأحد الاتحادات الطلابية أو لجانها .

يتم انتخابات مجلس الاتحاد ولجانه سنوياً خلال مده أقصاها 8 أسابيع من بدء الدراسة كل عام، ويصدر قرار من عميد الكلية بتحديد المواعيد التفصيلية للانتخابات للمستويات المختلفة، ولا يحق لأي طالب الادلاء بصوته إلا إذا كان مسدداً للرسوم الدراسية .

ولا يجوز استخدام الشعارات الدينية أو الحزبية أو الفئوية في انتخابات أو أنشطة اتحادات الطلاب، كما لا يجوز التفرقة بين الطلاب بسبب الجنس أو الأصل أو اللون .

يشترط لصحة الانتخابات في لجان اتحادات طلاب الكليات حضور 50% على الاقل من الطلاب الذين لهم حق الانتخاب في كل فرقة دراسية على حدة .

إذا لم يكتمل العدد تؤجل الانتخابات إلى اليوم التالي، وفي هذه الحالة يشترط لصحة الانتخابات حضور 20% على الأقل من الناخبين. فإذا لم يكتمل العدد يعين عميد الكلية ممثلي لجان هذه المستويات الدراسية .

**2. أهداف الاتحاد:**

1. تدريب الطلبة على القيادة وممارسة الديمقراطية وإتاحة الفرصة لهم للتعبير عن آرائهم .
2. توثيق الروابط بين الطلبة بعضهم وبعض وبينهم وبين أعضاء هيئة التدريس .
3. اكتشاف وتنمية مواهب الطلاب وقدراتهم ومهاراتهم .
4. نشر وتشجيع وتنظيم الأنشطة الرياضية والاجتماعية والكشفية والفنية والثقافية وارتفاع مستواها .

**3. مهام لجان الاتحاد :**

- **لجان الأسر :**

–تشجيع تكوين الأسر بالكلية .

–التنسيق بين نشاط الأسر المختلفة .

- **لجان النشاط الرياضي :**

–تشجيع المواهب الرياضية .

–نشر ثقافة حب الرياضة .

–تنظيم النشاط الرياضية .

- **لجنة النشاط الثقافي :**

–تنظيم أوجه النشاط الثقافي بالكلية .

–تنمية طاقات الطلبة الأدبية والثقافية .

- **لجنة النشاط الفني :**

–تنمية النشاط الفني للطلاب بما يتفقمع أغراضه السامية لإبراز مواهبهم ورفع مستوى إنتاجهم الفني.

- **لجنة الجوالة والخدمة العامة :**

–تنظيم حركة الكشافة والخدمة العامة بما يساهم في تنمية المجتمع المحيط بالجامعة .

- **لجنة النشاط الاجتماعي :**

–تنمية الروابط الاجتماعية بين الطلاب وبين أعضاء هيئة التدريس والعاملين .

- **للجنة النشاط العلمي والتكنولوجي :**

–تختص بعرض الندوات والمحاضرات العلمية بهدف تنمية القدرات العلمية والتكنولوجية ونشر المعرفة إنتاجاً وتطبيقاً عن طريق نوادي العلوم والجمعيات العلمية مما يؤدي إلى خلق جيل من الشباب مزود بالمعرفة العلمية والخبرة التطبيقية التي تؤهله للمنافسة في سوق العمل .

## ثانياً: واجبات الطلاب ومسئوليتهم التأديبية

### 1. واجبات الطلاب :

1 - احترام القوانين واللوائح والقرارات والتقاليد الجامعية .

2 - المحافظة على المنشآت الجامعية وعدم الاعتداء عليها .

3 - حضور الدروس والمحاضرات وجميع الأعمال الجامعية التي تقضي القوانين واللوائح بالمواظبة عليها بحد أدنى 75% وفي حالة عدم استيفاء النسبة يحرم الطالب من الامتحان ويتم إنذار الطالب بعد الأسبوع الثالث وفي حالة تكرار الغياب ينذر مرة ثانية فإذا اكتمل غيابه 25% يتم الإنذار النهائي ويحرم من دخول الامتحان .

4 - يؤخذ الغياب عن طريق البصمة في المحاضرات والدروس العملية وفي حالة تغيب الطالب لعذر مرضي يلتزم بتقديم شهادة طبية من إحدى الوحدات الطبية الحكومية وذلك **خلال ثلاثة أيام** من تاريخ حدوث السبب المؤدي للعذر وإلا يعد غيابه بدون عذر .

5 - عدم القيام بأي عمل يمس الشرف والكرامة أو يخل بالسلوك القويم للطالب داخل الجامعة أو خارجها.

6 - الالتزام بقواعد الحماية المدنية وعلى الطالب حين سماع صفارة إنذار الحريق أو غيرها في الحالات الطارئة التواجد في الأماكن المخصصة للتجمع .

7 - عدم التدخين داخل المنشآت الجامعية والحرم الجامعي إلا في الأماكن المحددة التي تحمل العلامة

8 - المحافظة على نظافة جميع المنشآت الجامعية .

9 - عدم الإخلال بنظام الامتحان أو الهدوء اللازم له وعدم الغش في الامتحان بأي صورة من الصور .

10 -معاملة أعضاء هيئة التدريس والهيئة المعاونة وجميع العاملين بالجامعة المعاملة التي تتفق مع السلوك الجامعي .

11 -عدم توزيع منشورات أو إصدار مجلات حائط أو مجلات ورقية إلا بإذن من إدارة الكلية .

12 -عدم الاعتصام داخل المباني الجامعية لأي سبب من الأسباب .

2. **المساءلة التأديبية :**

كل طالب يخل بأحد الواجبات السالف ذكرها يحال للتحقيق وتوقع عليه إحدى العقوبات المنصوص عليها في قانون تنظيم الجامعات والتي تبدأ من الإنذار وتتدرج حتى الفصل من الجامعات المصرية.

3. **التدخين داخل الحرم الجامعي :**

ممنوع منعا باتا التدخين داخل الحرم الجامعي إلا بالأماكن المخصصة لذلك والتي تحمل العلامة 

4. **الخط والحريق :**

الجامعة مجهزة بأجهزة إنذار للحريق والمخاطر المختلفة, وعلى جميع الطلاب الاتجاه الى نقطة التجمع الخاصة بكل مبني ومنطقة والتي تحمل العلامة  فور سماع الإنذار والانتظار بهذه النقط حتي سماع الصفارة مرة أخري.

5. **الدخول والخروج من الحرم الجامعي :**

على كل طالب الالتزام بإظهار بطاقة الطالب الخاصة به السارية لدخول الحرم الجامعي وإدخال بصمته بالجهاز المخصص لذلك عبر البوابات أثناء الدخول والخروج .

6. **الزيارات :**

يسمح لأولياء الأمور بزيارة الحرم الجامعي وذلك بموعد مسبق مع الجهة المعنية أو الاتجاه إلى إدارة العلاقات العامة بالمبنى الرئيسي من خلال البوابة الرئيسية وذلك في أوقات العمل الرسمية فقط .

# الخدمات العامة بالجامعة

## أولاً: المدينة الجامعية

يوجد بالجامعة مدينة جامعية على مستوى راق توفر كل خدمات الاقامة العصرية والآمنة لإسكان الطلاب. تضم المدينة الجامعية استراحة وقاعة استقبال، وقاعة للقراءة والمذاكرة، ومصلى, وتضم المدينة حجرات فردية وثنائية وثلاثية مكيفة ومؤثثة بأحدث وأرقى الأثاث العصري كما تتوفر خدمة تنظيف الحجرات يومياً .

ويتولى مشرفو مدينة الطلبة ومشرفات مدينة الطالبات العمل على توفير الراحة والامان وانتظام الحياة داخل المدينة والالتزام بالتعليمات الجامعية وكذلك الحفاظ على الانضباط السلوكي للطلاب .

### 1. القواعد العامة في استخدام المدينة الجامعية

1 - تنفيذ التعليمات الخاصة بالسكن الطلابي في المدينة.
2 - الالتزام بآداب المعاملة مع العاملين بالمدينة والزملاء .
3 - المحافظة علي جميع منشآت وتجهيزات المدينة والغرف.
4 - المحافظة علي النظافة العامة ونظافة الغرف.
5 - عدم التدخين .
6 - معرفة قواعد الحريق ونقط التجمع والالتزام بها.
7 - الالتزام بالسلوك القويم والمنضبط أخلاقيا.

### 2. استخدام الغرف :-

1 - يقوم الطالب باستخدام الغرفة في النوم والمذاكرة .
2 - عدم وضع أي أجهزة كهربائية داخل الغرف بدون تصريح كتابي ( باستثناء الكمبيوتر).
3 - عدم تناول الوجبات الساخنة داخل الغرف .
4 - عدم تعليق أي ملصقات داخل الغرف .
5 - عدم الإسراف في استهلاك المياه والمحافظة عليها والإبلاغ الفوري في حالة وجود أي تلف أو تسريب مياه.
6 - عدم ترك الأنوار مضاءة دون استخدام.
7 - عدم استخدام جهاز الحاسب الشخصي في تشغيل أغاني أو فيديو داخل الغرف بصوت مرتفع.
8 - عدم الإزعاج داخل الغرف ومراعاة آداب الجيرة.

9 - عدم استضافة زملائه داخل الغرفة وعمل اللقاءات في الصالون المخصص لذلك بالمبنى .

10 - حفظ المتعلقات الثمينة بدرج الكومود وإغلاقه بالمفتاح.

11 - متعلقات الطالب هي مسئوليته وإدارة الجامعة إذ تبذل كل الجهد للمحافظة عليها فهي عهدته الشخصية وإدارة الجامعة غير مسئولة عن فقدانها أو تلفها.

3. **الأمانات:-**

يوجد صندوق أمانات بإدارة الجامعة ويتم الاستعلام عن شروط استخدامه من مكتب الأمين العام .

4. **النظافة :-**

تتولى إدارة المدينة المحافظة على النظافة عامة، وتكون نظافة الغرف مسئولية الطلاب، حيث يجب على كل مقيم بالمدينة مراعاة العناية بنظافة وترتيب غرفته وعدم ترك فضلات طعام والتخلص من أي نفايات فوراً . وعلى الطلاب إخطار المشرف بالمواعيد المناسبة لهم حتى يتسنى لإدارة المدينة القيام بعملية النظافة .

ويكون على شاغل الغرفة السماح للعمال بالدخول للقيام بأعمال النظافة اليومية وأعمال الصيانة، حيث يقوم العامل بنظافة الحمام والأرضيات وتلميع المرايا والأثاث فقط وعلى الطالب ترتيب سريره وكتبه وحفظ ملابسه والأدوات الخاصة به .

5. **التجهيزات والأعطال :-**

على الطلاب ضرورة الإبلاغ عن أي عطل فور حدوثه بموجب طلب الخدمة. كما يجب الإبلاغ عن أي تقصير في الخدمات الموفرة من الجامعة .

6. **استخدام الغسالات:-**

1 -يتم استخدام الغسالات تحت إشراف مشرف المدينة.

2 -استخدام مساحيق غسيل خاصة بالغسالات الأوتوماتيك فقط.

3 -عدم ترك الملابس بداخل الغسالة.

4 -لايتم تشغيل الغسالة بكمية صغيرة من الملابس حفاظاً علي سلامتها.

## 7. المواعيد والزيارات:-

للمحافظة على هدوء المدينة الجامعية تراعى القواعد التالية :

1 - إتباع تعليمات الأمن بشأن زيارات السادة أولياء الأمور.

2 - إتباع التعليمات واللوائح المنظمة بدخول وخروج الطلبة من المدينة.

3 - ممنوع تواجد أولياء الأمور إلا في الأماكن والمواعيد المسموح لهم فيها (الاستراحة ) .

4 - ممنوع استضافة أي طلبة أو أقارب أو أصدقاء من خارج المدينة لأي سبب من الأسباب.

## 8. الجزاءات: -

1 - يتحمل الطالب قيمة ما أتلفه من أثاث أو أجهزه طبقا لسعر التكلفة.

2 - يتم تحويل الطالب إلى التحقيق في حال مخالفته للوائح المدينة.

3 - يتم إحالة الطالب إلى مجلس تأديب في حال ضبط أي ممنوعات داخل غرفته.

4 - في حالة التدخين داخل الأماكن غير المخصصة لذلك يتم سحب الكارنية وتطبق اللائحة الخاصة بغرامة التدخين.

5 - في المخالفات الجسيمة يحال الطالب إلي مجلس التأديب.

## ثانيا: المطعم

يعمل 24 ساعة ويقدم جميع أنوع المأكولات حسب رغبة الطالب وجميع العصائر الطازجة والمثلجة والغازية.

ويقوم بإعداد الطعام طهاة على أعلى مستوى من الخبرة ومقدمي الوجبات جميعهم من خريجي السياحة والفنادق

وهو أيضاً يقوم بإعداد وتقديم جميع وجبات طلاب المدينة الجامعية

## ثالثا: السوبر ماركت

يعمل من الساعة 8 صباحاً وحتى 11 مساءً وبه جميع الأدوات المكتبية والحلويات والعصائر وأيضاً ماكينة تصوير مستندات .

## رابعا: كافيتريا NUB

تطل على البحيرة وهي أول بحيرة تنشأ في داخل جامعة خاصة وتقدم مشروبات ساخنة وباردة وهى تعمل من الساعة 8 صباحاً وحتى 5 مساءً.

**خامسا: العيادة الطبية**

وهي متوفرة داخل مستشفى النهضة التعليمي بجوار كلية الهندسة وهي عيادات مجهزة على أعلى مستوى من التجهيزات الطبية مع تواجد أطباء أمناء متعددي التخصصات وممرضات متواجدين دائماً داخل الجامعة.

**سادسا: المكتبة المركزية**

توجد مكتبة مركزية بالجامعة تخدم كلية الهندسة بالإضافة الى باقي كليات الجامعة. كما توجد مكتبة خاصة بكلية الهندسة تقع في مبنى الكلية و تتوفر بالمكتبة المركزية جميع الكتب المتخصصة في الهندسة. كما انها مزودة بأحدث الكتب وبها من الكتب ما يقر ب من 2000 كتاب وعدد (6) أجهزة حاسب آلي ومتصلة بمكتبة الكترونيةومتصلة بموقع المجلس الاعلى للجامعات وذلك للاطلاع على أحدث الكتب والمراجع العلمية و المنشورات البحثية في التخصص.

1. **مساحة المكتبة:**

تحتوي المكتبة على مساحة مناسبة وتبلغ مساحة المكتبة 150 متر مربع وتحتوي على 37 كرسي و8 طاولات للطلاب لخدمة اكبر عدد ممكن من الطلبة.

2. **نظـــــام ميكنـــــة المكتبـــــة:**

- يتيح النظام سهولة التواصل وتبادل المقتنيات ومعرفة آخر الأبحاث والرسائل العلمية المجازة من أي جامعة من جامعات مصر.
- يوفر النظام إمكانية الاطلاع على المكتبات العالمية للوقوف على أحدث ما لديهم من مقتنيات مثل مكتبة الكونجرس ومكتبة إنديانا و أكثر من 400 مكتبة أخرى على مستوى العالم.
- يتيح النظام البحث على أحدث الكتب التي تم إصدارها وشرائها مباشرة من الانترنت بمساعدة موقع الأمازون للتجارة الالكترونية.

3. **المكتبة الرقمية:**

تم الاشتراك في وحدة المكتبة الرقمية (Digital Library Unit) وهي إحدى وحدات خدمات مركز معلومات التعليم العالي بالمجلس الأعلى للجامعات. وهي تشمل النصوص الكاملة لأكثر من 2000 دورية علمية متخصصة. ويمكن لجميع الطلاب بالكلية الوصول إلى كل هذه المصادر وذلك من خلال أي جهاز حاسب متصل بالشبكة داخل الحرم الجامعي للكلية وذلك عن طريق الرابط التالي: ebscohost/login

## 4. الخدمات التى تقدمها المكتبة:

- خدمة الاطلاع الداخلي: وهي القراءة والاطلاع على الكتب داخل المكتبة.
- خدمة الاطلاع الخارجي: وهي الاطلاع على الأوعية الموجودة في المكتبة من خارج المكتبة عن طريق موقع الجامعة www.nahdauniversity.org.
- خدمة الإحاطة الجارية: وهي تكون عن طريق إصدار نشرة عن الكتب الجديدة الواردة للمكتبة وعمل تصميمات power point وعرضها على شاشات الجامعة لمعرفة ما هو جديد بالمكتبة.
- خدمة البث الانتقائي للمعلومات: استخدام الحاسب الآلي في تسجيل بيانات المستفيدين علي نظام المكتبة مثل الاسم والكلية والغرض من الزيارة وانتقاء ما يلائم من الكتب للمستفيدين كل حسب المواد التي يدرسها.
- خدمة الرد على الاستفسارات التي يحتاجها الطالب أو أعضاء هيئة التدريس.
- خدمة التصوير في مكان قريب من المكتبة.

## سابعا: المنشآت الرياضية

الإمكانيات المتاحة للأنشطة الرياضية والثقافية والفنية والاجتماعية لطلاب المؤسسة:

- يوجد بالجامعة العديد من الملاعب الرياضية وتشمل:

1. ملعب كرة قدم سداسي
2. ملعب الكرة الطائرة
3. ملعب كرة السلة
4. ملعب الشطرنج
5. جمنازيوم مجهزاً بأحدث الأجهزة الرياضية شاملة طاولات لتنس الطاولة.

## ثامنا: مسرح الجامعة

يوجد بالجامعة مسرح مجهز بأحدث أنظمة الإضاءة والأنظمة الصوتية المتقدمة وذات خشبة عرض كبيرة.

## تاسعا: تلفزيون واستوديو اذاعي بالجامعة

يوجد بالجامعة استوديو اذاعي وتليفزيوني مجهز بأحدث الكاميرات وأنظمة الإضاءة والصوتيات بكلية الإعلام ومبني تلفزيون الجامعة.

## عاشرا: مركز أبحاث الجامعة

يوجد بالجامعة مركز أبحاث علمية وتطبيقية .

## الخدمات الهامة بمحافظة بني سويف

| م | تصنيف الخدمة | التليفون | العنوان |
|---|---|---|---|
| | **أولاً الطوارئ** | | |
| 1 | المركز الطبي (شرق النيل) | 2240726 | |
| 2 | طوارئ | 123 | |
| 3 | المطافي | 180 | |
| 4 | شرطة النجدة | 122 | |
| | **ثانياً : الخدمات الصحية والطبية** | | |
| 1 | المستشفى التعليمي | 2351563 | مقبل – بجوار كلية الطب |
| 2 | المستشفى العام | 2317809 – 2324683 | كورنيش النيل – بجوار محافظة بني سويف |
| 3 | مستشفى الدكتور التخصصي | 2341494 | ش أحمد عرابي – بجوار المدرسة الثانوية |
| 4 | مستشفى برج الزهراء | 235307 – 2353508 – 2353509 | ش أحمد عرابي – الهلال |
| 5 | مستشفى الدعوة الإسلامية | 22317922– 22316166 – 0106528765 | تقاطع الطريق الدائرة مع ش عبد السلام عارف أمام مصنع الثلج |
| | **ثالثاً : المطاعم والمأكولات السريعة** | | |
| 1 | مشويات ميهوب | 2349402 | ش 23 يوليو متفرع من ش أحمد عرابي |
| 2 | مطعم كافيار للأسماك | 01026240424 | الشرق – الحي الأول – خلف البنك الأهلي |
| 3 | دجاج زادو (بروست) | 2358866 | 59 ش أحمد عرابي |
| 4 | 23 يوليو | 2320914 | ش 23 يوليو – بجوار محطة القطار |
| 5 | المواردي | 2352900 | ش عبد السلام عارف أمام المديرية المالية |
| 6 | مشويات الهاشم | 2365151 | ش بور سعيد بجوار الثانوية بنات |
| | **رابعاً : مكاتب توصيل الخدمات** | | |
| 1 | مكتب الأسباني | 0822363600 - 0104090824 | |
| 2 | مكتب الفرسان | 2360808 | |
| 3 | مكتب النيل | 2350035- 2360036 | |

**أرقام تليفونات تهمك بالجامعة**

- تليفون الجامعة 1/2/3/4/5/6/7/9 (082) 2246680
- فاكس الجامعة 2246688 (082)
- مكتب رئيس الجامعة (1103) داخلي
- مكتب عميد كلية طب الفم والأسنان (1005) داخلي
- مكتب عميد كلية صيدلة (1016) داخلي
- مكتب عميد كلية التسويق وإدارة الأعمال (1036) داخلي
- مكتب عميد كلية الإعلام (1014) داخلي
- مكتب عميد كلية علوم الحاسب (1011) داخلي
- مكتب المشرف العام (1109) داخلي
- مكتب عميد الطلبة (1069) داخلي
- مكتب أمين عام الجامعة (1029) داخلي
- شئون الطلاب والتسجيل (1080 – 1032) داخلي
- شئون الدراسة (1036)
- الاستقبال (1107 – 1101) داخلي

# اتصل بنا

## وسائل الاتصال بالمؤسسة / الكلية :

**العنوان البريدي للجامعة**: طريق جامعة النهضة – مدينة بني سويف الجديدة – بني سويف – كلية الهندسة.
**الموقع الإلكتروني للجامعة**: gro.ytisrevinuadhan.www
**الخط الساخن للجامعة: 19206**

**مكتب الأستاذ الدكتور / عميد كلية الهندسة**
**موبايل: 01001760939**
**الايميل : salem.elkhodary@nub.edu.eg**

# ملحق البرامج والتخصصات الحديثة وفق لائحة 144 ساعة

# The Bylaws of Undergraduate Programs

# Faculty of Engineering, Nahda University



**March 2025**

# Participants in the Preparation of these Bylaws

The following list shows the staff members of the Faculty of Engineering, Nahda University who have effectively participated in the preparation of the 2024/2025 Bylaws for the Undergraduate Studies.

| No. | Name | Occupation |
|---|---|---|
| 1. | **Prof. Dr. Salem Mahmoud ElKodary** | Dean of the Faculty of Engineering |
| 2. | **Prof. Dr. Sayed Abdelkader Ahmed** | Vice Dean of the Faculty of Engineering |
| 3. | **Prof. Mostafa Deep Hashem** | Head of Civil Engineirng Department |
| 4. | **Prof. Gamal Mohamed Dousoky** | Head of Mechatronics Engineering Department |
| 5. | **Prof. Ahmed Abdelmoneim Ibrahim** | Head of Communication and Computer Engineering Department |
| 6. | **Dr. Maher Abd El Kader Saleem** | Head of Basic Sciences Department |
| 7. | **Dr. Rashwan Tahseen Almashhour** | Head of Architecture Engineering Department |
| 8. | **Dr. Mohamed Kourany Saad** | Head of Electrical Power Engineering Department |
| 9. | **Dr. Mohamed Adel Abdelaziem** | Lecturer |
| 10. | **Assoc. Prof. Ahmed Abd El-Baset Donkol** | Bylaws and Governance Coordinator |
| 11. | **Dr. Abdelrahman Ahmed Yasser Elsherief** | Bylaws and Governance Coordinator |

# General Articles of the Faculty

## Part 1: Preface

## The Vision

To be a distinguished faculty in educational services and applied research for community service and environmental development in various engineering fields.

## The Mission:

The Faculty of Engineering is committed to preparing engineering cadres staff capable of creativity and innovation by offering contemporary academic programs that develop their cognitive and skill aspects in a manner that suits the local, regional and international labor market, meets the needs of society and giant national projects, encourages scientific research and applies quality standards in all its academic and service activities.

## الجزء ١: مقدمة

## الرؤية:

أن تكون الكلية متميزة في الخدمات التعليمية والبحوث التطبيقية لخدمة المجتمع وتنمية البيئة في مختلف المجالات الهندسية.

## الرسالة:

تلتزم كلية الهندسة بإعداد كوادر هندسية قادرة على الإبداع والابتكار من خلال تقديم برامج أكاديمية معاصرة تنمي جوانبها المعرفية والمهارية بما يتناسب مع سوق العمل المحلي والإقليمي والدولي ، ويلبي احتياجات المجتمع والمشاريع الوطنية العملاقة ، ويشجع البحث العلمي ويطبق معايير الجودة في جميع أنشطتها الأكاديمية والخدمية.

## الأهداف:

١. التطوير المستمر للبرامج الأكاديمية وتعزيز فعاليتها لتلبية متطلبات سوق العمل من خلال اعتماد طرائق التعليم والتعلم والتقويم الطلابي المتنوعة والمتقدمة.
٢. استقطاب أعضاء هيئة التدريس والباحثين المتميزين في مختلف التخصصات الهندسية لإثراء البيئة التعليمية والبحثية.
٣. تطوير مهارات وكفاءات أعضاء هيئة التدريس والهيئة المعاونة والموظفين الإداريين من خلال برامج تدريبية فعالة ومستمرة.
٤. تعزيز قيم النزاهة وأخلاقيات المهنة ، والتأكد من كون أعضاء هيئة التدريس قدوة تجسد القيم الأخلاقية والإنسانية الراقية.
٥. تشجيع البحث العلمي التطبيقي والمشاركة الفاعلة في المشاريع البحثية بالتعاون مع المؤسسات الصناعية والإنتاجية والخدمية.
٦. تحسين جودة التعليم من خلال المتابعة المستمرة واستخدام طرائق التدريس الحديثة والمعامل وورش العمل.
٧. إبرام بروتوكولات تعاون وشركات مع الجامعات المحلية والإقليمية والدولية في مجالات الدراسات العليا والبحوث وتبادل أعضاء هيئة التدريس والهيئة المعاونة والتبادل الطلابي الفعال.
٨. خلق بيئة ثقافية وتعليمية محفزة وداعمة تعزز الابتكار وتقدر قيمة الوقت وتعزز الرضا الوظيفي بين أعضاء هيئة التدريس والباحثين والطلاب.
٩. تخريج مهندسين وباحثين بمؤهلات أكاديمية وعلمية ومهنية وأخلاقية عالية، قادرين على التعلم مدى الحياة والمساهمة في التنمية الوطنية في مختلف المجالات الهندسية.
١٠. تطوير النظم الإدارية والأكاديمية بالكلية وتبني مبادئ الحوكمة والشفافية المؤسسية.
١١. تعزيز العلاقة بين الكلية وخريجيها وممثلي الصناعة وأطراف المجتمع المدني لضمان المنفعة المتبادلة وتبادل المعرفة والخبرات.
١٢. تقديم خدمات مهنية واستشارية وتدريبية وانتاجية عالية الجودة في مختلف المجالات الهندسية من خلال مركز الاستشارات والتدريب التابع للكلية.

## The Objectives:

1. Continuously develop academic programs and enhance their effectiveness to meet labor market demands by adopting diverse and advanced teaching, learning, and student assessment methods.
2. Attract distinguished faculty members and researchers across various engineering disciplines to enrich the educational and research environment.
3. Enhance the skills and competencies of faculty members, teaching assistants, and administrative staff through effective and continuous training programs.
4. Promote the values of integrity and professional ethics, ensuring that faculty members serve as role models who embody high moral and human values.
5. Encourage applied scientific research and active participation in research projects in collaboration with industrial, productive, and service institutions.
6. Improve the quality of education through continuous monitoring and the use of state-of-the-art teaching tools, laboratories, and workshops.
7. Establish cooperation protocols with local, regional, and international universities in areas of postgraduate studies, research, and the exchange of faculty members and students.
8. Create a motivating and supportive educational environment that fosters innovation, respects time, and promotes job satisfaction among faculty, researchers, and students.
9. Graduate engineers and researchers with strong scientific, professional, and ethical qualifications, capable of lifelong learning and contributing to national development in engineering fields.
10. Develop the faculty's administrative and academic systems and adopt principles of governance and institutional transparency.
11. Strengthen the relationship between the faculty and its graduates, industry, and civil society to ensure mutual benefit and knowledge exchange.
12. Provide high-quality professional, consulting, training, and productive services in various engineering fields through the Faculty's Consultancy and Training Center.

## Part 2: Organizational Structure

## الجزء ٢: الهيكل التنظيمي

### Article (1): Faculty Academic Departments

### المادة (١): الأقسام الأكاديمية بالكلية

The faculty includes the following scientific Departments.

تضم الكلية الأقسام العلمية التالية.

***Table 1 Departments Faculty students at FoE – NUB***

| # | Depatment | Code |
|---|---|---|
| 1 | Civil Engineirng Department | CVE |
| 2 | Architecture Engineering Department | DAE |
| 3 | Communication and Computer Engineering Department | CCE |
| 4 | Mechatronics Engineering Department | MIM |
| 5 | Electrical Power Engineering Department | EPR |

**جدول ١ الاقسام العلمية في كلية الهندسة جامعة النهضة .**

| م | القسم | رمز |
|---|---|---|
| ١ | قسم الهندسة المدنية | CVE |
| ٢ | قسم الهندسة العمارية | DAE |
| ٣ | قسم هندسة الاتصالات و الحاسبات | CCE |
| ٤ | قسم هندسة الميكاترونكس | MIM |
| ٥ | قسم هندسة القوى الكهربية | EPR |

There are two departments serving Faculty students (Non Student Department):

يوجد قسمان يخدمان طلاب الكلية (قسم خدمي لايخرج طلاب):

***Table 2 Departments serving Faculty students at FoE - NUB***

| No | Department | Code |
|---|---|---|
| 1 | Basic Sciences Department | BAS |
| | | BME |

**جدول ٢: الأقسام التي تخدم طلاب الاقسام الخدمية في كلية الهندسة جامعة النهضة.**

| م | قسم | رمز |
|---|---|---|
| ١ | قسم العلوم الأساسية | BAS |
| | | BME |

Other Department Specializations that may be introduced by the faculty in the future.

بالاضافة الي أقسام التخصصات الاخري التي قد تطرحها الكلية مستقبلا.

## Article (2): Offered Programs

*Table 3 List of Undergraduate Programs offered by FoE – NUB*

| # | Program |
|---|---|
| 1 | Intelligent and Sustainable Civil Engineering Program |
| 2 | Digital Architecture Engineering Program |
| 3 | Communications and Computers Engineering Program |
| 4 | Mechatronics and Intelligent Machines Engineering Program |
| 5 | Electrical Power and Renewable Energy Engineering Program |

Each department of the faculty is responsible for scientific research and teaching courses for all programs affiliated with it that require courses in the specialization of this program and per the program code. The program is responsible for the scientific content of the course under the supervision of the department affiliated with it and for nominating teachers for each course, whether from its department, another department or outside the college. The appointment of teachers from outside the college is subjected to the approval of the faculty Council.The engineering, humanities, general social and cultural courses that fall outside the scientific departments of the faculty will be taught by specialized members from of recognized universities and research centers. Additionally, the program is responsible for continuously developing the teaching methodologies and scientific content throughout the courses under the supervision of the department affiliated with it.

## المادة (٢): البرامج المطروحة

**الجدول ٣ قائمة برامج البكالوريوس التي تقدمها كلية الهندسة جامعة النهضة.**

| # | البرنامج |
|---|---|
| ١ | برنامج الهندسة المدنية الذكية والمستدامة |
| ٢ | برنامج هندسة العمارة الرقمية |
| ٣ | برنامج هندسة الاتصالات و الحاسبات |
| ٤ | برنامج هندسة الميكاترونكس والآلات الذكية |
| ٥ | برنامج هندسة الطاقة الكهربائية والطاقة المتجددة |

يَعْنَى كل قسم من أقسام الكلية بالبحث العلمي وتدريس جميع المقررات التابعة له والتى قد تكون متطلب في برامج اخري ما دامت في تخصص هذا البرنامج، وحسب كود البرنامج. يختص البرنامج بالمحتوى العلمي للمقرر تحت إشراف القسم التابع له وترشيح المدرسين لكل مقرر سواء من قسمه أو قسم آخر أو خارج الكلية. يخضع تعيين المدرسين من خارج الكلية لموافقة مجلس الكلية. ويتم تدريس المقررات الهندسية والإنسانية والاجتماعية والثقافية العامة التي تقع خارج الأقسام العلمية بالكلية من قبل أعضاء هيئة التدريس من جامعات ومراكز بحثية معترف بها. بالإضافة إلى ذلك ، فإن البرنامج مسؤول عن التطوير المستمر لمنهجيات وطرائق التدريس والمحتوى العلمي لكافة المقررات تحت إشراف القسم التابع له.

## Article (3): Degrees Awarded by the Faculty

Upon the recommendation of the Faculty Council and the approval of the University Council, the University grants a bachelor's degree in one of the following specializations

- Bachelor of Science in Intelligent and Sustainable Civil Engineering
- Bachelor of Science in Digital Architecture Engineering
- Bachelor of Science in Communications and Computers Engineering
- Bachelor of Science in Mechatronics and Intelligent Machines Engineering
- Bachelor of Science in Electrical Power and Renewable Energy Engineering

Degrees are awarded to students who have completed graduation requirements at the end of each semester ( Fall – Spring – Summer)

## Article (4): Procedure to add/freeze Programs

Any Department at FoE - NUB can propose a New Specialized Major or New Minor within the Discipline of this department. More than one department can jointly propose new Inter-Disciplinary (Major or Minor) Program.

Any group of 3 faculty members including at least one Professor at FoE - NUB can also submit a proposal for a new (Major or Minor) program.

The Program proposal should be submitted including all program information as in these bylaws. The proposal should also include a review of the available resources inside Nahda University to run this program.

All proposals should be submitted to the Faculty Council.

Once approved by the Faculty Council, it is forwarded to the Supreme Council of Universities through Nahda University and then added to these bylaws.

The Faculty Council may, freeze any Program temporarily or permanently if necessary.

## المادة (٣): الدرجات العلمية التي تمنحها الكلية

بناء على موافقة مجلس الكلية ومجلس الجامعة تمنح الجامعة، درجة البكالوريوس في احد التخصصات التالية:

- بكالوريوس العلوم في الهندسة المدنية الذكية والمستدامة
- بكالوريوس العلوم في هندسة العمارة الرقمية
- بكالوريوس العلوم في هندسة الاتصالات والحاسبات
- بكالوريوس العلوم في هندسة الميكاترونكس والآلات الذكية
- بكالوريوس العلوم في هندسة الطاقة الكهربائية والطاقة المتجددة

تمنح الدرجات العلمية للطلاب الذين أكملوا متطلبات التخرج في نهاية كل فصل دراسي (الخريف - الربيع - الصيف)

## المادة (٤): إجراءات إضافة / تجميد البرنامج

يمكن لأي قسم في كلية الهندسة – جامعة النهضة اقتراح تخصص رئيسي او فرعي جديد ضمن مجال هذا القسم. يمكن لأكثر من قسم علمي أن يقترح بشكل مشترك برنامجا جديدا متعدد التخصصات (رئيسي أو ثانوي).

كما يمكن لأي مجموعة من ٣ أعضاء هيئة تدريس بما في ذلك أستاذ واحد على الأقل في كلية الهندسة – جامعة النهضة تقديم اقتراح لبرنامج جديد (رئيسي أو ثانوي).

يجب تقديم مقترح البرنامج بما في ذلك جميع معلومات البرنامج كما هو موضح في هذه اللوائح. يجب أن يتضمن المقترح أيضا مراجعة الموارد المتاحة داخل جامعة النهضة لتشغيل هذا البرنامج. و يجب تقديم جميع المقترحات إلى مجلس الكلية. بعد اعتماد المقترح من قبل مجلس الكلية ، يتم إحالته إلى المجلس الأعلى للجامعات عن طريق جامعة النهضة ثم إضافته إلى هذه اللوائح. يجوز لمجلس الكلية تجميد أي برنامج مؤقتا أو نهائيا إذا لزم الأمر.

## Article (5): Agreements with other Universities

The Faculty Council, based on a proposal from the relevant Department Board, may propose agreements for cooperation in specific educational activities or to offer joint or dual degrees for one or some running study programs.

## Article (6): Program Executive Committee

- Based on the approval of the Faculty Council, a Program Executive Committee is formed of four faculty members: the program's Executive Manager, who serves as chairman; two faculty members from academic departments related to the program; and the Coordinator of the Program. In case there are academic advisors for the program's students, the oldest of them is/are selected for membership in the Program Executive Committee.
- **The Program Executive Committee is responsible for:**

1- All administration aspects relevant to the program students.
2- Following up the academic advising for the program students.
3- Following the progress in study plan for each student until completing the program requirements.
4- Administration of the course equivalence for students transferred from other programs or from other faculties.
5- Following up the educational process and the field training.
6- Forming partnerships with distinguished training entities.
7- Planning course offerings at the beginning of every semester.
8- Identifying the requirement for developing the program's infrastructure, including auditoriums, lecture halls, exercise halls, laboratories, and their equipment.
9- The tasks assigned to them by the Faculty Council
   - The Program Executive Committee conducts monthly meetings to follow up on all activities related to the program.
   - The Program Executive Committee's recommendations are submitted to department consuil then to the Faculty Council for review and approval.

## المادة (٥): الاتفاقيات مع الجامعات الأخرى

يجوز لمجلس الكلية بناء على اقتراح من مجلس القسم المعني اقتراح اتفاقيات للتعاون في أنشطة تعليمية محددة أو تقديم درجات مشتركة أو مزدوجة لبرنامج دراسي واحد أو أكثر.

## المادة (٦): اللجنة التنفيذية للبرنامج

- بناء على موافقة مجلس الكلية ، يتم تشكيل لجنة تنفيذية للبرنامج من أربعة أعضاء هيئة تدريس: المدير التنفيذي للبرنامج ، الذي يشغل منصب رئيس مجلس الإدارة. عضوا هيئة تدريس من الأقسام الأكاديمية ذات الصلة بالبرنامج. ومنسق البرنامج. في حالة وجود مرشدين أكاديميين لطلاب البرنامج ، يتم الاختيار وفق الاقدمية لعضوية اللجنة التنفيذية للبرنامج
- **اللجنة التنفيذية للبرنامج مسؤولة عن:**

١. كافة الجوانب الإدارية ذات الصلة بطلاب البرنامج.
٢. متابعة الإرشاد الأكاديمي لطلاب البرنامج.
٣. متابعة التقدم في الخطة الدراسية لكل طالب حتى استكمال متطلبات البرنامج.
٤. إدارة معادلة المساقات للطلاب المحولين من برامج أخرى أو من كليات أخرى (المقاصات العلمية).
٥. متابعة العملية التعليمية والتدريب الميداني.
٦. تكوين شراكات مع جهات تدريبية متميزة.
٧. الخطة الدراسية لطرح المقررات في بداية كل فصل دراسي.
٨. تحديد متطلبات تطوير البنية التحتية للبرنامج بما في ذلك المدرجات وقاعات المحاضرات وقاعات التمارين والمختبرات ومعداتها.
٩. المهام الموكلة إليهم من قبل مجلس الكلية.
   - تعقد اللجنة التنفيذية للبرنامج اجتماعات دورية شهرية لمتابعة جميع الأنشطة المتعلقة بالبرنامج.
   - يتم تقديم توصيات اللجنة التنفيذية للبرنامج إلى قنصل القسم ثم إلى مجلس الكلية لمراجعتها واعتمادها.

## Article (7): Program Executive Manager

The Dean appoints a faculty member as an executive manager for the program for two academic years, with the possibility of annual renewal based on his annual performance reports.

The Program Executive Manager shall undertake the following tasks.

1- Following up on the tasks assigned to the relevant Program Executive Committee.
2- Supervising the implementation of the program's internal bylaws.
3- Coordination between scientific programs in assigning teaching duties to faculty members.
4- Supervise administrative work by the program staff.
5- Supervising the regularity of academic advising in the program.
6- Follow up on the regularity of the educational process in accordance with the approved study schedules.
7- Organizing and supervising the program's scientific conference.
8- Develop a plan to develop and improve the efficiency of existing laboratories and coordinate with the college administration and funding agencies to provide modern equipment and tools that meet the requirements of the curricula.
9- Participate in updating course content based on modern trends in engineering and hold periodic meetings with students and faculty members to gather feedback on study materials and teaching methods.
10- Work to motivate faculty members and students to participate in scientific research and applied projects and direct research teams towards modern engineering fields and innovations with a societal impact.

The head of the department may hold the position of Program Executive manager unless he is appointed.

## المادة (٧): المدير التنفيذي للبرنامج

يعين العميد عضو هيئة تدريس مديرا تنفيذيا للبرنامج لمدة عامين دراسيين، مع إمكانية التجديد السنوي بناء على تقارير أدائه السنوية.

يتولى المدير التنفيذي للبرنامج المهام التالية:

١. متابعة المهام الموكلة إلى اللجنة التنفيذية للبرنامج المعنية.
٢. الإشراف على تنفيذ اللائحة الداخلية للبرنامج.
٣. التنسيق بين البرامج العلمية في إسناد المهام التدريسية لأعضاء هيئة التدريس.
٤. الإشراف على العمل الإداري لموظفي البرنامج.
٥. الإشراف على انتظام الإرشاد الأكاديمي في البرنامج.
٦. متابعة انتظام العملية التعليمية وفقا للجداول الدراسية المعتمدة.
٧. التنظيم والإشراف على المؤتمرات العلمية للبرنامج.
٨. وضع خطة لتطوير وتحسين كفاءة المختبرات الموجودة والتنسيق مع إدارة الكلية وجهات التمويل لتوفير المعدات والأدوات الحديثة التي تلبي متطلبات المناهج الدراسية.
٩. المشاركة في تحديث محتوى المقرر بناء على الاتجاهات الحديثة في الهندسة وعقد لقاءات دورية مع الطلاب وأعضاء هيئة التدريس لجمع الملاحظات حول المواد الدراسية وطرق التدريس.
١٠. العمل على تحفيز أعضاء هيئة التدريس والطلاب على المشاركة في البحث العلمي والمشاريع التطبيقية وتوجيه فرق البحث نحو المجالات الهندسية الحديثة والابتكارات ذات الأثر المجتمعي.

يجوز لرئيس القسم شغل منصب المدير التنفيذي للبرنامج ما لم يتم تعيينه.

In cases where the Head of Department is not appointed as the Program Executive Manager, a complementary relationship shall be maintained between both roles. The Head of Department retains full academic and administrative authority as stipulated in the Universities Organization Law No. 49 of 1972 and its Executive Regulations.
Such authority includes
general oversight of the educational process within the department, ensuring integration of academic programs (if any), equitable distribution of teaching loads among faculty members, and coordination with the Faculty administration regarding all academic and administrative matters related to faculty affairs.
In this case, the Program Executive Manager shall remain responsible for the daily operational and executive functions of the program, under the supervision of the Head of Department and in accordance with the college's approved institutional structure.
In all cases, the Department Council retains its full academic and organizational authority as defined in the Universities Organization Law No. 49 of 1972 and its Executive Regulations.

## Article (8): Coordinator of the Program

The Dean of the Faculty, based on the nomination of the Head of Department and the Executive Director of the Program, appoints a faculty member as the Program Coordinator for a period of two academic years with the possibility of annual renewal based on his annual performance reports. The Program Coordinator undertakes the following tasks:

1- The fulfillment of all quality assurance requirements in coordination with the program coordinator for continuous Development and Quality Assurance and Continuous Development and Quality

في الحالات التي لا يتم فيها تعيين رئيس القسم كمدير تنفيذي للبرنامج، يجب الحفاظ على علاقة تكاملية بين كلا الدورين. يحتفظ رئيس القسم بالصلاحيات الأكاديمية والإدارية الكاملة المنصوص عليها في قانون تنظيم الجامعات رقم ٤٩ لسنة ١٩٧٢ ولائحته التنفيذية.

وتشمل هذه السلطة:

الرقابة العامة على العملية التعليمية داخل القسم، وضمان تكامل البرامج الأكاديمية (إن وجدت)، والتوزيع العادل للأعباء التدريسية بين أعضاء هيئة التدريس، والتنسيق مع إدارة الكلية فيما يتعلق بجميع الأمور الأكاديمية والإدارية المتعلقة بشؤون الكلية.

في هذه الحالة ، يظل المدير التنفيذي للبرنامج مسئولا عن الوظائف التشغيلية والتنفيذية اليومية للبرنامج ، تحت إشراف رئيس القسم ووفقا للهيكل المؤسسي المعتمد للكلية.

وفي جميع الأحوال يحتفظ مجلس القسم بصلاحياته الأكاديمية والتنظيمية الكاملة على النحو المحدد في قانون تنظيم الجامعات رقم ٤٩ لسنة ١٩٧٢ ولائحته التنفيذية.

## المادة (٨): منسق البرنامج

يقوم عميد الكلية بناء على ترشيح رئيس القسم والمدير التنفيذي للبرنامج بتعيين عضو هيئة تدريس كمنسق للبرنامج لمدة عامين دراسيين مع إمكانية التجديد السنوي بناء على تقارير أدائه السنوية، يتولى منسق البرنامج المهام التالية:

١. استيفاء جميع متطلبات ضمان الجودة بالتنسيق مع منسق البرنامج والتطوير المستمر وضمان الجودة في جامعة النهضة وفقا لمعايير الهيئة القومية

assurance Unit of FoE - NUB in accordance with the standards of the National Authority for Accreditation and Quality Assurance of Education and the relevant international bodies targeted by the faculty's strategic plan.

2- Preparing the annual self-study and annual report for the program.
3- Collect and analyze academic performance data (e.g., pass/fail rates, student satisfaction indicators, and feedback from faculty members) and include these findings in the annual and periodic reports submitted to the Faculty administration.
4- Identify potential problems and challenges that may hinder the educational process or affect students (e.g., lack of resources, difficulties in laboratories, weak electronic communication), and work on finding solutions in coordination with the program administration and the Faculty.
5- Establish permanent communication channels with relevant sectors (ministries, companies, and consulting offices, unions) to enhance training and employment opportunities, and ensure that learning outcomes are consistent with the needs of the labor market.

## Article (9): Academic Advisor

The dean appoints an academic advisor for each group of students from the faculty academic staff, based on the nomination of the relevant department consuil and the opinion of the Head of the Department and the Executive Manager for the relevant program affiliated with it, to guide students in the course of their studies and help them choose courses and graduation project. Moreover, he determines the number of credit hours they can register according to their circumstances, abilities, and academic readiness, and helps them solve the problems they face while studying. In addition, he supervises the study programs for students, monitors their progress, monitors their performance, and follows up on field training as part of the educational process.

لضمان جودة التعليم والاعتماد والجهات الدولية ذات العلاقة المستهدفة بالخطة الاستراتيجية للكلية.

٢. الدراسة الذاتية السنوية والتقرير السنوي للبرنامج.
٣. جمع وتحليل بيانات الأداء الأكاديمي (على سبيل المثال، معدلات النجاح / الرسوب ومؤشرات رضا الطلاب والتغذية الراجعة من أعضاء هيئة التدريس) وإدراج هذه النتائج في التقارير السنوية والدورية المقدمة إلى إدارة الكلية.
٤. تحديد المشكلات والتحديات المحتملة التي قد تعيق العملية التعليمية أو تؤثر على الطلاب (مثل نقص الموارد، وصعوبات في المختبرات، وضعف الاتصال الإلكتروني)، والعمل على إيجاد الحلول بالتنسيق مع إدارة البرنامج والكلية.
٥. إنشاء قنوات اتصال دائمة مع القطاعات ذات العلاقة (الوزارات والشركات والمكاتب الاستشارية والنقابات) لتعزيز فرص التدريب والتوظيف، وضمان توافق مخرجات التعليم والتعلم مع احتياجات سوق العمل

## المادة (٩): المرشد الأكاديمي

يعين العميد مرشدا أكاديميا لكل مجموعة من الطلاب من أعضاء هيئة التدريس بالكلية، بناء على ترشيح وتوصيات رئيس القسم المعني والمدير التنفيذي للبرنامج المختص التابع له، لتوجيه الطلاب في مسار دراستهم ومساعدتهم على اختيار المقررات ومشروع التخرج. كما يحدد عدد الساعات المعتمدة التي يمكنهم تسجيلها وفقا لظروفهم وقدراتهم وجاهزيتهم الأكاديمية، ويساعدهم على حل المشكلات التي يواجهونها أثناء الدراسة. بالإضافة إلى ذلك ، يشرف على البرامج الدراسية للطلاب ، ويراقب تقدمهم العلمي ، ويراقب أدائهم ، ويتابع التدريب الميداني كجزء من العملية التعليمية.

Accordingly:

1- The academic advisor meets with his students periodically to follow up on their results and provide them with guidance to avoid students being subjected to academic warnings.
2- Following up on cases of enrolment, warning and suspension in accordance with Faculty rules.
3- Following up on the students' results and their academic progress, in addition to their extracurricular activities.
4- All educational processes are carried out through the academic advisor and with his approval.
5- Each academic advisor sets an office hour in his time table each week, which is announced at the beginning of each semester to receive and discuss students' topics. A report on these topics is prepared and submitted to the Program Executive Committee.
6- The Academic Advisor may ask the student to repeat a course or some courses which he has already passed or ask him to register in specific courses to raise his cumulative GPA to that required for graduation.

**Article (10): The Industry and Labor Market Advisory Board**

The Higher Advisory Board for Industry and the Labor Market is formed at the Faculty under the chairmanship of the Dean, and the membership of Vice deans, Heads of Departments, Programs Executive Managers and Coordinators of the Programs for the different typologies representatives from bodies in the public and private sectors working in the areas of industry and the labor market related to the various specializations of the faculty, and its tasks are:

1- Submitting proposals regarding everything that serves to explore the future of the faculty's programs.

وبذلك:

١. يلتقي المرشد الأكاديمي بطلابه بشكل دوري لمتابعة نتائجهم وتقديم الإرشادات لهم لتجنب تعرض الطالب للانذار الأكاديمي.
٢. متابعة حالات ايقاف القيد والانذار الاكاديمي وفقا لقواعد الكلية.
٣. متابعة نتائج الطلاب وتقدمهم الأكاديمي بالإضافة إلى أنشطتهم اللاصفية.
٤. تتم جميع العمليات التعليمية من خلال المرشد الأكاديمي وبموافقته.
٥. يحدد كل مرشد أكاديمي ساعات عمل مكتبية في جدوله الزمني كل أسبوع ، والتي يتم الإعلان عنها في بداية كل فصل دراسي لاستقبال ومناقشة موضوعات الطلاب. يتم إعداد تقرير حول هذه الموضوعات وتقديمه إلى اللجنة التنفيذية للبرنامج.
٦. يجوز للمرشد الأكاديمي أن يطلب من الطالب إعادة مقرر أو بعض المقررات التي سبق أن اجتازها أو أن يطلب منه التسجيل في مقررات محددة لرفع معدله التراكمي المطلوب للتخرج.

**المادة (١٠): المجلس الاستشاري الصناعي وسوق العمل**

يشكل المجلس الاستشاري الأعلى للصناعة وسوق العمل بالكلية برئاسة العميد وعضوية وكلاء الكلية ورؤساء الأقسام والمديرين التنفيذيين للبرامج ومنسقي البرامج وممثلين عن جهات في القطاعين العام والخاص العاملة في مجالات الصناعة وسوق العمل المتعلقة بتخصصات الكلية المختلفة. وتتمثل مهامها فى:

١. تقديم المقترحات المتعلقة بكل ما يخدم استكشاف مستقبل برامج الكلية.

2- Providing ways to deepen the partnership between the faculty and the local and global community.
3- Contributing to the development of programs and curricula in accordance with the requirements of the labor market.
4- Contributing to the implementation of the faculty's strategic plan.
5- Submitting proposals that would provide material and moral support for the faculty.
6- Contributing to the development of a mechanism for coordination and the establishment of joint projects between the faculty and the sectors of society in order to find solutions to the problems of society in an integrated manner.
7- Suggesting methods to provide funding sources for the faculty's developmental projects.

The Industry and Labor Market Advisory Board is formed for each program under the chairmanship of the executive director of the program, coordinator of the program and the membership of representatives from entities in the public and/or private sectors working in the fields of industry and labor market related to the program, and its tasks are as follows:

1- Submitting proposals regarding whatever serves foreseeing program’s future.
2- Providing ways to deepen the partnership between the Faculty represented in the program and the local and global community.
3- Contributing to the development of program and curriculam in accordance with the requirements of the labor market.

٢. توفير سبل لتعميق الشراكة بين الكلية والمجتمع المحلي والعالمي.

٣. المساهمة في تطوير البرامج والمناهج وفقا لمتطلبات سوق العمل.

٤. المساهمة في تنفيذ الخطة الاستراتيجية للكلية.

٥. تقديم المقترحات التي من شأنها تقديم الدعم المادي والمعنوي لأعضاء هيئة التدريس.

٦. المساهمة في تطوير آلية للتنسيق وإقامة مشاريع مشتركة بين الكلية وقطاعات المجتمع من أجل إيجاد حلول لمشكلات المجتمع بشكل متكامل.

٧. اقتراح طرق لتوفير مصادر التمويل للمشاريع التنموية للكلية.

يتم تشكيل المجلس الاستشاري للصناعة وسوق العمل لكل برنامج برئاسة المدير التنفيذي للبرنامج ومنسق البرنامج وعضوية ممثلين عن الجهات المختلفة في القطاعين العام و/أو الخاص العاملة في مجالات الصناعة وسوق العمل المتعلقة بالبرنامج، وتتمثل مهامه فيما يلي:

١. تقديم المقترحات بشأن كل ما يخدم استشراف مستقبل البرنامج.

٢. توفير سبل تعميق الشراكة بين الكلية الممثلة في البرنامج والمجتمع المحلي والعالمي.

٣. المساهمة في تطوير البرامج والمناهج وفقا لمتطلبات سوق العمل.

4- Monitoring the performance of the academic units related to industry and the labor market in the courses of the program in order to find solutions to the problems of society in an integrated manner.
5- Suggesting participation in the training programs for the students of the program.
6- Submitting proposals that would provide financial and moral support for the program.

- The Advisory Board meets at the invitation of its chairman at least once a year, and it is permissible to hold board sessions inside or outside the faculty, and it is also permissible to invite whoever it sees from outside the board to attend its sessions.
- The membership of the boards shall be for two years, subject to renewal, and its members shall be granted a certificate of appreciation at the end of their membership term.

٤- متابعة أداء الوحدات الأكاديمية ذات الصلة بالصناعة وسوق العمل في مساقات البرنامج من أجل إيجاد حلول لمشكلات المجتمع بشكل متكامل.
٥- اقتراح المشاركة في البرامج التدريبية لطلاب البرنامج.
٦- تقديم المقترحات التي من شأنها تقديم الدعم المادي والمعنوي للبرنامج.

- يجتمع المجلس الاستشاري بدعوة من رئيسه مرة واحدة على الأقل في السنة، ويجوز عقد جلسات المجلس داخل الكلية أو خارجها، كما يجوز دعوة من يراه من خارج المجلس لحضور جلساته.
- تكون عضوية المجالس لمدة سنتين قابلة للتجديد، ويمنح أعضاؤها شهادة تقدير في نهاية مدة عضويتهم.

## Part 3: Admission Regulations

### Article (11): Admission Requirements:

- The faculty accepts the certificate of the Egyptian General Secondary School (Scientific section) or its equivalent, in accordance with the rules established by the Supreme Council of Universities, or technical diploma which approved by the Ministry of higher education.
- The medical examination shall prove the validity of the student to pursue the study.

### Article (12): Accept depleted repetition times:

- Students transferring from other faculties or higher institutes are accepted in accordance with the approved academic regulations, provided that they have obtained a high school diploma or its equivalent with grades that meet the faculty's admission requirements, either in the year of obtaining the certificate or in the year of enrollment, whichever is lower. Additionally, the student must have been enrolled in a faculty or higher institute during the academic year preceding their transfer application.
- The student's enrollment level is determined by a specialized committee that evaluates the previously studied courses to ensure their alignment with the faculty's curriculum requirements. Based on this assessment, a decision regarding credit transfer is made and submitted to the Academic Council for approval upon the recommendation of the Dean of the Faculty.

## الجزء ٣: لائحة القبول

### المادة (١١): شروط القبول:

- تقبل الكلية شهادة الثانوية العامة المصرية (القسم العلمي) أو ما يعادلها وفقا للقواعد التي يضعها المجلس الأعلى للجامعات أو الدبلوم الفني المعتمد من وزارة التعليم العالي.
- يجب أن يثبت الفحص الطبي صحة الطالب لمتابعة الدراسة.

### المادة (١٢): قبول مستنفذي مرات الرسوب:

- يتم قبول الطلاب المحولين من كليات أو معاهد عليا أخرى وفقا للوائح الأكاديمية المعتمدة، على أن يكونوا حاصلين على شهادة الثانوية العامة أو ما يعادلها بدرجات مستوفية لشروط القبول بالكلية، سواء في سنة الحصول على الشهادة أو في سنة القيد أيهما أقل. بالإضافة إلى ذلك ، يجب أن يكون الطالب مسجلا في كلية أو معهد عالي خلال العام الدراسي الذي يسبق طلب التحويل.
- يتم تحديد مستوى التحاق الطالب من قبل لجنة متخصصة تقوم بتقييم المقررات التي تمت دراستها سابقا للتأكد من مواءمتها مع متطلبات المناهج الدراسية للكلية. بناء على هذا التقييم ، يتم اتخاذ قرار بشأن معادلة الساعات المعتمدة وتقديمه إلى المجلس الأكاديمي للموافقة عليه بناء على توصية عميد الكلية.

## Article (13): Transfer from a Corresponding or Non-Corresponding Faculty:

The student may be transferred to the faculty from corresponding or non-corresponding university faculties, provided that he has the total grades accepted by the faculty in the year of obtaining the secondary school or equivalent, and according to the regulations approved by the University Council and the Supreme Council of Private and National Universities.The student is enrolled at the level of study which corresponds to the number of credit hours approved in his new study plan.

## Article (14): Transfer from Military Faculties:

Without prejudice to the conditions of admission to the faculty, the registration of dismissed students may be transferred from the military faculty "Military Technical College" (MTC) for non-validity of the military life or dismissal for failure of repetition times, as a new student at the first level provided that the student has obtained the total grades accepted by the faculty in the year of The qualification or year of separation is better for the student.

## Article (15): Transfer of Students and Transfer of their Registration:

Students may be transferred to another equivalent faculty in the university or to a non-corresponding higher institutions provided that the minimum number of grades accepted by the faculty is obtained in the year of admission to the secondary school or equivalent, and according to the regulations approved by the University Council and the Supreme Council of Private and National Universities.

## المادة (١٣): التحويل من كلية مناظرة أو غير مناظرة:

يجوز تحويل الطالب إلى الكلية من كليات الجامعة المناظرة أو غير المناظرة، على أن يكون حاصلا على مجموع الدرجات المقبولة لدى الكلية في سنة حصوله على الثانوية العامة أو ما يعادلها، ووفقا للأنظمة المعتمدة من مجلس الجامعة والمجلس الأعلى للجامعات الخاصة والاهلية. يتم تسجيل الطالب في المستوى الدراسي الذي يتوافق مع عدد الساعات المعتمدة في خطته الدراسية الجديدة.

## المادة (١٤): النقل من الكليات العسكرية:

مع عدم الإخلال بشروط القبول في الكلية، يجوز نقل قيد الطلاب المفصولين من الكليات العسكرية "الكلية الفنية العسكرية" لعدم صلاحية الحياة العسكرية أو الفصل لتجاوز أوقات الرسوب، كطالب جديد في المستوى الأول على أن يكون الطالب قد حصل على مجموع الدرجات المقبولة لدى الكلية في سنة التأهيل أو سنة الانفصال ايهما أفضل للطالب.

## المادة (١٥): نقل الطلاب ونقل تسجيلهم:

يجوز تحويل الطلاب إلى كلية أخرى معادلة في الجامعة أو إلى مؤسسات عليا غير مناظرة على أن يكون الحد الأدنى من الدرجات المقبولة لدى الكلية في سنة القبول في المدرسة الثانوية أو ما يعادلها، ووفقا للأنظمة المعتمدة من مجلس الجامعة والمجلس الأعلى للجامعات الخاصة والوطنية

## Article (16): Change / Transfer of Specialization:

- A student can change his / her specialty upon his / her own request. Changing the speciality requires the approval of the two scientific department and the approval of the Faculty Council. The student shall complete the requirements of the degree specified in the regulations in the year of approval of the change of specialization.
- When a student is transferred from one program to another within the Faculty, the subjects that have not been equated by the other program are deleted from the student's academic registry.

## المادة (١٦): تغيير / نقل التخصص:

- يمكن للطالب تغيير تخصصه بناء على طلبه الخاص. يتطلب تغيير التخصص موافقة القسمين العلميين وموافقة مجلس الكلية. أن يستكمل الطالب متطلبات الدرجة المحددة في اللائحة في سنة الموافقة على تغيير التخصص.
- عند تحويل الطالب من برنامج إلى آخر داخل الكلية ، يتم حذف المواد التي لم يتم مساواتها من قبل البرنامج الآخر من السجل الأكاديمي للطالب.

## Part 4: Study Regulations based on Credit Hour System

## Article (17): Programs' System:

- The official teaching Language is English, and the Faculty of Engineering will ascertain the student's proficiency in English. Textbooks, assignments, and examinations are all in English.
- The Faculty Council may, after taking the opinion of the Program Executive Committee and, depending on the nature of the academic courses, decide to hold the exam electronically in one or more courses. It is also permissible to have the exam in all or part of the course in a way that allows it to be corrected electronically.
- The Programs follow the Credit-Hour (CH) system. This is a measure of the contact hours between the teachers and the student per semester. One Credit Hour is equivalent to the course Contact Hours as follows:
  1. One-hour weekly lecture for a semester of 15 weeks.
  2. Two to three hours of weekly tutorial or Laboratory work for a semester of 15 weeks.
- One Contact Hour is divided into 50 minutes actual teaching and 10 minutes' break.
- For each course and Program in this curriculum, the European Credit Transfer and Accumulation System (ECTS) is given as a numerical descriptive value of qualification expressed in terms of Student Work-Load (SWL). It is defined as "the number of working hours typically required to complete the learning activities of course units to achieve their expected learning outcomes." This system was adopted

## الجزء ٤: اللائحة الدراسية القائمة على نظام الساعات المعتمدة

## المادة (١٧): نظام البرامج:

- لغة التدريس الرسمية هي اللغة الإنجليزية ، وستقوم كلية الهندسة بالتأكد من إجادة الطالب في اللغة الإنجليزية. الكتب الدراسية والتكليفات والامتحانات كلها باللغة الإنجليزية.
- يجوز لمجلس الكلية بعد أخذ رأي اللجنة التنفيذية للبرنامج وحسب طبيعة المقررات الأكاديمية أن يقرر إجراء الاختبار إلكترونيا في مقرر أو أكثر. كما يجوز إجراء الاختبار في كل أو جزء من المقرر بطريقة تسمح بتصحيحها إلكترونيا.
- تتبع البرامج نظام الساعة المعتمدة (CH). هذا مقياس لساعات الاتصال بين اعضاء هيئة التدريس والطالب في كل فصل دراسي. ساعة معتمدة واحدة تعادل ساعات الاتصال بالمقرر على النحو التالي:

١- محاضرة أسبوعية مدتها ساعة واحدة لمدة فصل دراسي مدته ١٥ أسبوعا.

٢- ساعتان إلى ثلاث ساعات من البرنامج التعليمي الأسبوعي أو العمل المختبري لمدة فصل دراسي مدته ١٥ أسبوعا.

- تنقسم ساعة الاتصال الواحدة إلى ٥٠ دقيقة من التدريس الفعلي و ١٠ دقائق من الاستراحة.
- لكل دورة وبرنامج في هذا اللائحة ، يعطي نظام التحويل والتراكم الاوروبي (ECTS) كقيمة وصفية رقمية للمؤهلات معبرا عنها من حيث عبء عمل الطالب (SWL). يتم تعريفه على أنه "عدد ساعات العمل المطلوبة عادة لإكمال أنشطة التعلم لوحدات المقرر لتحقيق نتائج

through the Bologna Declaration in 1999 at the University of Bologna in Italy to facilitate the mobility of students through Europe.

**The total SWL comprises two components:**

1- The structured SWL which is the scheduled teacher-contact hour's interventions.
2- The unstructured SWL (USWL) which is the time spent by students in their own self-study, completing course assignments, and preparing for all types of exams, e.g. assessment workload.

- It has been considered as an essential description of the educational qualification recommended in the European Higher Education Area as a key element of the Bologna and Europeans Framework Qualifications in terms of total SWL.
- One ECTS credit corresponds to 25 hours of total student working, and each 15-weeks academic semester should meet 30 ECTS. As an agreed requirement, 750 hours of total SWL are necessary in a full academic semester, or about 50 hours of total SWL/per week.

**Expected values for each semester:**

1. 16-19 CHs
2. 25-28 Contact hours per week for 15 weeks
3. 750 hours of total student work load
4. 30 ECTS

The distribution of marks is left to course designer to decide. It depends on the nature of the course. Some courses are theoretical, and therefore give more marks to the exams, and some courses are more practical and therefore give more marks to the projects, assignments and labs.

التعلم المتوقعة". تم اعتماد هذا النظام من خلال إعلان بولونيا في عام ١٩٩٩ في جامعة Bologna في إيطاليا لتسهيل تنقل الطلاب عبر أوروبا.

**يتكون إجمالي SWL من مكونين:**

١. SWL المنظم وهو تدخلات ساعات الاتصال بالمعلمين المجدولة.
٢. SWL غير المنظم (USWL) وهو الوقت الذي يقضيه الطلاب في دراستهم الذاتية ، وإكمال مهام المقرر ، والتحضير لجميع أنواع الامتحانات ، مثل عبء عمل التقييم.

- وقد اعتبر وصفا أساسيا للمؤهل التعليمي الموصى به في منطقة التعليم العالي الأوروبية كعنصر أساسي في مؤهلات إطار Bologna والأوروبيين من حيث إجمالي SWL.
- يتوافق رصيد ECTS واحد مع ٢٥ ساعة من إجمالي عمل الطالب ، ويجب أن يفي كل فصل دراسي مدته ١٥ أسبوعا ب ٣٠ ECTS. كشرط متفق عليه ، ٧٥٠ ساعة من إجمالي SWL ضرورية في فصل دراسي كامل ، أو حوالي ٥٠ ساعة من إجمالي SWL / في الأسبوع.

**القيم المتوقعة لكل فصل دراسي:**

١. ١٦-١٩ ساعة المعتمدة
٢. ٢٥-٢٨ ساعة اتصال في الأسبوع لمدة ١٥ أسبوعا
٣. ٧٥٠ ساعة من إجمالي عبء عمل الطلاب
٤. ٣٠ نظام التحويل والتراكم الاوروبي (ECTS)

يترك توزيع العلامات لمصمم المقرر لاتخاذ قرار. ذلك يعتمد على طبيعة المقرر. بعض المقررات نظرية ، وبالتالي تعطي المزيد من العلامات للامتحانات ، وبعض المقررات أكثر عملية وبالتالي تعطي المزيد من العلامات للمشاريع والتكليفات والمختبرات.

## Article (18): Study Levels

- Whenever the student completes 25% of the Program requirements (36 Credit Hours), he will be transferred from one level to the next. The following Table shows the student status based on the completed number of achieved Credit Hours.

***Table 4 Study Levels and relation to the achieved Credit Hours.***

| Study Level | Student Status | Achieved Credit Hours |
|---|---|---|
| 1 | Freshman | 0% to less than 25% CH |
| 2 | Sophomore | 25% to less than 50% CH |
| 3 | Junior | 50% to less than 75% CH |
| 4 | Senior | 75% to less than 100% CH |

## المادة (١٨): المستويات الدراسية

- عندما يكمل الطالب ٢٥٪ من متطلبات البرنامج (٣٦ ساعة معتمدة) ، سيتم نقله من مستوى إلى آخر. يعرض الجدول التالي حالة الطالب بناء على العدد المكتمل للساعات المعتمدة التي تم تحقيقها.

**جدول ٤ مستويات الدراسة وعلاقتها بالساعات المعتمدة المحققة.**

| مستوى الدراسة | حالة الطالب | الساعات المعتمدة المحققة |
|---|---|---|
| ١ | طالب في الفرقة الأولى | ٠٪ إلى أقل من ٢٥٪ الساعات المعتمدة |
| ٢ | طالب في الفرقة الثانية | ٢٥٪ إلى أقل من ٥٠٪ الساعات المعتمدة |
| ٣ | طالب في الفرقة الثالثة | ٥٠٪ إلى أقل من ٧٥٪ الساعات المعتمدة |
| ٤ | طالب في الفرقة الرابعة | ٧٥٪ إلى أقل من ١٠٠٪ الساعات المعتمدة |

## Article (19): Academic Semesters and Course Registration

- The academic year comprises two main semesters (Fall semester and Spring Semester), and one optional summer semester:
  - ❖ First main semester (Fall): Begins on Saturday of the third week of September or the date set by the Supreme Council of Universities for the start of the study, and lasts for 15 weeks of teaching followed by 3 weeks of examinations. Course registration takes place within 3 weeks before the starting day of the semester.
  - ❖ Second main semester (Spring): Begins in February and lasts for 15 weeks followed by 3 weeks of examination. Course registration takes place within 1 week before the starting day of the semester.

## المادة (١٩): الفصول الدراسية وتسجيل المقررات

- يتكون العام الدراسي من فصلين دراسيين رئيسيين (فصل الخريف وفصل الربيع) ، وفصل صيفي اختياري:
  - ❖ الفصل الدراسي الرئيسي الأول (الخريف): يبدأ يوم السبت من الأسبوع الثالث من شهر سبتمبر أو الموعد الذي يحدده المجلس الأعلى للجامعات لبدء الدراسة، ويستمر لمدة ١٥ أسبوعا من التدريس تليها ٣ أسابيع من الامتحانات. يتم تسجيل المقرر في غضون ٣ أسابيع قبل يوم بدء الفصل الدراسي.
  - ❖ الفصل الدراسي الرئيسي الثاني (الربيع): يبدأ في فبراير ويستمر لمدة ١٥ أسبوعا يليه ٣ أسابيع من الامتحان. يتم تسجيل المقرر في غضون أسبوع واحد قبل يوم بدء الفصل الدراسي.

- Summer semester: Begins late June or early July and lasts for 7 weeks followed by 1 week of examination. Course registration takes place within 1 week before the starting day of the semester.
  - The detailed academic calendar is approved by the Faculty council and announced to students on the Faculty website before the start of the academic year.
  - Registration in the summer semester is optional.
  - New students' enrolment in the programs takes place all year long, after fulfilling all the programs enrolment requirements and paying the enrolment fees, per the student status.

- الفصل الصيفي: يبدأ في أواخر يونيو أو أوائل يوليو ويستمر لمدة ٧ أسابيع يليه أسبوع واحد من الامتحان. يتم تسجيل المقرر في غضون أسبوع واحد قبل يوم بدء الفصل الدراسي.
  - يتم اعتماد التقويم الأكاديمي التفصيلي من قبل مجلس الكلية والإعلان عنه للطلاب على موقع الكلية قبل بدء العام الدراسي.
  - التسجيل في الفصل الصيفي اختياري.
  - يتم تسجيل الطلاب الجدد في البرامج طوال العام ، بعد استيفاء جميع متطلبات التسجيل في البرامج ودفع رسوم التسجيل ، حسب حالة الطالب.

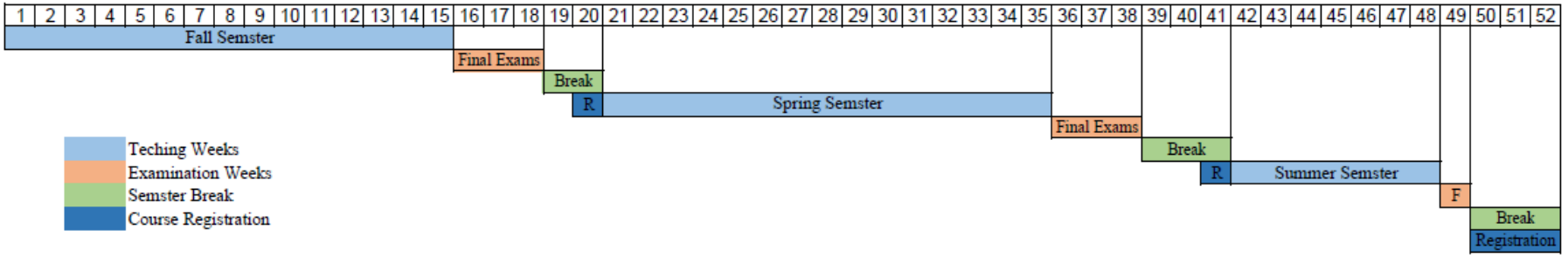



***Figure 1 Academic Calendar***

## Article (20): Program Study Duration

- The minimum allowed study duration is eight main semesters.
- The maximum allowed study duration is eight academic years, which does not include frozen semesters (suspension of registration - medical excuse - etc.) for reasons accepted by the Faculty of Engineering Council, after which the student is dismissed from the programs.

## Article (21): Terms of Course Registration

- The student may register for courses in the main semesters with a maximum total of Credit Hours according to the following rules (after approval of the Academic Advisor):
  - ❖ Up to 21 Credit Hours, for a student with a Cumulative GPA higher than or equal to 3.0.
  - ❖ Up to 18 Credit Hours, for a student with a Cumulative GPA higher than or equal to 2.0 but less than 3.0.
  - ❖ Up to 14 Credit Hours, for a student with a Cumulative GPA less than 2.0.

The student may register courses in the summer semester in a maximum total Credit Hours according to the following rules (after approval of the Academic Advisor):

- ❖ Up to 9 Credit Hours,

The student may register three additional credit hours for the maximum if his graduation depends on that with a recommendation of his academic Advisor and the approval of the academic board.

## المادة (٢٠): مدة دراسة البرنامج

- الحد الأدنى لمدة الدراسة المسموح بها هو ثمانية فصول دراسية رئيسية.
- الحد الأقصى لمدة الدراسة المسموح بها هو ثماني سنوات دراسية، ولا تشمل الفصول الدراسية المجمدة (تعليق التسجيل - العذر الطبي - إلخ) لأسباب يقتربها مجلس كلية الهندسة، وبعدها يتم فصل الطالب من البرامج.

## المادة (٢١): شروط التسجيل في المقررات

- يجوز للطالب التسجيل في المقررات في الفصول الدراسية الرئيسية بحد أقصى إجمالي الساعات المعتمدة وفقا للقواعد التالية (بعد موافقة المرشد الأكاديمي):
  - ❖ لغاية ٢١ ساعة معتمدة، للطالب الذي لديه معدل تراكمي أعلى من أو يساوي ٣,٠.
  - ❖ لغاية ١٨ ساعة معتمدة، للطالب الذي لديه معدل تراكمي أعلى من أو يساوي ٢,٠ ولكن أقل من ٣,٠.
  - ❖ لغاية ١٤ ساعة معتمدة، للطالب الذي لديه معدل تراكمي أقل من ٢,٠.

يجوز للطالب تسجيل المقررات في الفصل الصيفي بحد أقصى إجمالي الساعات المعتمدة وفقا للقواعد التالية (بعد موافقة المرشد الأكاديمي):

- ❖ ما يصل إلى ٩ ساعات معتمدة ،

يجوز للطالب تسجيل ثلاث ساعات معتمدة إضافية بحد أقصى إذا كان تخرجه يعتمد على ذلك بتوصية من مرشده الأكاديمي وبموافقة المجلس الأكاديمي.

## Article (22): Degree Awarding Requirements

- To obtain the Bachelor of Science Degree in Engineering, the student must successfully complete the required Credit Hours in one of the Majors according to the requirements stipulated in Part 5, with a cumulative GPA at graduation of at least 2.0.
- The student must pass all zero-credit courses in his Program.
- The student must perform Field Training in accordance with the rules stipulated in these bylaws.
- The student can study a number of courses in another University, which has a cooperation agreement with Nahda University regarding the transfer of Credits. This requires prior approval from FoE - NUB. The Credit Hours of these courses are included in the student's graduation requirements, if the Credit Hours of these courses do not exceed 40% of total Credit Hours for the program.

## Article (23): Field Training

- The student must complete two field-training sessions, each lasting 6 weeks, making the total training duration 12 weeks, in an industrial or service facility related to the student's program.
- The training follow-up will be handled by the academic advisor assigned by Program Executive Committee.
- A committee of examiners shall be formed by the competent department approved by the dean of the Faculty to hold an oral exam for the student
- The student must submit a technical report to committee of examiners at the end of the training period.

## المادة (٢٢): متطلبات منح الدرجات

- للحصول على درجة بكالوريوس العلوم في الهندسة ، يجب على الطالب إكمال الساعات المعتمدة المطلوبة بنجاح في أحد التخصصات وفقا للمتطلبات المنصوص عليها في الجزء ٥ ، مع معدل تراكمي عند التخرج لا يقل عن ٢,٠.
- يجب على الطالب اجتياز جميع المقررات بدون ساعات معتمدة في برنامجه.
- يجب على الطالب إجراء التدريب الميداني وفقا للقواعد المنصوص عليها في هذه اللائحة.
- يمكن للطالب دراسة عدد من المقررات في جامعة أخرى لها اتفاقية تعاون مع جامعة النهضة بشأن تحويل الساعات المعتمدة. هذا يتطلب موافقة مسبقة من FoE - NUB. يتم تضمين الساعات المعتمدة لهذه المساقات في متطلبات تخرج الطالب، إذا كانت الساعات المعتمدة لهذه المقررات لا تتجاوز ٤٠٪ من إجمالي الساعات المعتمدة للبرنامج.

## المادة (٢٣): التدريب الميداني

- يجب على الطالب إكمال جلستين تدريبيتين ميدانيتين ، مدة كل منهما ٦ أسابيع ، مما يجعل المدة الإجمالية للتدريب ١٢ أسبوعا ، في منشأة صناعية أو خدمية ذات صلة ببرنامج الطالب.
- سيتم التعامل مع متابعة التدريب من قبل المرشد الأكاديمي المعين من قبل اللجنة التنفيذية للبرنامج.
- تشكل القسم المختص لجنة من الممتحنين يوافق عليها عميد الكلية لإجراء امتحان شفوي للطالبة
- يجب على الطالب تقديم تقرير فني إلى لجنة الممتحنين في نهاية فترة التدريب.

- The company should submit a student's training evaluation form to the committee of examiners at the end of the training period
- The student's score in the field-training course is calculated on the basis of 50% of the student's activities (including the technical report + evaluation form from the company) and 50% for the oral exam by the examiners committee
- The field training is evaluated but does not count towards the cumulative GPA calculation.

## Article (24): Adding and Dropping course

- Upon the approval of the academic advisor, the student may add courses in the first week of the main semesters, or the first three days of the summer semester.
- The student can drop courses, until the end of the second week of the main semesters or the end of the first week of the summer semester.

## Article (25): Withdrawal from course

- The student may withdraw from the registration in one or more courses with an excuse accepted by the Faculty Council after the fourth week until the end of the tenth week or the first five weeks for the summer semester, taking into account the minimum academic load of the semester. In this case, the courses that have been withdrawn are recorded in the student's academic record.
- The student does not fail the withdrawn course, provided that the withdrawal application and approval are finalized within the time limit mentioned in the previous point.

- يجب على الشركة تقديم نموذج تقييم تدريب الطالب إلى لجنة الفاحصين في نهاية فترة التدريب.
- يتم احتساب درجة الطالب في المقرر لتدريبية الميدانية على أساس ٥٠٪ من أنشطة الطالب (بما في ذلك التقرير الفني + نموذج التقييم من الشركة) و ٥٠٪ للامتحان الشفوي من قبل لجنة الممتحنين.
- يتم تقييم التدريب الميداني ولكن لا يتم احتسابه ضمن حساب المعدل التراكمي.

## المادة (٢٤): إضافة وحذف المساق

- يجوز للطالب بعد موافقة المرشد الأكاديمي إضافة مقررات في الأسبوع الأول من الفصول الدراسية الرئيسية، أو الأيام الثلاثة الأولى من الفصل الصيفي.
- يمكن للطالب التخلي عن المقررات حتى نهاية الأسبوع الثاني من الفصول الدراسية الرئيسية أو نهاية الأسبوع الأول من الفصل الصيفي.

## المادة (٢٥): الانسحاب من المسار

- يجوز للطالب الانسحاب من التسجيل في مقرر أو أكثر بعذر يقبله مجلس الكلية بعد الأسبوع الرابع حتى نهاية الأسبوع العاشر أو الأسابيع الخمسة الأولى للفصل الصيفي، مع مراعاة الحد الأدنى للعبء الدراسي للفصل الدراسي. في هذه الحالة ، يتم تسجيل المقررات التي تم سحبها في السجل الأكاديمي للطالب.
- ألا يتخلف الطالب عن المقرر المسحوب بشرط الانتهاء من طلب الانسحاب والموافقة عليه خلال المهلة المذكورة في النقطة السابقة.

- The student gets a (W) grade in his academic record for the withdrawn course and is allowed to register that course (with full attendance and performing all activities including examinations) in a following semester.
- A student is not allowed to withdraw from a course if the number of hours the student takes in the semester is less than 12 hours, according to article (19).

## Article (26): Course Repeating

The student can repeat a course for improvement if his grade satisfies the minimum passing requirement, according to the following rules:

- The student gets the higher grade of the course after repeating. This grade is the one that will be accounted for in the cumulative GPA, on condition that the improvement should be shown in the student's transcript.
- The maximum number of times that the student can repeat for repeating is **five times** during his/her study duration, except for improving courses with the purpose of getting out of the academic probation or satisfying the graduation requirements.
- For the elective course, the student is allowed to change it in the following semesters. This is subject to the approval of the academic advisor and the requirements of his program.
- In case that the student fails in the repetition, the previous grade for the course is cancelled and is not counted after that, the student is considered to have failed and gets an F grade.
- If the student fails a course (gets F grade), he should repeat the course (full attendance and performing all activities), **according to the following rules:**

- يحصل الطالب على درجة (W) في سجله الأكاديمي للمقرر المسحوب ويسمح له بتسجيل ذلك المقرر (مع الحضور الكامل وأداء جميع الأنشطة بما في ذلك الامتحانات) في فصل دراسي تالي.
- لا يسمح للطالب بالانسحاب من مقرر إذا كان عدد الساعات التي يستغرقها الطالب في الفصل الدراسي أقل من ١٢ ساعة، وفقا للمادة (١٩).

## المادة (٢٦): تكرار المقرر

يمكن للطالب إعادة مقرر للتحسين إذا استوفى علامته الحد الأدنى من متطلبات النجاح ، وفقا للقواعد التالية:

- يحصل الطالب على الدرجة الأعلى من المقرر بعد التكرار. هذا المعدل هو الذي سيتم احتسابه في المعدل التراكمي ، بشرط أن يظهر التحسن في كشف درجات الطالب.
- الحد الأقصى لعدد المرات التي يمكن للطالب التكرار فيها هو **خمس مرات خلال** مدة دراسته، باستثناء تحسين المقررات بغرض الخروج من الاختبار الأكاديمي أو استيفاء متطلبات التخرج.
- بالنسبة للمقرر الاختياري ، يسمح للطالب بتغييره في الفصول الدراسية التالية. يخضع ذلك لموافقة المرشد الأكاديمي ومتطلبات برنامجه.
- في حالة فشل الطالب في الرسوب يتم إلغاء الدرجة السابقة للمقرر ولم يتم احتسابه بعد ذلك يعتبر الطالب راسبا ويحصل على درجة F.
- إذا رسب الطالب في مقرر (حصل على درجة F) ، فيجب عليه إعادة المقرر (الحضور الكامل وأداء جميع الأنشطة) ، **وفقا للقواعد التالية:**

- The maximum grade of the repeated course is B+.
- The student gets the grade of the course after repeating. This grade is the one that will be accounted for in the cumulative GPA, on condition that the repeating should be shown in the student's transcript.
- If a student repeats a course, he is required to repeat all course assessment criteria and will be completely re-evaluated. The course grade is calculated from scratch.

## Article (27): Enrolment Suspension

The Faculty Council may suspend a student's enrolment for four consecutive or separate main semesters during study duration in the faculty if he presents an excuse that prevents him from regularly attending in studies, which the Faculty Council has investigated. In case of necessity, the University Council may increase the period of suspension of enrolment.

## Article (28): Re-Enrollment

- Re-enrollment in the faculty with the approval of the faculty Council and the Academic Council after taking the opinion of the academic advisor and the Council of the department and the student's exhaustion academic warnings within the required period of time as a minimum of re-enrollment, which are four main semesters.
- The student shall pay the re-entry fee determined by the University Council, upon becoming a regular student once the absence of the reason for his dismissal from the faculty has ceased.
- The student shall register in the term of Re-enrollment a study load according to the last general cumulative rate before re-enrollment

- الحد الأقصى لدرجة المقرر المعاد هو B+.
- يحصل الطالب على تقدير المقرر بعد التكرار. هذا المعدل هو الذي سيتم احتسابه في المعدل التراكمي ، بشرط أن يظهر التكرار في كشف علامات الطالب.
- إذا كرر الطالب مقررا ، فسيطلب منه تكرار جميع معايير تقييم المقرر وسيتم إعادة تقييمه بالكامل. يتم احتساب درجة المقرر من البداية.

## المادة (٢٧): تعليق القيد

يجوز لمجلس الكلية إيقاف قيد الطالب لمدة أربعة فصول دراسية رئيسية متتالية أو منفصلة خلال مدة الدراسة في الكلية إذا قدم عذرا يمنعه من الحضور المنتظم للدراسة، والتي قام مجلس الكلية بالتحقيق فيها. يجوز لمجلس الجامعة في حالة الضرورة زيادة فترة وقف التسجيل

## المادة (٢٨): إعادة القيد

- إعادة القيد بالكلية بموافقة مجلس الكلية والمجلس الأكاديمي بعد أخذ رأي المرشد الأكاديمي ومجلس القسم وتحذيرات استنفاد الطالب الأكاديمي خلال المدة الزمنية المطلوبة كحد أدنى لإعادة القيد وهي أربعة فصول دراسية رئيسية.
- يسدد الطالب رسوم العودة التي يحددها مجلس الجامعة، عند بلوغه طالبا منتظما بعد زوال سبب فصله من الكلية.
- يسجل الطالب في مدة إعادة القيد عبء دراسي وفقا لآخر معدل تراكمي عام قبل إعادة التسجيل.

- The student may be registered and re-enrolled in the following cases:
  1. The new student who has not completed the registration procedures for an acceptable excuse.
  2. The student who withdrew his papers and is restricted to the faculty and gave an acceptable excuse.
  3. The student who did not apply to the Coordination Office in the year of obtaining the high school or its equivalent with acceptable excuse

## Article (29): Student Evaluation

- The marks of each course are distributed as percentages of the total mark, divided into Course Activities, Mid-Term Assessment, Technical Assessment, and Final Assessment.
- With considering Article (15), the student must attend at least 75% of tutorial and laboratory hours for the course, otherwise he is considered failed, in this case he is not allowed to attend the technical assessment or final assessment of the course (if any).
- The Faculty Council may, based on the study of the Executive Committee of the program and after taking the opinion of the relevant department council and according to the nature of the courses, decide to decide to hold the exam in all or part of the course in a way that allows it to be corrected electronically. This will be presented to the University's Education and Student Affairs Council for approval and submitted to the Supreme Council for approval.
- For the student to pass a course, the minimum mark that must be earned in the final assessment is 40% of the total final assessment marks, otherwise the student will fail the course irrespective of the total marks he earned in the course and he will get an F grade in this course.

- **يجوز تسجيل الطالب وإعادة تسجيله في الحالات التالية:**
  ١. الطالب المستجد الذي لم ينته إجراءات التسجيل لعذر مقبول.
  ٢. الطالب الذي سحب أوراقه ويقتصر على أعضاء هيئة التدريس وقدم عذرا مقبولا.
  ٣. الطالب الذي لم يتقدم إلى مكتب التنسيق في سنة حصوله على الثانوية العامة أو ما يعادلها بعذر مقبول

## المادة (٢٩): تقييم الطالب

- يتم توزيع علامات كل مقرر كنسب مئوية من العلامة الإجمالية ، مقسمة إلى أنشطة المقرر، وتقييم منتصف المدة ، والتقييم الفني ، والتقييم النهائي.
- مع مراعاة المادة (١٥) يجب على الطالب حضور ٧٥٪ على الأقل من الساعات التعليمية والمختبرية للمقرر، وإلا اعتبر راسبا، وفي هذه الحالة لا يسمح له بحضور التقييم الفني أو التقييم النهائي للمقرر (إن وجد).
- يجوز لمجلس الكلية بناء على دراسة اللجنة التنفيذية للبرنامج وبعد أخذ رأي مجلس القسم المعني ووفقا لطبيعة المقررات أن يقرر عقد الاختبار في كل أو جزء من المقرر بما يسمح بتصحيحه إلكترونيا. وسيتم عرض هذا المبلغ على مجلس شؤون التعليم والطلاب بالجامعة للموافقة عليه ورفعه إلى المجلس الأعلى للموافقة عليه.
- لكي يجتاز الطالب مقررا ، فإن الحد الأدنى للعلامة التي يجب الحصول عليها في التقييم النهائي هو ٤٠٪ من إجمالي علامات التقييم النهائي ، وإلا سيرسوب الطالب في المقرر بغض النظر عن إجمالي العلامات التي حصل عليها في المقرر وسيحصل على درجة F في هذا المقرر.

- The student fails the course if he obtains an F grade (less than 60% of the course marks) or was not allowed to attend the final assessment because of exceeding the absence percentage or cheating … etc. or did not attend the final assessment without submitting a prior excuse that is accepted by the Education and Student Affairs Committee and approved by the Faculty Council of Engineering.
- Zero-Credit courses are marked as Pass or Fail. The student gets a grade but does not contribute to the cumulative GPA. To pass the course, the student should get at least 60% of the course total marks.

## Article (30): Course Grades

- The grade of each course is calculated based on the marks a student collects during his study of this course (Student Activities – Mid Term Assessment – Technical Assessment – Final Assessment). The following table shows how to calculate the grades and equivalent points based on the collected marks. The student must get a minimum Grade D in order to pass the course and be considered in the calculation of the Semester GPA and Cumulative GPA.
- The distribution of the marks among different assessment typologies is determined in the course description table of this Bylaws. However, the Faculty Council can modify the distribution for a course due to the different nature of the program upon request of the concerned Department and announce to the students before the beginning of the semester.

- رسوب الطالب في المقرر إذا حصل على درجة F (أقل من ٦٠٪ من علامات المقرر) أو لم يسمح له بحضور التقييم النهائي بسبب تجاوز نسبة الغياب أو الغش ... إلخ أو لم يحضر التقييم النهائي دون تقديم عذر مسبق تقبله لجنة شئون التعليم والطلاب ويوافق عليه مجلس كلية الهندسة.
- يتم وضع علامة على المقررات التدريبية بدون ساعات معتمدة على أنها ناجحة أو راسبة. يحصل الطالب على درجة ولكنه لا يساهم في المعدل التراكمي. لاجتياز المقرر ، يجب أن يحصل الطالب على ٦٠٪ على الأقل من إجمالي درجات المقرر.

## المادة (٣٠): درجات المقررات

- يتم احتساب درجة كل مقرر بناء على العلامات التي يجمعها الطالب أثناء دراسته لهذا المقرر (الأنشطة الطلابية – تقييم منتصف الفصل الدراسي – التقييم الفني – التقييم النهائي). يوضح الجدول التالي كيفية حساب الدرجات والنقاط المكافئة بناء على العلامات التي تم جمعها. يجب أن يحصل الطالب على درجة D كحد أدنى لاجتياز المقرر وأن يتم أخذه في الاعتبار عند حساب المعدل التراكمي للفصل الدراسي والمعدل التراكمي.
- يتم تحديد توزيع العلامات بين أنماط التقييم المختلفة في جدول وصف المقرر في هذه اللائحة. ومع ذلك ، يمكن لمجلس الكلية تعديل التوزيع لمقرر ما نظرا لاختلاف طبيعة البرنامج بناء على طلب القسم المعني والإعلان عنه للطلاب قبل بداية الفصل الدراسي.

*Table 5 Course marks, grades and equivalent points.*

| Marks % Collected | Student Status | Points |
|---|---|---|
| 97% and above | A+ | 4.0 |
| 93% to less than 97% | A | |
| 89% to less than 93% | A- | 3.7 |
| 84% to less than 89% | B+ | 3.3 |
| 80% to less than 84% | B | 3.0 |
| 76% to less than 80% | B- | 2.7 |
| 73% to less than 76% | C+ | 2.3 |
| 70% to less than 73% | C | 2.0 |
| 67% to less than 70% | C- | 1.7 |
| 64% to less than 67% | D+ | 1.3 |
| 60% to less than 64% | D | 1.0 |
| Less than 60% | F | 0.0 |

**الجدول ٥ - علامات المقررات الدراسية والدرجات والنقاط المعادلة.**

| العلامات ٪ المحصلة | حالة الطالب | النقاط |
|---|---|---|
| ٩٧٪ فما فوق | +A | ٤,٠ |
| ٩٣٪ إلى أقل من ٩٧٪ | A | |
| ٨٩٪ إلى أقل من ٩٣٪ | -A | ٣,٧ |
| ٨٤٪ إلى أقل من ٨٩٪ | +B | ٣,٣ |
| ٨٠٪ إلى أقل من ٨٤٪ | B | ٣,٠ |
| ٧٦٪ إلى أقل من ٨٠٪ | -B | ٢,٧ |
| ٧٣٪ إلى أقل من ٧٦٪ | +C | ٢,٣ |
| ٧٠٪ إلى أقل من ٧٣٪ | C | ٢,٠ |
| ٦٧٪ إلى أقل من ٧٠٪ | -C | ١,٧ |
| ٦٤٪ إلى أقل من ٦٧٪ | +D | ١,٣ |
| ٦٠٪ إلى أقل من ٦٤٪ | D | ١,٠ |
| أقل من ٦٠٪ | F | ٠,٠ |

## Article (31): Estimates not included in the calculation of the student's GPA:

## المادة (٣١): التقديرات غير المشمولة بحساب المعدل التراكمي للطالب:

*Table 6 Grades don't include in the calculation of the student's GPA*

| Rating | Description |
|---|---|
| P | Pass |
| F | Fail |
| I | Incomplete |
| W | Withdraw |
| AU | Audit |
| FW | Forbidden |
| FX | absence without excuse |

**الجدول ٦ لا يتم تضمين الدرجات في حساب المعدل التراكمي للطالب**

| تقييم الموقع | وصف |
|---|---|
| P | ناجح |
| F | راسب |
| I | غير مكتمل |
| W | انسحاب |
| AU | إستماع |
| FW | حرمان |
| FX | غياب بدون عذر |

## Article (32): Prerequisite:

- The prerequisite is a course which must be completed for the study of a subsequent course and the following conditions apply:
  1. A student may not take a course before successfully completing the prerequisite.
  2. A student may register one course in parallel with its prerequisite upon the approval of the lecturer or the department, if he is in the final term for graduation.

## Article (33): Incomplete (I):

- If a student does not attend the final exam of the course in a semester with an excuse that is accepted by the Program Executive Committee and approved by the Faculty Council of Engineering, the course is considered Incomplete.
- The student will temporarily receive a grade (I) in the course until the exam is conducted. If the student fails to attend the final exam at the next available date two weeks after the end of the academic semester, the student will receive a grade (F) in that course. Grade (I) will not count towards the student's cumulative GPA.
- If the student cannot complete the study requirements of a specific course at the end of the semester, the student will be given an "Incomplete" grade. The instructor will fill in an incomplete form specifying the reasons and specify the assignments that the student did not complete. The student shall perform the makeup exam two week after the last exam in the Final Term Exam.

## المادة (٣٢): المتطلب السابق:

- الشرط الأساسي هو مقرر يجب إكماله لدراسة مقرر لاحق وتنطبق الشروط التالية:

١. لا يجوز للطالب أن يأخذ مقررا قبل إكمال الشرط الأساسي بنجاح.

٢. يجوز للطالب تسجيل مقرر واحد بالتوازي مع متطلباته الأساسية بعد موافقة المحاضر أو القسم إذا كان في الفصل الدراسي النهائي للتخرج.

## المادة (٣٣): غير مكتمل (I):

- إذا لم يحضر الطالب الامتحان النهائي للمقرر في فصل دراسي بعذر تقبل به اللجنة التنفيذية للبرنامج ويوافق عليه مجلس كلية الهندسة يعتبر المقرر غير مكتمل.
- سيحصل الطالب مؤقتا على درجة (I) في المقرر حتى يتم إجراء الاختبار. إذا فشل الطالب في حضور الاختبار النهائي في الموعد التالي المتاح بعد أسبوعين من نهاية الفصل الدراسي ، فسيحصل الطالب على درجة (F) في ذلك المقرر. لن يتم احتساب الدرجة (I) ضمن المعدل التراكمي للطالب.
- . إذا لم يتمكن الطالب من إكمال متطلبات الدراسة لمقرر معين في نهاية الفصل الدراسي ، منح الطالب درجة "غير مكتملة". سيقوم المدرس بملء نموذج غير مكتمل يحدد الأسباب ويحدد الواجبات التي لم يكملها الطالب. يجب على الطالب إجراء الامتحان تعويضي بعد أسبوعين من الامتحان الأخير من امتحان الفصل النهائي.

- The student must complete all the course requirements within two weeks after the last exam in the Final Term Exam in the same semester; otherwise he/she will receive a failed assessment in the course.

## Article (34): Study Dismissal and Academic Warning

- A student receives an academic warning if his/her GPA is less than 2.0 in any main semester.
- A student will be dismissed from the university if his/her cumulative GPA remains below 2.0 for half of the required study duration (excluding summer semesters).
- If the student raises his cumulative GPA to 2.0 or above in any main semester, the count of consecutive academic warnings will be reset.
- If a student fails to meet graduation requirements within the maximum study duration, they will be permanently dismissed from the university.
- The student will be dismissed from FoE - NUB if he/she obtains a GPA of less than 1.0 in the first three consecutive main semesters.
- A student facing dismissal due to inability to raise his/her GPA to 2.0 will be granted one final opportunity.
- This opportunity includes studying two consecutive main semesters, plus a summer semester, provided that:
  - ❖ The student has successfully completed at least 80% of the total credit hours required for graduation.
  - ❖ There is a realistic chance to raise his/her semester GPA to at least 2.0.

- يجب على الطالب إكمال جميع متطلبات المقرر في غضون أسبوعين بعد الامتحان الأخير في امتحان الفصل النهائي في نفس الفصل الدراسي. وإلا فسوف يتلقى تقييما فاشلا في المقرر.

## المادة (٣٤): الفصل الدراسي والتنبيه الأكاديمي

- يتلقى الطالب إنذارا أكاديميا إذا كان معدله التراكمي أقل من ٢,٠ في أي فصل دراسي رئيسي.
- سيتم فصل الطالب من الجامعة إذا ظل معدله التراكمي أقل من ٢,٠ لمدة نصف مدة الدراسة المطلوبة (باستثناء الفصول الصيفية).
- إذا رفع الطالب معدله التراكمي إلى ٢,٠ أو أعلى في أي فصل دراسي رئيسي ، إعادة تعيين عدد التحذيرات الأكاديمية المتتالية.
- إذا فشل الطالب في تلبية متطلبات التخرج خلال الحد الأقصى لمدة الدراسة ، فصله نهائيا من الجامعة.
- سيتم فصل الطالب من كلية الهندسة جامعة النهضة إذا حصل على معدل تراكمي أقل من ١,٠ في الفصول الدراسية الرئيسية الثلاثة الأولى المتتالية.
- سيتم منح الطالب الذي يواجه الفصل بسبب عدم قدرته على رفع معدله التراكمي إلى ٢,٠ فرصة أخيرة.
- تشمل هذه الفرصة دراسة فصلين دراسيين رئيسيين متتاليين، بالإضافة إلى فصل صيفي، شريطة:
  - ❖ أكمل الطالب بنجاح ما لا يقل عن ٨٠٪ من إجمالي الساعات المعتمدة المطلوبة للتخرج.
  - ❖ هناك فرصة واقعية لرفع المعدل التراكمي للفصل الدراسي إلى ٢,٠ على الأقل.

## Article (35): Calculation of the Cumulative Grade Point Average (GPA)

- The Cumulative GPA score for a semester is calculated by obtaining the GPA score multiplied by the number of credit hours for each course to produce the so-called quality points. The sum of the quality points is then divided by the total number of credit hours in which the Cumulative GPA score is calculated.
- To obtain CGPA, the total qualitative score is divided by the total credit hours of the courses whose points are included in the calculation of the average CGPA for all semesters. The student's academic load in any semester (excluding the summer semester) is determined by the CGPA and not by the GPA of the previous semester.

  **Note:** The third decimal point of the average cumulative score is rounded to only two decimal places in accordance with the accepted accounting rules or as determined by the approved university regulations.

## Article (36): The Approval of the Final Examination Results:

Council of the University shall approve the results of the final examinations to obtain a bachelor's degree or a higher degree at the suggestion of the Faculty Council.

## المادة (٣٥): حساب المعدل التراكمي

- يتم احتساب درجة المعدل التراكمي للفصل الدراسي من خلال الحصول على درجة المعدل التراكمي مضروبا في عدد الساعات المعتمدة لكل مقرر لإنتاج ما يسمى بنقاط الجودة. ثم يتم تقسيم مجموع نقاط الجودة على إجمالي عدد الساعات المعتمدة التي يتم فيها حساب المعدل التراكمي للمعدل التراكمي.
- للحصول على المعدل التراكمي ، يتم تقسيم الدرجة النوعية الإجمالية على إجمالي الساعات المعتمدة للمقررات التي يتم تضمين نقاطها في حساب متوسط المعدل التراكمي لجميع الفصول الدراسية. يتم تحديد العبء الأكاديمي للطالب في أي فصل دراسي (باستثناء الفصل الصيفي) من خلال المعدل التراكمي وليس المعدل التراكمي للفصل الدراسي السابق.

**ملاحظة:** يتم تقريب الفاصلة العشرية الثالثة من متوسط الدرجة التراكمية إلى منزلتين عشريتين فقط وفقا للقواعد المحاسبية المقبولة أو وفقا لما تحدده لوائح الجامعة المعتمدة.

## المادة (٣٦): الموافقة على نتائج الامتحان النهائي:

يوافق مجلس الجامعة على نتائج الامتحانات النهائية للحصول على درجة البكالوريوس أو أعلى بناء على اقتراح مجلس الكلية.

## Article (37): Declaration of Honour:

For a student to achieve the declaration of honour, he / she has to fulfil the following conditions:

- Maintain a cumulative GPA of 3.3 throughout his study at the Program and any semester GPA should be higher than or equal 3.3.
- Does not fail any course throughout his study at the Program.
- Did not get any penalty throughout his study at the Faculty.

## Article (38): Scholarships:

The University offers scholarships to outstanding students and students who face special emergency circumstances in accordance with the system established by the University Council and approved by the Board of Trustees.

## Article (39): Discipline of Students:

The provisions of Law No. 12 of 2009 for Private and Private Universities and the Law of Organizing Universities No. 49 of 1972, its Executive Regulations and the decisions of the University Council apply to student discipline.

## Article (40): General Provisions:

- No student may declare being unaware of any contents of the above-mentioned articles or of not being informed of the publications issued by the University.
- These regulations shall be applied on newly admitted students, where these regulations might be applied on old students if they were subject to clearing procedure, and then approved by the Faculty Council.

## المادة (٣٧): مرتبة الشرف:

لكي يحصل الطالب على مرتبة الشرف، فإن عليه أن يستوفي الشروط التالية :

- الحفاظ على المعدال التراكمى ٣,٣ خلال فترة دراساته بالبرنامج مع تحقيق هذا المعدل على الأقل خلال جميع فصول الدراسة
- ألا يكون قد رسب فى أى مقرر دراسي خلا فترة راسته بالبرنامج
- ألا يكون قد تم توقيع أى عقوبات تأديبية خلال فترة دراسته بالكلية

## المادة (٣٨): الابتعاث:

تقدم الجامعة منحا دراسية للطلاب المتفوقين والطلاب الذين يواجهون ظروفا طارئة خاصة وفقا للنظام الذي وضعه مجلس الجامعة ويوافق عليه مجلس الأمناء.

## المادة (٣٩): تأديب الطلاب:

تسري على الانضباط الطلابي أحكام القانون رقم (١٢) لسنة ٢٠٠٩ بشأن الجامعات الخاصة والخاصة وقانون تنظيم الجامعات رقم (٤٩) لسنة ١٩٧٢ ولائحته التنفيذية وقرارات مجلس الجامعة.

## المادة (٤٠): أحكام عامة:

- لا يجوز لأي طالب أن يثبت عدم علمه بأي من محتويات المواد المذكورة أعلاه أو عدم إبلاغه بالمطبوعات الصادرة عن الجامعة.
- تطبق هذه اللائحة على الطلاب المقبولين حديثا، حيث يجوز تطبيق هذه اللائحة على الطلاب القدامى إذا كانوا خاضعين لإجراءات المقصة، ثم اعتمادها من مجلس الكلية.

- Law No. 12 of 2009 for national and private universities and the Law of Organizing Universities No. 49 of 1972 and its executive regulations and its amendments and the resolutions of the University Council.

- وعلى القانون رقم (١٢) لسنة ٢٠٠٩ بشأن الجامعات الخاصة و الأهلية وقانون تنظيم الجامعات رقم (٤٩) لسنة ١٩٧٢ ولائحته التنفيذية وتعديلاته وقرارات مجلس الجامعة.

- ## Part 5. Details of the Offered Programs

Nahda University, upon the request of the Faculty of Engineering Council, awards the Bachelor of Science (B.Sc.) Degree in one of the Majors enumerated in Table 7.

***Table 7. List of offered programs by the Faculty of Engineering, Nahda University.***

| # | Program | Code |
|---|---|---|
| 1 | Intelligent and Sustainable Civil Engineering Program | CVE |
| 2 | Digital Architecture Engineering Program | DAE |
| 3 | Communications and Computers Engineering Program | CCE |
| 4 | Mechatronics and Intelligent Machines Engineering Program | MIM |
| 5 | Electrical Power and Renewable Energy Engineering Program | EPR |

According to the Supreme Council of Universities Terms of Reference for Undergraduate Engineering Programs, the courses in any program are divided into the following categories:

1.University requirements.
2.Faculty requirements.
3.Discipline requirements.
4.Program requirements.

***Table 8 shows the distribution of Credit Hours among different programs.***

| | University requirements | Faculty requirements | Discipline requirements | Program requirements |
|---|---|---|---|---|
| **Offered Programs** | 11 CH<br>8% | 33 CH<br>23% | 59 – 68 CH<br>40 – 47 % | 34 – 42 CH<br>24 – 29 % |

Figure 2 shows the different levels of competences as published in National Academic Reference Standards (NARS-2018). These Levels of competences determine the allocation of courses in different competency level with respect to the level requirements.

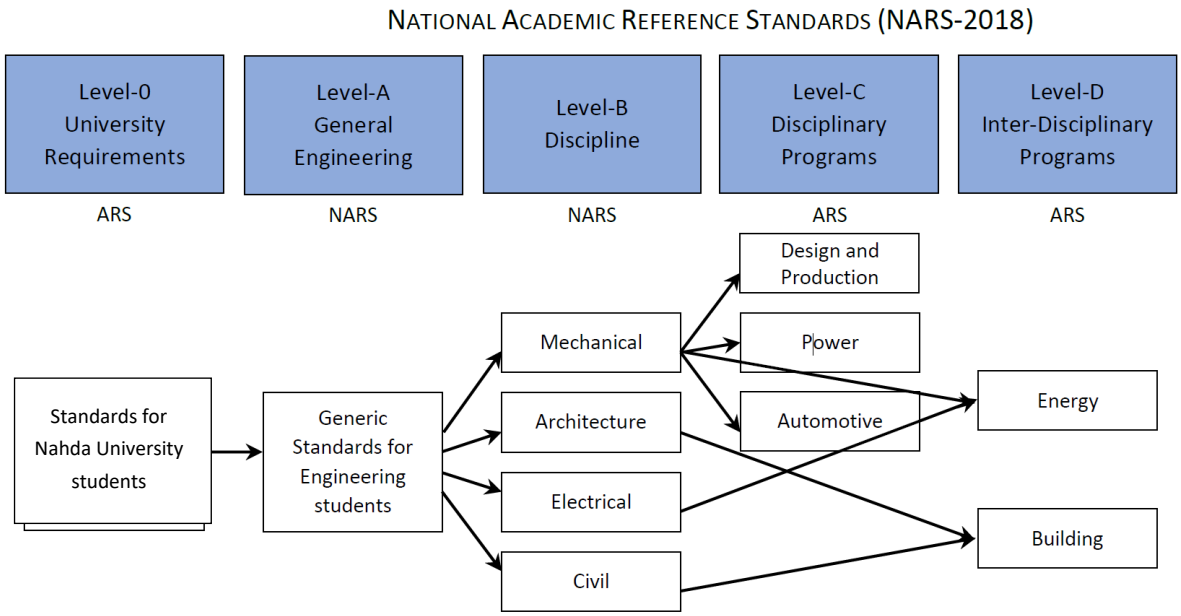



***Figure 2 Different Levels of Competences as per NARS 2018, as published by NAQAAE***

***Table 9. Summarizes the overall data about the programs included in these bylaws.***

| # | Program | NC | Weight | | | Total Contact Hours | | | | Requirements Distribution % | | | | BS % | EC % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CH | ECTS | SWL | Lec | Tut | Lab | TT | UR | FR | DR | PR | | |
| 1 | CVE | 60 | 144 | 250 | 6250 | 110 | 76 | 32 | 218 | 8% | 23% | 40% | 29% | 18% | 20% |
| 2 | DAE | 57 | 144 | 250 | 6250 | 86 | 103 | 33 | 222 | 8% | 19% | 47% | 26% | 15% | 15% |
| 3 | CCE | 58 | 144 | 250 | 6250 | 108 | 62 | 51 | 221 | 8% | 23% | 41% | 28% | 20% | 15% |
| 4 | MIM | 58 | 144 | 250 | 6250 | 108 | 57 | 53 | 218 | 8% | 23% | 40% | 29% | 18% | 15% |
| 5 | EPR | 56 | 144 | 250 | 6250 | 104 | 72 | 67 | 243 | 8% | 23% | 42% | 27% | 19% | 18% |

**NC** Total number of Courses
**CH** Credit Hour
**ECTS** European Credit Transfer System
**SWL** Student Workload

**Lec** Lectures
**Tut** Tutorials
**Lab** Laboratory
**TT** Total

**UR** University Requirement
**FR** Faculty Requirement
**DR** Discipline Requirement
**PR** Program Requirement

**BS** Basic Sciences Percentage, Credit Hours
**EC** Elective Courses Percentage, by Credit Hours

- ## Part 6. Academic Course Categorization and Coding System

  - The courses are categorized according to Figure (2), and this categorization is important as it connects them to the scientific program or department that offers them, regardless of the students' specialization. The first part of the course code is the program or scientific department code. The second part of the course code consists of three numbers: the first ($N_1$) represents the level, the second number ($N_2$) represents the minor specialization number within the program, and the third ($N_3$) represents the course number in the minor specialization.
  - The university's requirements for humanities, social sciences, and business administration are symbolized by the symbol (NUB)

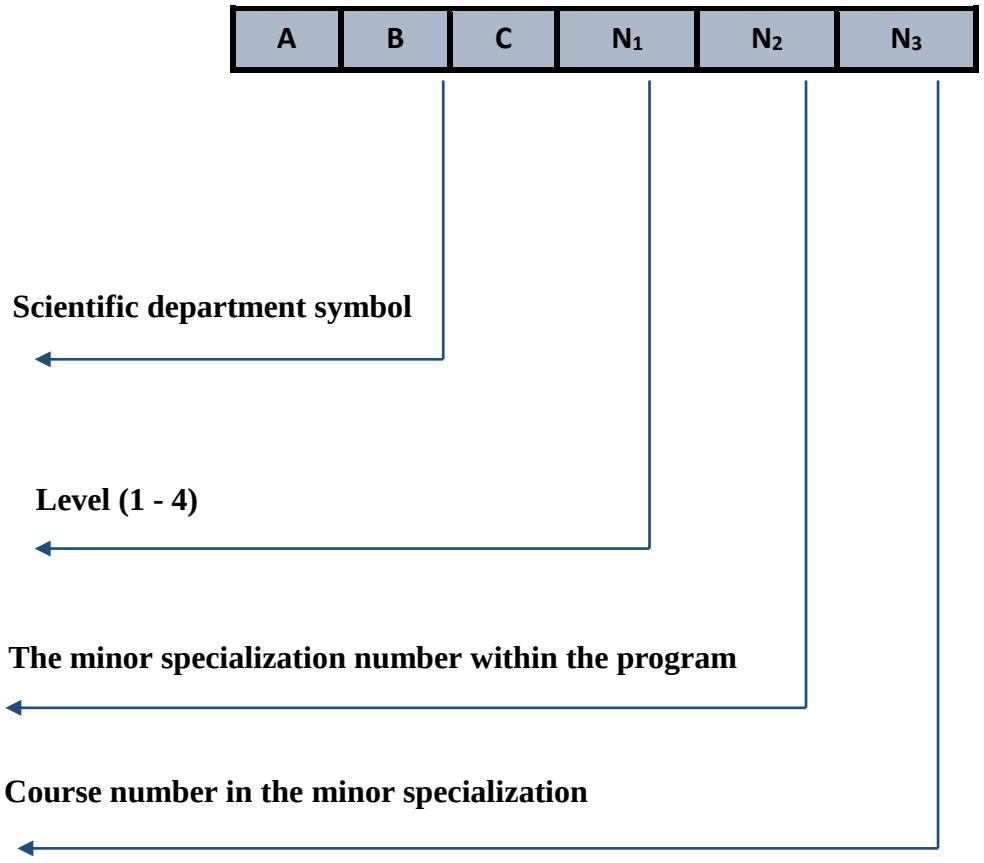



*Figure (2) - Academic Course Categorization*

# Nahda University Requirements

- ## Nahda University Requirements Courses

In Egypt, the university is considered a core of Human Thinking at its highest level, and the source of investment and development of human resources. It is responsible for the progess of the Arabian Civilization, sustaining the Historical Heritage of the Egyptian Society, and conserving its traditions. It is also concerned with the education of Religion, Morals and Nationalism (Egyptian National Law for Universities, Law 49 for Year 1972).

To achieve this goal, Nahda University has designed several courses planned to build the student's personality, develop his skills, and increase his awareness of different topics. These courses are called University Requirements. These courses are:

| Code | Course Title | Credits | | | Contact Hours | | | |
|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| - | University Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| - | University Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| - | University Elective (3) | 1 | 2 | 50 | 1 | 0 | 0 | 1 |
| - | University Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| CS-121 | Aptech-Computer Skills (1) | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| CS-122 | Aptech-Computer Skills (2) | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| CS-123 | Aptech-Computer Skills (3) | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| **Total** | | 11 | 18 | 450 | 11 | 0 | 0 | 11 |
| **Pool of University Elective (1) (One Course)** | | | | | | | | |
| NUB111 | History of Engineering | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB112 | Modern history of Egypt | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB113 | History of Civilizations | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB114 | Fundamentals of Engineering | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| **Pool of University Elective (2) (One Course)** | | | | | | | | |
| NUB121 | Report Writing and Communication Skills | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB122 | Climate Change, Energy and Water Issues | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB123 | Scientific Thinking | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| **Pool of University Elective (3) (One Course)** | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NUB131 | Professional Legislations and Engineering Ethics | 1 | 2 | 50 | 1 | 0 | 0 | 1 |
| NUB132 | Literature and Arts | 1 | 2 | 50 | 1 | ٠ | ٠ | 1 |
| NUB133 | Human Rights | 1 | 2 | 50 | 1 | ٠ | ٠ | 1 |
| NUB134 | Professional Ethics | 1 | 2 | 50 | 1 | ٠ | ٠ | 1 |
| **Pool of University Elective (4) (One Course)** | | | | | | | | |
| NUB141 | Building Safety and Fire Protection | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB142 | Entrepreneurship and Startups | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB143 | Business Administration | 2 | 3 | 75 | 2 | 0 | 0 | 2 |
| NUB144 | Principle of General Management | 2 | 3 | 75 | 2 | 0 | 0 | 2 |

- The pass of these courses in the table above is a prerequisite for graduation and is divided into three types as follows:

**Type 1:**

- Calculated in the cumulative total and calculated in the number of graduation hours.

**Type 2:**

- English language courses are not counted in the cumulative total and are calculated in the number of graduation hours.
- If the student is exempted from one or more of the English language courses based on the placement test result, the student must choose a course from the university faculties or an alternative course from the general requirements of the faculty to complete the credit hours of the university requirements.

**Type 3:**

- Computer Skills courses are not counted in the cumulative total and are not counted in the number of graduation hours.

- **Nahda University Requirements Courses Content**

| ENG111 | English (1) | 1 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

Aptech at NUB – preparing students with essential skills for the job market

NUB is committed to developing the student knowledge and skills so that our graduates become job ready at graduation. NUB, in association with Aptech Learning and Training Academy Ltd., India, for the first time in academic year 2017-18, introduced accredited English and computer courses as university requirements across all faculties. The courses are obligatory for students starting their first year at NUB, and are taught across three academic years, six semesters.

Spoken English courses from Aptech enable learners to use English for everyday situations and purposes related to social life, workplace and leisure. These courses prompt learners to use their own knowledge and personal experiences to express their ideas and opinions during classroom sessions.

The course delivered at NUB consists of five levels from Beginners level to Professional level and is equivalent to four credit hours.

Year 1 courses: Beginners and Spoken English – Pre Intermediate; Credit hours: 1, The course duration is two semesters.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| ENG112 | English (2) | 1 CH |
|---|---|---|
| Prerequisites | English (1) - ENG111 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

Aptech at NUB – preparing students with essential skills for the job market.

NUB is committed to developing the student knowledge and skills so that our graduates become job ready at graduation. NUB, in association with Aptech Learning and Training Academy Ltd., India, for the first time in academic year 2017-18, introduced accredited English and computer courses as university requirements across all faculties. The courses are obligatory for students starting their first year at NUB, and are taught across three academic years, six semesters.

Spoken English courses from Aptech enable learners to use English for everyday situations and purposes related to social life, workplace and leisure. These courses prompt learners to use their own knowledge and personal experiences to express their ideas and opinions during classroom sessions.

The course delivered at NUB consists of five levels from Beginners level to Professional level and is equivalent to four credit hours.

Year 2 courses: Spoken English – Intermediate and Upper Intermediate; Credit hours: 1, The course duration is two semesters.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| ENG113 | English (3) | 2 CH |
|---|---|---|
| Prerequisites | English (2) - ENG112 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

Aptech at NUB – preparing students with essential skills for the job market

NUB is committed to developing the student knowledge and skills so that our graduates become job ready at graduation. NUB, in association with Aptech Learning and Training Academy Ltd., India, for the first time in academic year 2017-18, introduced accredited English and computer courses as university requirements across all faculties. The courses are obligatory for students starting their first year at NUB, and are taught across three academic years, six semesters.

Spoken English courses from Aptech enable learners to use English for everyday situations and purposes related to social life, workplace and leisure. These courses prompt learners to use their own knowledge and personal experiences to express their ideas and opinions during classroom sessions.

The course delivered at NUB consists of five levels from Beginners level to Professional level and is equivalent to four credit hours.

| Year 3 courses: Business Communication; Credit hours: 2, The course duration is two semesters. | | | |
|---|---|---|---|
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| NUB111 | History of Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| The evolution of engineering from ancient to modern times, covering key innovations, influential engineers, and significant technological advancements. Topics include ancient engineering marvels, medieval construction techniques, Renaissance inventions, Industrial Revolution mechanization, and 20th-century breakthroughs. Emphasis is placed on sustainable and future engineering trends, highlighting the role of artificial intelligence and emerging technologies in shaping the future of engineering. |
| References |
| • "Engineering: An Illustrated History from Ancient Craft to Modern Technology" by Tom Jackson<br>• "The History of Engineering" by Graham Hollister-Short<br>• "The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution" by Walter Isaacson |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB112 | Modern history of Egypt | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Egypt's modern history from the 19th century to the present, focusing on significant political, social, and economic developments. Key topics include the British occupation, the 1952 revolution, Nasser's presidency, the Sadat era, Mubarak's rule, and the 2011 revolution. The course highlights Egypt's evolving role in regional and global contexts, emphasizing contemporary challenges and future prospects. |
| References |
| • "A History of Modern Egypt" by Afaf Lutfi al-Sayyid Marsot<br>• "Modern Egypt: The Formation of a Nation-State" by Arthur Goldschmidt Jr.<br>• "The Egyptian Revolution of 2011: A Brief History" by Azmi Bishara |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB113 | History of Civilizations | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Development and impact of major civilizations throughout history. It covers the rise and fall of ancient civilizations, including Mesopotamia, Egypt, Greece, Rome, China, and the Indus Valley. Key topics include cultural, technological, and political contributions, as well as interactions between civilizations. The course also examines the influence of these ancient civilizations on modern societies and their lasting legacies. |
| References |
| • "Guns, Germs, and Steel: The Fates of Human Societies" by Jared Diamond<br>• "A History of World Civilizations" by Philip J. Adler and Randall L. Pouwels<br>• "Civilization: The West and the Rest" by Niall Ferguson |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB114 | Fundamentals of Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

History of Engineering, Engineering definition, Engineering fields of specialization, Engineer carrier path, Engineers initial carrier profile, Study programs at NUB Faculty of Engineering, registration, advising and examination procedures, The engineering approach to problem solving, Engineering calculations: Numbering systems, units and dimensions, The International System of Units, Units Used with SI, Units conversions, Significant Figures, Scientific Notation, Branches of mathematics and physics. Case studies

References

- "Introduction to Engineering Design " by Andrew Samuel
- "Fundamentals of Engineering Mechanics" by Ferdinand P. Beer & E. Russell JohnstonJr
- "Engineering Mechanics: Statics and Dynamics" by R.C. Hibbeler

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB121 | Report Writing and Communication Skills | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Typography and writing, Formal report components, types of engineering reports, content and appearance, communication types, nonverbal communication, memo, letter, email and social media, infographics in reports and presentations, types of graphs, how to evaluate written material and oral presentations.

References

- "Technical Communication" by Mike Markel and Stuart A.
- Selber "The Elements of Style" by William Strunk Jr. and E.B. White
- "Communicating in Groups: Applications and Skills" by Katherine Adams and Gloria Galanes

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB122 | Climate Change, Energy and Water Issues | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Global climate and the greenhouse effect, Global Mean Surface Temperature, Heating and cooling of earth, the natural greenhouse effect, Energy flows within earth-atmosphere system, Global energy budget, Water cycles, Ground and surface water, Water-Food-Energy nexus, Resources efficiency, Environmental indicators.

References

- Islam R Khan MM. The Science of Climate Change. Hoboken NJ Beverly MA: John Wiley and Sons; Scrivener Publishing; 2019.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB123 | Scientific Thinking | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

**Concept and Characteristics of Logical Thinking** - Methods and Approaches to Thinking, Correlation, and Inference - Types and Objectives of Scientific Research - Concept of Scientific Research - Characteristics of Scientific Research - Stages, Steps, and Methodology of Scientific Research - Criteria and Guidelines for Utilizing Scientific Research to Serve Development Issues

References

- **“**Moore BN Parker R. Critical Thinking. Thirteenth ed. New Yo4k NY United States of America: McGraw-Hill Education; 2021

- "Scientific Methods in Practice" by Hugh G. Gauch
- "The Structure of Scientific Revolutions" by Thomas S. Kuhn
- "Thinking, Fast and Slow" by Daniel Kahneman

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB131 | Professional Legislations and Engineering Ethics | 1 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

Introduction to the Egyptian Legal Systems. Egyptian Laws and Regulations. Legislations and Institutions related to the Profession: Engineers' Syndicate's Laws and By-laws, Engineering Professional Ethics, Commercial, Criminal and Civil Laws, International Law, Arbitration and Litigation.

References

- Popovski V. International Rule of Law and Professional Ethics. Farnham Surrey: Ashgate; 2014.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB132 | Literature and Arts | 1 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

Relation between the different typologies of literature and art to contemporary trends in science, engineering, culture, society, politics and other humanities related fields, discussing issues of beauty, taste, aesthetics, and iconography, identify elements of simple arguments, literary genres, and creative writings, different modes of verbal and visual communication

References

- Understanding Art, Ninth Edition, by Lois Fichner-Rathus (Boston, Wadsworth, Cengage Learning, 2007).
- The Art of Being Human: Humanities as a Technique for Living Pearson, Richard Janaro, Thelma Altshuler, (Emeritus) New World School for the Arts, 2017
- The Literature Book, Dorling Kindersley publishing UK, 2016
- The Art Book, Dorling Kindersley publishing UK, 2017

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB133 | Human Rights | 1 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

"The historical background of human rights - Constitutions and the protection of human rights - The crisis of rights and public freedoms in contemporary political and global systems - The political, social, economic, and technical causes of this crisis - Evaluating the role and activities of international organizations in protecting human rights - The Egyptian constitution and human rights in Egypt

References

- Human Rights: A Very Short Introduction" by Andrew Clapham
- international Human Rights Law" by Rhona K. M. Smith
- Comparative Human Rights Law" by Sandra Fredman

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB134 | Professional Ethics | 1 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

| Course Content |
|---|
| Global vision about Engineering Science & job of Engineer: Engineering Science is the indicator for any civilization since long time ago. Being an Engineer is one of the finest and the highest job (Engineering job based on creativity, innovation and development from his own imagination - serving the whole humanity and seeking for the quality in human life). Engineer`s responsibility in the national and the international scale: vital role for the engineer according to the international engineering contracts (FIDIC) - Responsibility of the engineer according to the Egyptian Laws. Job ethics and etiquette - global vision on the Engineers Syndicate law no.66 for 1974 - Confirming.. |
| References |
| • Davis M. Engineering Ethics. London: Routledge; 2016.. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB141 | Building Safety and Fire Protection | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Teaches recognition and mitigation of safety hazards. Includes OSHA safety standards, fire detection and protection, emergency procedures, and construction product properties. Discusses fire risk assessment, evacuation procedures, and fire safety management. |
| References |
| • OSHA, 29 CFR 1910 & 1926.<br>• NFPA standards (org/Codes-and-Standards A11-Codes-and-Standards/List-of-Codes-and-Standards)<br>• NEBOSH and IOSH standards. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB142 | Entrepreneurship and Startups | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

**Introduction to Entrepreneurship:** Definition of entrepreneurship and the importance of entrepreneurs. Characteristics of successful entrepreneurs, Differences between entrepreneurship and traditional businesses.

**Innovating Ideas and Turning Them into Ventures:** Creative thinking methods, analyzing market opportunities, Business models and how to choose the right one.

**Writing a Business Plan:** Components of a business plan, how to define goals and vision, Marketing and sales strategies.

**Securing Funding:** Funding sources (personal financing, loans, angel investors, venture capital), Pitching ideas to investors, Evaluating the benefits of startup funding.

**Managing Startups:** Challenges during the founding and growth stages, Effective management strategies, Building a strong team.

**Expansion and Sustainable Growth:** Expansion strategies and international growth, understanding risks and challenges related to rapid growth.

**Legal and Economic Challenges:** Laws and regulations for startups, Economic issues that startups may face and how to overcome them..

References


- Timmons, J. A., & Spinelli, S. (2014). New Venture Creation: Entrepreneurship for the 21st Century. McGraw-Hill Education.
- Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
- Stevenson, H. H., & Jarillo, J. C. (1990). A Paradigm of Entrepreneurship: Entrepreneurial Management. Strategic Management Journal.
- Drucker, P. F. (1985). Innovation and Entrepreneurship: Practice and Principles. Harper & Row.
- Blank, S. (2013). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| NUB143 | Business Administration | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| The nature of business and entrepreneurship as the vehicle for making money by creating wealth and producing goods and services. Management, Planning, Controlling and Organizing. Various functional areas in business including: accounting, entrepreneurship, economics, finance management and marketing, legal environment of business, globalization and e-business |
| References |
| • "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries<br>• "Innovation and Entrepreneurship" by Peter F. Drucker<br>• "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers" by Alexander Osterwalder and Yves Pigneur |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| NUB14٤ | Principles of General Management | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| 1. Concept and importance of management<br>2. Management schools and management functions<br>3. Managerial roles and functions<br>4. The project<br>5. Basic dimensions of the management problem in developing countries<br>6. Administrative development and the development of management systems |
| References |
| • Principles of Management" by Stephen P. Robbins and Mary Coulter<br>• Management: Principles and Practices" by L.M. Prasad<br>• Management and Organizational Behavior" by Laurie J. Mullins |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40 |

| CS-121 | Aptech-Computer Skills (1) | 0 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 0 | | 0 |

Course Content

Semester 1:

- Increase desk-based productivity using MS Word

Semester 2:

Create Spreadsheets for analysing data using MS Excel

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CS-122 | Aptech-Computer Skills (2) | 0 CH |
|---|---|---|
| Prerequisites | Aptech-Computer Skills (1) | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 0 | | 0 |

Course Content

Semester 3:

- Create advanced attractive presentations using Microsoft PowerPoint
- Use various Web tools for efficient communication and task management over the Web

Semester 4:

Normalise raw data into well-organised database tables in MS Access

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CS-123 | Aptech-Computer Skills (3) | | 0 CH |
|---|---|---|---|
| Prerequisites | Aptech-Computer Skills (2) | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 0 | | 0 | |

Course Content

Semester 5:

- Demonstrate the understanding of Digital marketing and media concepts.
- Effectively build your users lists, deliver e-mails & generate relevant clicks.
- Understand mobile marketing measurement and analytics.

Semester 6:

Use MS Project to track software development

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

# Faculty of Engineering Requirements

All the programs offered at the Faculty of Engineering, Nahda University are Engineering Programs. The graduates are called Engineers and are automatically enrolled in the Egyptian Engineering Syndicate (EES).

**According to the National Academic Reference Standards (NARS-2018), The Engineering Graduate must be able to (A-Level):**

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
A5. Practice research techniques and methods of investigation as an inherent part of learning.
A6. Plan supervises and monitors implementation of engineering projects.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.
.

To achieve these Intended Learning Outcomes, a set of courses must be completed as a Faculty Requirement. These courses are divided into Basic Science Courses and Basic Engineering Courses.

- **Faculty of Engineering Requirements Courses**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS113 | Probability and Statistics | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| BAS121 | Vibration and Waves | 3 | 8 | 125 | 2 | 2 | 1 | 5 | |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS142 | Dynamics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| TRN2x1 | Field training (1) | 0 | 5 | 125 | 0 | 0 | 0 | 0 | |
| TRN3x1 | Field Training (2) | 0 | 5 | 125 | 0 | 0 | 0 | 0 | |
| - | Engineering Economy and Project Management Elective | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| - | Structures and Properties of Materials Elective Courses | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | Engineering Technology Elective Courses | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | Spatial Perception and Design Elective Courses | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| Total | | **33** | **64** | **1600** | **24** | **18** | **9** | **51** | |
| **Pool of Engineering Economy and Project Management Elective Courses (One Course)** | | | | | | | | | |
| MIM21٦ | Engineering Economy | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE223 | Project Management Essentials | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| EPR391 | Project Management and Economic for Electrical Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CCE312 | Software Project Management | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| **Pool of Structures and Properties of Materials Elective Courses (One Course)** | | | | | | | | | |
| EPR111 | Materials of Electrical Science | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CCE216 | Properties of Electrical Materials | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CVE221 | Structures and Properties of Construction Materials | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| MIM111 | Basics of Mechatronics | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| **Pool of Engineering Technology Elective Courses (One Course)** | | | | | | | | | |
| GME141 | Production Engineering | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CVE222 | Modern Building Material | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CVE121 |
| DAE261 | Building Technology and Maintenance | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| **Pool of Spatial Perception and Design Elective Courses (One Course)** | | | | | | | | | |
| DAE161 | Projection and Engineering Graphics | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| MIM112 | Computer Aided Drawing | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| EPR333 | AutoCAD Electrical Drawing | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CCE111 | Electrical Installations and Construction Equipment | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |

**A. Courses offered by Basic Sciences Department in Mechatronics and Intelligent Machines Engineering**

| No. | Code | Course Name |
|---|---|---|
| 1 | BME211 | Theory of Machines |
| 2 | BME241 | Strength of Materials |
| 3 | BME321 | Machine Elements Design |
| 4 | BME411 | Machine Construction |
| 5 | BME311 | Mechanical Vibrations |
| 6 | BME251 | Thermodynamics (1) |
| 7 | BME262 | Fluid Mechanics and Aerodynamics |
| 8 | BME351 | Heat Transfer |

**B. Courses offered by by Basic Sciences Department in Electrical Power and Renewable Energy**

| No. | Code | Course Name |
|---|---|---|
| 1 | BME251 | Thermodynamics (1) |
| 2 | BME351 | Heat Transfer |
| 3 | BME261 | Fluid and Aerodynamics |

- **Faculty of Engineering Requirements Courses Content**

| BAS111 | Mathematics (1) | 3 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

CALCULUS: Covers Relations and Functions including domain, range, and types like piecewise and symmetric. Explores Limits and Continuity with theorems, infinity limits, and L'Hopital's Rule.

DERIVATIVES: Focuses on derivative rules, including the Chain Rule and derivatives of various function types. Also covers higher order derivatives, implicit differentiation, and applications such as curve sketching and optimization.

INTEGRATION: Introduces basic integration concepts.

ANALYTIC GEOMETRY: Examines Conic Sections and their polar coordinates.

ALGEBRA: Discusses Partial Fractions.

References


- Stewart, James. Calculus. Australia, Cengage Learning, 2016.
- Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
- O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.
- Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS112 | Mathematics (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Mathematics (1) - BAS111 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

INTEGRATION:

Types of integrals include indefinite integrals (using substitution, parts, and partial fractions) and definite integrals.

SEQUENCES AND SERIES:

Properties and tests for sequences and series, including limit laws, monotonicity, geometric series, divergence, and convergence (integral and comparison tests), and alternating series.

MULTIVARIABLE CALCULUS:

Functions of several variables, domain, range, graphing, and continuity. Partial derivatives, their geometric interpretation, and applications (maxima, minima, and optimization). Double and triple integrals with applications to calculating arc length, area, and volume.

References


- Stewart, James. Calculus. Australia, Cengage Learning, 2016.
- Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
- O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.
- Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS113 | Probability and Statistics | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Descriptive and Inferential Statistics, Data Description, Measures of Central Tendency, Dispersion and Position. Review of Probability, Bayes' Theorem, Random Variables (Continuous and Discrete), Probability Distributions. Simple regression and correlation: Simple linear regression by least square method, validation the model, correlation coefficient.

References


- Ross, Sheldon. First Course in Probability, A, Global Edition. Pearson Higher Ed, 12 July 2019.
- Mendenhall, William, et al. *Introduction to Probability and Statistics*. Boston, Ma, Cengage, 2020.
- Rozanov, Y A. Probability Theory. Courier Corporation, 27 May 2013.
- Arnold, Barry C, et al. A First Course in Order Statistics. Philadelphia, Pa, Siam, 2008.
- Terrell, George R. Mathematical Statistics. Springer Science & Business Media, 6 Apr. 2006.
- Rosenkrantz, Walter A. Introduction to Probability and Statistics for Scientists and Engineers. New York, McGraw-Hill, 1997.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS211 | Mathematics (3) | | 2 CH |
|---|---|---|---|
| Prerequisites | Mathematics (2) - BAS112 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Ordinary Differential Equations: Basics Concepts, Classification, and Formation of Differential Equations (ODEs and PDEs). Methods to solve first-order differential equations (Separable, Homogeneous, Exact, integrating Factor, Bernoulli Equation).

Second-Order Linear Differential Equations; Homogeneous Equations with Constant Coefficients; Operator D; Second-Order Nonhomogeneous Equations; Laplace Transform; Methods for Solving Partial Differential Equations.

References


- Kenneth B. Howell, Ordinary Differential Equations, 2nd Edition, 2019.
- Stewart, James. Calculus. Australia, Cengage Learning, 2016.
- Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
- O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.

- Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS212 | Applied Engineering Mathematics for Civil Systems | | 2 CH |
|---|---|---|---|
| Prerequisites | Mathematics (2) - BAS112 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

1. Differential Equations:
**First-Order ODEs:** Separable equations, Exact equations and integrating factors.
**Second-Order ODEs**: Homogeneous equations with constant coefficients. Nonhomogeneous solutions using undetermined coefficients.
**Laplace Transforms:** Solving transient ODEs.
**PDEs:** Classification (parabolic, hyperbolic, elliptic) and examples.
2. Linear Algebra
Gauss Elimination:
Eigenvalues/Eigenvectors:
3. Numerical Methods:
Bisection Method.
Newton-Raphson Method.
4. Complex Numbers
Explores basic operations, trigonometric (polar) forms, and vector representation of complex numbers

References


- Kenneth B. Howell, Ordinary Differential Equations, 2nd Edition, 2019.
- Stewart, James. Calculus. Australia, Cengage Learning, 2016.
- Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
- O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.
- Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS213 | Mathematics (4) | | 2 CH |
|---|---|---|---|
| Prerequisites | Mathematics (3) - BAS211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

ALGEBRA: Covers matrix algebra including systems, notations, determinants, and their properties. Discusses methods for solving linear systems such as Gauss Elimination, Gauss-Jordan, and Cramer's Rule, along with eigenvalues and eigenfunctions.

COMPLEX NUMBERS: Explores basic operations, trigonometric (polar) forms, and vector representation of complex numbers. Includes De Moivre's Theorem and calculations involving products, quotients, powers, and roots of complex numbers.

NUMERICAL ANALYSIS: Focuses on solving nonlinear equations using various methods: Iteration, Bisection, Secant, False Position, Fixed-Point Iteration, and Newton-Raphson.

References


- Stewart, James. Calculus. Australia, Cengage Learning, 2016.
- Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
- O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.
- Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.


Assessment Criteria

| Student Activities | Student Activities | Student Activities | Student Activities |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| BAS311 | Mathematics (5) | | 2 CH |
|---|---|---|---|
| Prerequisites | Mathematics (4) - BAS213 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Partial differential equations: methods for solving linear and non-linear partial differential equations of first order.

Partial differential equations of order two with variable coefficients.

Some physical models (heat, waves, Laplace equations).

Special functions - System of linear and nonlinear equations and ordinary differential equations - Fourier analysis - Orthogonal Expansions - Wavelets.

References

7. Victor Ivrii, Partial differential equations, 2021.
8. Stewart, James. Calculus. Australia, Cengage Learning, 2016.
9. Autor: Erwin Kreyszig. Advanced Engineering Mathematics. Editora: S.L., Wiley, 2020.
10. O'Neil, Peter V. Advanced Engineering Mathematics, SI Edition. Cengage Learning, 27 Jan. 2017.
11. Zill, Dennis G, and Warren S Wright. Advanced Engineering Mathematics. Burlington, Ma, Jones & Bartlett Learning, 2014.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS121 | Vibration and Waves | 3 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Review of basic physical mechanics: Work, Kinetic energy, Potential energy, Conservation of energy, Conservative and non-conservative forces, Potential gradient and Power. Vibrations: Uniform circular motion, Simple harmonic motion, energy of a simple harmonic oscillator, Superposition of harmonic vibrations, Damped vibration, Forced vibration and resonance. Wave motion: Wave equation, Transverse & Longitudinal waves, velocity of sound waves, Intensity of sound waves & intensity levels, Standing waves, Interference & Diffraction of light.

References

- Shipman, James T, et al. An Introduction to Physical Science. Cengage Learning, 2009.
- Serway, Raymond A, and Robert J Beichner. Physics for Scientists and Engineers with Modern Physics. Houghton Mifflin, 2000.
- Richard T.Weidner, Physics - Revised Version, Allyn and Bacon, Boston, USA, 1989.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |

| | | | |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| | | |
|---|---|---|
| BAS122 | Electricity and Magnetism | 3 CH |
| Prerequisites | Vibration and Waves - BAS121 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Electricity: Review of vectors, Coulomb's law, Electric field, Electric flux, Gauss Law and its applications, Electric potential, Capacitance and Dielectrics, Electric current and RC circuits. Magnetism: Magnetic field, Magnetic Force, Sources of Magnetic Fields, Ampere's law, Faraday's Law, Electromagnetic induction, Magnetic properties of materials and AC circuits.

References


- Shipman, James T, et al. An Introduction to Physical Science. Cengage Learning, 2009.
- Serway, Raymond A, and Robert J Beichner. Physics for Scientists and Engineers with Modern Physics. Houghton Mifflin, 2000.
- Richard T.Weidner, Physics - Revised Version, Allyn and Bacon, Boston, USA, 1989.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 10% | 40% |

| | | |
|---|---|---|
| BAS131 | Engineering Chemistry | 3 CH |
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Structure of matter, Atomic and electronic structure, Periodic tables, Naming of compounds, Equations of State – Introduction to Chemical Thermodynamics – Material & Energy Fuel Combustion – General Properties of Solutions – Dynamic Equilibrium in Physical – Basic Principles in Electrochemistry – Introduction to Corrosion Engineering – Selected topics in process – Chemical Industries (Industry of Cement – Chemical Fertilizer Industries – Metal Alloys Industry – Silicon Industry – Petrochemical Industries).

References

| | | | |
|---|---|---|---|
| • Handbook of chemical engineering calculations; editors Tyler G. Hicks, Nicholas P. Chopey, Hicks, Tyler Gregory, New York, United States: McGraw-Hill, c.2012., 4th ed, Engineering Chemical February 2015<br>• Handbook notes, LMS: www.nub.edu.eg. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 10% | 40% |

| | | | |
|---|---|---|---|
| BAS141 | Statics | | 3 CH |
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| Fundamentals of statics, Types of supports, Free Body Diagram (FBD), Equilibrium of system of particles under plane forces, Frames, Trusses and Machines, Space statics: Resultant of systems of space forces, Moments about a point and about an axis, Reduction of system of forces to one force and couple, Wrench, Equilibrium under system of space forces, Friction and its applications, Belt friction, Center of mass, Center of weight for single and composite bodies, Shearing forces and bending moment diagrams, Virtual work. | | | |
| References | | | |
| • R. C. Hibbeler, Statics, 14th edition, Pearson prentice hall, 2016.<br>• Beer, Ferdinand P. Vector Mechanics for Engineers. McGraw-Hill Science, Engineering & Mathematics, 1 Feb. 2005.<br>• Muvdi, Bichara B, et al. Statics for Engineers. Springer, 14 Jan. 2014. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| | | | |
|---|---|---|---|
| BAS142 | Dynamics | | 3 CH |
| Prerequisites | Statics - BAS141 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Kinematics of particles, linear motion, Motion in resistive media, Study of curvilinear motion using: Cartesian coordinates, cylindrical coordinate and Intrinsic coordinate, Relative motion, Kinetics of motion with applications on projectiles and harmonic motion, Work and energy, Applications on conservative and non-conservative fields of forces, Impulse and impact, Newton's empirical formula, Impact of particle with fixed plane, Impact of two small balls, Introduction to vibration mechanics. |
| References |
| • R. C. Hibbeler, Dynamics, 14th edition, Pearson prentice hall, 2016.<br>• Muvdi, Bichara B, et al. Dynamics for Engineers. Springer Science & Business Media, 6 Dec. 2012. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| BAS143 | Engineering Drawing (1) | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Introduction & importance of engineering drawing, Manual drawing, drawing instruments and their uses, conventions in drawing, geometrical constructions, scales, curves in engineering practice, principles of projections, projections of points, lines, planes and solids, auxiliary projections, sections of solids: intersections of solids, development of surfaces, axinometric projection and perspective projections. The principles of steel drawing and construction. Derivation of views and sections from given views of steel constructions. Fundamentals of architectural drawing. Home plan, Floor plan, symbols of windows, doors, stairs, ramps, etc. |
| References |
| • "Engineering Drawing and Design" by David A. Madsen and David P. Madsen<br>• "Technical Drawing with Engineering Graphics" by Frederick E. Giesecke, Alva Mitchell, and Henry C. Spencer<br>• "Architectural Drawing" by David Dernie |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| MIM216 | Engineering Economy | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Origins of engineering economy, Principles of engineering economy, Design and manufacturing processes and EE, Cost estimation and cost terminology, Accounting, Balance sheet, Profit loss statement, Concept of equivalence, Money time relationships, Simple and compound interest rates, Single amounts and uniform series, Increasing and decreasing gradient, Application of money, Time relationships, Present value, Internal rate of return, External rate of return, Payback period, Evaluation of alternatives for different useful life and study period, Depreciation methods, Replacement analysis, Determination of the economic life of challenger and defender, Engineering economy techniques for evaluation of public projects.

**References**

- 'Engineering Economy' – 7th Edition Authors: Leland T. Blank & Anthony J. Tarquin. McGraw-Hill - ISBN 0073376301
- 'Basics of Engineering Economy', Anthony J. Tarquin. McGraw-Hill – ISBN 978–0–07–340129–4 ISBN 0–07–340129–3 (hard copy : alk. paper)
- 'Engineering Economy Analysis', Newman, Lavelle and Eschenbach, Engineering Press (8th edition).

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 4٠% |

| CVE223 | Project Management Essentials | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

Definition of Projects and Project Management, Project management techniques, models, and knowledge to enable students to design and operate an effective project management system, Project Life Cycle in Construction, Project Scope Management, Quality Management, Introduction to Procurement Management, Introduction to Equipment Management, Introduction

to Risk Management, Human Resources Management including Charts and staff motivation, Communication, and stakeholder management, Construction method statements and constructability, introduction to operation research. Topics are aligned with the Project Management Body of Knowledge (PMBOK).

References


- PMI, A guide to the project management body of knowledge, 5th edition, PMI, USA
- Hinze, Jimmie, Construction Planning and Scheduling, 4th edition, Person Prentice Hall, New Jersey, USA, 2011
- Sears, S. et al., Construction Project Management, 6th edition, John Wiley and Sons, New York, 2015
- Mubarak, Saleh A., Construction Project Scheduling and Control, 3rd edition, John Wiley and Sons, New York, 2015


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR391 | Project Management and Economics for Electrical Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Definitions used in project management of the electrical power and renewable energy, The project life cycle, project stages, relationships and responsibilities of the different project parties, execution phase responsibilities, productivity, quality management, Time management, material delivery management, sequencing and scheduling.

The course also focuses on studying the economic and life cycle assessment of the electrical power and renewable energy systems in order to be able to make informed decisions when it comes to the design and implementation of them in different buildings.

**References**


- Chang, C.M., 2016. Engineering management: Meeting the global challenges. CRC Press.
- Leland Blank and Antony Tarquin: Engineering Economy, 2017
- C.M. Chang: Engineering Management - Meeting the Global Challenges, 2004.
- Twidell, John, and Tony Weir. Renewable Energy Resources. Taylor and Francis, 2005. ISBN: 9780419253303.
- McKay, David J. C. Sustainable Energy – Without the Hot Air. UIT Cambridge, Ltd., 2009. ISBN: 9780954452933.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE312 | Software Project Management | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

The course introduces the methodologies and techniques for software project management both traditional and agile, this also includes scope, effort, risk estimation, plus scheduling and communication management of stakeholders. The course also includes several techniques and the student is introduced to different PM tools.

**References**


- Stellman, Andrew; Greene, Jennifer (2005). Applied Software Project Management. O'Reilly Media. ISBN
- Murali Chemuturi, Thomas M. Cagley, Mastering Software Project Management: Best Practices, Tools and Techniques, J.Ross Publishing. ISBN 2978-1-60427-034-1010.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR111 | Materials of Electrical Science | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Atoms and atomic structure of conducting materials, Materials Classification, Conductors, High/low - Resistive Materials, Semiconductors, Insulators, Magnetic Materials: B-H curve for different magnetic materials, magnetic losses, reduction of losses, Ferro-resonance, Study and Measurement of Electrical, Magnetic, and Optical Properties of Materials, Materials for Electronic

Components, Materials used in electrical power and renewable energy systems and energy storage systems.

Laboratory

- Conductivity (σ) of insulators, semiconductors, and conductors' materials.
- Mechanical characteristics of insulators, semiconductors, and conductors' materials.
- Magnetic characteristics of materials: B-H curve for different magnetic materials.
- Magnetic losses, reduction of losses, Ferro-resonance.
- Materials used in electrical power and renewable energy systems and energy storage systems.

References


- S. O. Kasap, Principles of Electrical Engineering Materials, McGraw - Hill, 2000.
- J. Dekker, Electrical Engineering Materials, Prentice Hall, 1970.
- L. Solymar, D. Walsh, R. R. A. Syms., Electrical Properties of Materials, Oxford University Press, 10th edn, ISBN: 9780191868504, 2. BI Bleaney, B Bleaney Electricity and Magnetism, Volume 2, Third Edition OUP Oxford, Mar 28, 2013
- Charles K. Alexander, Matthew N. O. Sadiku., 'Fundamentals of electric circuits', © The McGraw-Hill Companies, 4th ed, TK454.A452, 2009
- Chapman. Stephen J. 'Electric machinery fundamentals' © The McGraw-Hill Companies, 4th ed, ISBN 0--07246523, 2005.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 35% | 20% | 15% | 40% |

| CCE216 | Properties of Electrical Materials | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Conducting Materials: Structure of conducting materials, Conductivity in solid materials, Synthesize of alloys, Mechanical characteristics of conducting materials. Insulating Material: Ceramic and polymers, Electrical and mechanical characteristics, PVC and XLPE insulation materials in cables. Magnetic Materials: B-H curve for different magnetic materials, magnetic losses, reduction of losses, Ferro-resonance. Materials used in batteries: Primary batteries, secondary batteries. Silicon semiconductors industries: Metallurgical grade silicon, Electronic grade silicon.

Laboratory

- Conductivity (σ) of insulators, semiconductors, and conductors materials.
- Mechanical characteristics of insulators, semiconductors, and conductors materials.
- Magnetic characteristics of materials: B-H curve for different magnetic materials.
- Magnetic losses, reduction of losses, Ferro-resonance.
- Materials used in batteries.

References

- S. O. Kasap, Principles of Electrical Engineering Materials, McGraw - Hill, 2000.
- J. Dekker, Electrical Engineering Materials, Prentice Hall, 1970.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 35% | 20% | 15% | 40% |

| CVE221 | Structures and Properties of Construction Materials | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ٠ | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Introduction to engineering materials. - Traditional materials - Alternate building materials - Composite materials - Smart materials. Material properties: physical, chemical, corrosion, electrical, thermal, and optical properties. Relationship between material properties and its internal structure. Basic properties of non-metal materials. Building stones, Bricks, Tiles, Timber, Isolation materials for moisture and heat, glass, Ceramics, Polymers and advanced composite materials, Mineral binders, Aggregates, Admixtures, Concrete.

Laboratory

- Tensile strength of mild steel.
- Cement testing (setting time, strength).
- Aggregate testing sive analysis test

References

- Thomas H. courtney, Mecanical Behaviar of Materia, Waveland Press Inc, 2005.
- Arthur lyons, Materials for Architects and Builders, Third Edition, 2007.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 35% | 20% | 10% | 40% |

| MIM111 | Basics of Mechatronics | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Mechatronics definition, background and history, industrial revolution, mechatronics design philosophy and methodologies, mechatronics and optimal machine design, mechatronics system components, configuration and synergetic. Case studies of mechatronic systems applications in automotive, industry, manufacturing, medical and healthcare etc. Beginning levels on programming, building electrical and electronics circuits, building simple mechatronic systems. Practice through Labs and projects. Introduction to microcontrollers such as Arduino: Arduino hardware overview, fundamentals and microcontroller board specifications, programming and understanding Arduino syntax, Examples on Arduino programming and using digital inputs/outputs and analog inputs in Arduino. Tips should be considered to build successful mechanical machines, actuator types such as stepper motors, Dc motors, AC motors, servo motors, pneumatics, hydraulics, …etc., selection criteria, and tips to select suitable actuators, electronic circuits and building printed circuits board (PCBs) tips. Select suitable: sensors, signal conditioning circuits, relays, motor drivers such as H-bridge, stepper motor driver

References


- Industrial Automation: Hands On 1st Edition by Frank Lamb (Author)
- Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 20% | 20% | 10% | 40% |

| GME141 | Production Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course aims to provide engineering students with a simple introduction and general knowledge about engineering parts, their materials, and primary production processes and manufacturing technologies. It includes engineering materials classification, and introduction to materials selection for different applications. Production processes such as casting, joining and metal forming processes. Some manufacturing processes of polymers, machining processes of metals and wood. Measuring instrumentations. In addition, a brief view on new materials and introduction to advanced processing techniques (e.g. water jet cutting…. etc.) is provided.

Laboratory

- Centre Lathe & its operations.
- Shaping Machine & its operations.
- Milling Machine & its operations.
- Drilling Machine & its operations.
- Gase Welding.
- Electrical Arc Welding.

References

- fundamentals-of-modern-manufacturing-4th-edition-by-mikell-p-groover
- DeGarmo's Materials and Processes in Manufacturing by J. T. Black [A comprehensive reference on various manufacturing processes, materials, and selection].
- Machining and Machine Tools by Andreas A. Antonissen [Explores machining fundamentals, processes, and machine tools].

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30 % | 20 % | 10 % | 40% |

| CVE222 | Modern Building Material | | 2 CH |
|---|---|---|---|
| Prerequisites | Properties of Materials – CVE121 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

fresh concrete properties: Consistency, Workability, Cohesion, Segregation, Bleeding. Properties of hardened concrete: Strength, Volumetric changes, Elasticity and creep, Durability of concrete. Mix design: Engineered methods, Empirical methods. Non- destructive testing: Rebound hammer, Ultrasonic, Pulse velocity, Core, Steel detection. Different types of modern building materials, Advanced Composite Materials, Fibers and Polymer properties, Fabrication technology, Advantages and disadvantages of modern building materials ,Structural applications, Flexural, shear and axial strengthening of concrete elements using advanced composite materials

Laboratory

- Fresh concrete test (slump test, compact factor test VB time test).
- Hardened concrete test compression strength.
- Tensile strength test, modulus or rupture.
- Design of concrete mixes and testing it.
- Destructive and non-destructive tests.

References

- Mamlouk, M and Zaniewski, J, Materialsfor Civil and Construction Engineers, Prentice Hall, 3rd. Ed., 2006
- Concrete Technology by M.Neville and J.J.Brooks Publisher:Pearson Education, Inc., Pearson Prentice Hall,USA, 2nd Edition, 2010

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30 % | 20 % | 10 % | 40% |

| DAE261 | Building technology and Maintenance | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course aims at educating students technology principles – productions basics – mass production – machines – time and movement – production lines – workers and machines – incentives – architectural assembling – technologies of prefabricated buildings: Basics and methods – elements and components – manufacturing, transportation, and installation – maintenance, and support – basics of maintenance of different building components- construction material- Industrialized Building System (IBS)- Construction Solutions.

References

- Smith P & Julian W, Building services, applied science publications.
- Brian J.B. WoodBrian J.B. Wood, Building Maintenance, 2009.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30 % | 20 % | 10 % | 40% |

| DAE161 | Projection and Engineering Graphics | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

This course covers an introduction to Computer Aided Drafting (CAD), including architectural and assembly drawings using AutoCAD. It covers types of threaded fasteners, their use in plans and elevations, internal and external thread standards, and drawings. The course also covers 3D modeling techniques, isometric and axonometric models, pattern features, and 3D animation drafting. Students will practice using computer graphics packages like AUTOCAD, inserting dimensions, normal and auxiliary projection, sectioning and documentation, and 3D with simple examples.

**Laboratory**

- Autodesk AutoCAD 2024 or the latest version.

**References**


- Thomas, E. F., Fundamentals of Engineering Drawing, McGraw Hill Co., 1998.
- Hart, K. R., Engineering Drawing, English Universities Press Ltd., 1999.
- Thomas, E. F. and Vierck, C. J., Engineering Drawing and Graphic Technology, McGraw Hill Co., 2001.
- Richard Shelton Kirby, the Fundamentals of Mechanical Drawing, Nabu Press, 2009.
- Cecil Jensen; Jay Helsel and Dennis Short, Engineering Drawing and Design, McGraw Hill, 7th. Ed., 2007.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM212 | Computer Aided Drawing | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

In the tutorial these contents will be covered: Introduction to Machine parts and assembly drawing, Types of threaded fasteners and washers, Internal and external Thread Standards,

| |
|---|
| definitions and drawings, bearing drawings, types of fittings, Fits and Tolerances, Geometrical Tolerances, Surface Finish. Exercises on assembly drawings such as: crane hook, stuffing box, valves, grinding wheel drive, worm and worm gear, machine vice, hand press, transmission shaft, 3d modeling using 3D CAD tools …, etc. |
| **Laboratory** |
| • Using computer lab to exercise on drawing |
| **References** |
| • Hart, K. R., Engineering Drawing with Problems, John Wiley and Sons, 1982.<br>• Giesecke, F., Technical Drawing, Macmilan Publisher Co., 1986 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 35% | 20% | 10% | 40% |

| EPR333 | AutoCAD Electrical Drawing | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 0 | 3 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| This course covers the indispensable core topics for working with the AutoCAD Electrical software and electrical terminology, . In this course, you will learn how to use many of the powerful electrical drawing creation tools in the software. You will create schematic drawings (ladder logic and point to point), panel drawings, and PLC-I/O circuits using automated commands for symbol insertion, component tagging, wire numbering, and drawing modification. In addition, you are introduced to methods of customizing electrical symbols, circuits, and databases. Other topics covered include title block linking, reporting tools, templates, and project files. |
| Laboratory |
| • Using computer lab to exercise on drawing |
| References |
| • Mastering AutoCAD 2019 and AutoCAD LT 2019. by George Omura (Author), Brian C. Benton (Author)<br>• Adobe Photoshop CC Classroom in a Book (2019 Release) by Andrew Faulkner (Author), Conrad Chavez (Author) Photographic Rendering with V-Ray for Sketchup by Brian Bradley,2014.<br>• Mastering AutoCAD 2019 and AutoCAD LT 2019. by George Omura (Author), Brian C. Benton (Author) |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 35% | 20% | 10% | 40% |

| CCE111 | Electrical Installations and Construction Equipment | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Introduction to electric circuits: Fundamental of Electricity (Voltage, current, resistance, power, resistor power ratings, Ohm's law). Simple resistive circuits. Kirchhoff's laws. Drawing of electrical symbols. Electrical installations in residential and industrial buildings (lighting, power, telephone, TV, air conditioning, lifts). Acoustic precautions. Alarm systems (Fire, Security, Gas), Electrical design for signaling systems in roads and railways, Electrical print reading. Assessment and selection of installations equipment.

Laboratory

- Drawing of electrical symbols using CAD software.
- Drawing of buildings wiring plans using CAD software.
- Applying electrical installation case studies using CAD software and in field.

References

- T. L. Floyd, and D. M. Buchla, "Principles of Electric Circuits: Conventional Current Version", 10 th ed., Pearson Education Limited, New York, 2020.
- Trevor Linsley, Basic Electrical Installation Work, 5th edition, Elsevier Ltd, 2008.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 35% | 20% | 15% | 40% |

| BME211 | Theory of Machines | | 3 CH |
|---|---|---|---|
| Prerequisites | Dynamics – BAS142 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

| |
|---|
| Mechanisms: Definitions, open-chain and closed-chain systems, constraints, degrees of freedom, steering mechanisms, inversions of mechanisms. Kinematics of machines: position analysis, velocity analysis, acceleration analysis. Kinetics of machines: equilibrium of machines, D'Alembert's principle, force analysis, power analysis, inertia-effects and flywheel design. Synthesis of mechanisms. Cams: Types of cams, cam design, kinematics and kinetics of cam. Gears: Concept of gear motion, transmission, gear geometry and gear trains. Rotation matrix, homogeneous transformation matrix, direct and inverse kinematics |
| Laboratory |
| |
| References |
| • "Theory of Machines" by R.S. Khurmi and J.K. Gupta<br>• "Theory of Machines and Mechanisms" by John J. Uicker, Gordon R. Pennock, and Joseph E. Shigley |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| BME241 | Strength of Materials | 2 CH |
|---|---|---|
| Prerequisites | Theory of Machines – BME211 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

| Course Content |
|---|
| Introduction, principles of mechanical properties, problems of engineering materials, testing types of mechanical properties, common methods of static and dynamic testing: tension, compression, bending, shear, hardness, impact, creep and fatigue. types of fracture, non- destructive testing of materials. |
| Laboratory |
| |
| References |
| • "Mechanics of Materials" by Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, and David F. Mazurek (2020).<br>• "Strength of Materials" by R.K. Bansal (2019).<br>• "Mechanics of Materials" by James M. Gere and Barry J. Goodno (2018).<br>• "Strength of Materials" by Timoshenko, S. P., and Gere, J. M. (2017). |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME321 | Machine Elements Design | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction to Design Concepts, General Concepts of (Deflection, Buckling and Thermal Stresses), Design for Fatigue, Design of Machine Elements (Bolts, Power Screws, Rivets, Keys, Welded Joints, Springs), Design of Power Transmission Elements (Shafts, Couplings, Gears, Belt Drives, Chain Drives), Selection of Bearings, Design of Pressure Cylinders. Use of interactive Finite Element computer programs for problem solving is illustrated and used. |
| Laboratory |
| |
| References |
| • Shigley, M., Mechanical Engineering Design, McGraw Hill, 1997.<br>• Orlov, P., Fundamentals of Machine Design, MIR Publisher, 1998.<br>• Jain, R. K., Machine Design, Khanna Publishers, 1999. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME411 | Machine Construction | | 3 CH |
|---|---|---|---|
| Prerequisites | Statics – BAS141 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|

| |
|---|
| Loading Diagrams, General concepts of Stress and Strain, Types of Stresses (Normal Stresses and Shear Stresses), Combined Stresses, Theories of Elastic Failure, and Safety Factor. Constructional details as affected by manufacturing, assembly, and strength considerations, Connections (Centering, Flanged, Riveted, Keyed, Splined, Screwed), Power Screw and its joints, Seals, Springs, Stress Concentrations, Reverse Engineering. |
| Laboratory |
| |
| References |
| • Orlove, Fundamentals of Machine Design, MIR Publisher, 1977.<br>• Shigly, Machine Design, McGraw Hill Co., 1999. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME311 | Mechanical Vibrations | 3 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 0 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| Revision of mass-spring-damper system (free, damped, forced). Single degree of freedom systems (translational, rotational, torsional, and multi-body systems). Applications: Vibration isolation, Selection of Anti-Vibration-Mounts for machines, engines, HVAC equipment. Vibration of two degree of freedom systems (free, forced). Equivalent torsional systems: Geared system, Crank system. Applications: Vibration absorber, Crank system. Multi-degree-of-freedom systems. Continuous systems: bending of shafts, analytical solution, Whirling of shafts. Vibration measurements: Instrumentation. Frequency measurement. Damping characterization. Forced vibrations. Transmissibility. Vibration absorber. Field measurements. |
| References |
| • Rao, Singiresu S.S., Mechanical Vibrations with Disk, Addison Wesley, 1995.<br>• Thomson, William T., and Marie Dillon Dahleh, Theory of Vibration with Applications, Simon and Schuster, 1997. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0 % | 40% |

| BME251 | Thermodynamics (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | Engineering Chemistry - BAS131 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Thermal System, Control Volume, States of the Working Medium, Processes and Cycles, Calculation of Work, Heat Exchange with the Surroundings, Ideal Gases, Specific Heat at Constant Volume, Specific Heat at Constant Pressure, Equation of State, Pure Substances, Phase Equilibrium, Tables of Thermodynamic Properties, Internal Energy, Enthalpy, First Law of Thermodynamics on Closed Systems, First Law of Thermodynamics on Steady State Steady Flow Open Systems, The Case of Uniform State Uniform Flow, Application on Reciprocating Compressors, Ideal Gas Mixtures. Heat Engines, Refrigerator and Heat Pump, Second Law of Thermodynamics.

**References**

- Thermodynamics An Engineering Approach, Ninth Edition, 2019 By Çengel, Yunus A. Boles, Michael A. Kanoğlu, Mehmet.
- Fundamentals Of Thermodynamics 7th Edition, 2009 By Claus Borgnakke, Richard Edwin Sonntag.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0 % | 40% |

| BME261 | Fluid and Aerodynamics | | 3 CH |
|---|---|---|---|
| Prerequisites | Dynamics – BAS142 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Properties of Fluids, Density, Pressure, Forces on Submerged Bodies, Continuity, Boundary Layer Flow, Flow in Closed Conduits, Bernoulli's Equation, Major and Minor Losses in Pipes, Laminar and Turbulent Flows, Drag and Lift Forces, Compressible Flow, Stagnation Properties, Mach

| |
|---|
| Number and Sonic Velocity, Pumps in Series and Parallel, Selection of Pumps, Dimensional analysis: Buckingham theorem. Dynamic Similarity, Angular Velocity, Vortices, Stream Function, Potential Function, Wind tunnel for low velocity, Velocity potential, Laplace Equation. |
| Laboratory |
| • Effect of Momentum Change<br>• Velocity Survey in a Circular Pipe Using Pitot Tube<br>• Primary and Secondary Losses in Pipes<br>• Sonic and Supersonic Air Flow |
| References |
| • Joseph H. Spurk, Nuri Askel, Fluid Mechanics, Springer, 2022.<br>• John, D. Andereso, Fundamentals of Aerodynamics 6th Edition, McGraw-Hill, 2017.<br>• John D. Anderson, Jr.” Fundamentals of Aerodynamics”5th edition, McGraw-Hill, 2011. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| BME261 | Fluid and Aerodynamics | | 3 CH |
|---|---|---|---|
| Prerequisites | Dynamics – BAS142 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Properties of Fluids, Density, Pressure, Forces on Submerged Bodies, Continuity, Boundary Layer Flow, Flow in Closed Conduits, Bernoulli's Equation, Major and Minor Losses in Pipes, Laminar and Turbulent Flows, Drag and Lift Forces, Compressible Flow, Stagnation Properties, Mach Number and Sonic Velocity, Pumps in Series and Parallel, Selection of Pumps, Dimensional analysis: Buckingham theorem. Dynamic Similarity, Angular Velocity, Vortices, Stream Function, Potential Function, Wind tunnel for low velocity, Velocity potential, Laplace Equation. |
| Laboratory |
| • Effect of Momentum Change<br>• Velocity Survey in a Circular Pipe Using Pitot Tube<br>• Primary and Secondary Losses in Pipes |
| References |
| • Joseph H. Spurk, Nuri Askel, Fluid Mechanics, Springer, 2022. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| BME262 | Fluid Mechanics and Aerodynamics | | 2 CH |
|---|---|---|---|
| Prerequisites | Thermodynamics(1) – BME251 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Properties of Fluids, Density, Pressure, Pressure Measurement, Forces on Submerged Bodies, Viscosity, Viscous Boundary Layers, Continuum Hypothesis, Streamlines, Velocity and Acceleration, Continuity Equation, Classification of Flow Fields: Pipe Flow, Jet Flow, Wake Flow, Boundary Layer Flow, Flow in Closed Conduits, Bernoulli's Equation, Major and Minor Losses in Pipes, Laminar and Turbulent Flows, Similitude and Dimensional Analysis, Lagrangian and Eulerian Coordinates, Transport Theorem on a Control Volume, Navier Stokes Equation, Flow around Immersed Bodies, Drag and Lift Forces, Compressible Flow, Stagnation Properties, Mach Number and Sonic Velocity, Equations of Gas Dynamics, Flow through Nozzles, Shock Waves, Classification of Turbo-Machines, Operation of Pumps, Series and Parallel Operation, Selection of Pumps.

**Laboratory**

- Effect of Momentum Change
- Velocity Survey in a Circular Pipe Using Pitot Tube
- Primary and Secondary Losses in Pipes

Sonic and Supersonic Air Flow

**References**


- Van Wylen, G. J. and Sonntag, R. E., Fundamentals of Classical Thermodynamics, John Wiley and Sons Inc., New York, 1973.
- El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.
- Holman, J. P., Heat Transfer, McGraw Hill Book Co., 1990.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME351 | Heat Transfer | 3 CH |
|---|---|---|
| Prerequisites | Thermodynamics (1) - BME251 | |
| Number of weekly Contact Hours | | |

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Thermal Conduction: The General Equation, Steady One Dimensional Conduction, Conduction without Heat Generation, Plane Wall, Composite Plane Wall, Composite Plane Wall Subjected to Convection, Overall Heat Transfer Coefficient, Cylindrical Shell, Composite Cylindrical Wall Subjected to Convection, Spherical Shell, Composite Spherical Shell Subjected to Convection, Extended Surfaces (Fins), Conduction with Uniform Internal Heat Generation, Conduction with Variable Thermal Conductivity, Steady Two Dimensional Conduction, Unsteady One Dimensional Conduction (Transient Conduction), Periodic Conduction. Convection: Types of Convection, Dimensionless Groups in Convection, Natural Convection, Forced Convection. Heat Exchanger: Heat Exchanger Types, Logarithmic Mean Temperature Difference, Effectiveness of Heat Exchangers. Thermal Radiation: Basic Concepts, Setfan-Boltzmann Law, Planck's Law, Radiation Properties of Real Surfaces, Emissivity and Absorptivity, Kirchoff's Law, Emissivity of Real Surfaces, Gray Surfaces, Selective Surfaces, Heat Exchange by Radiation, Heat Exchange between Two Planes, Heat Exchange between Two Cylinders or Spheres, Heat Exchange between Gray Surfaces, View Factors. Mass Transfer, Fick's Law of Diffusion, Mass Transfer Rate from a Pool of Liquid, and from a Liquid Droplet. Effect of using nanoparticles on the heat exchangers performance.

**Laboratory**

- Determination of the thermal conductivity coefficient of an insulating material
- Determination of the heat transfer coefficient in forced and natural convection heat transfer
- Determination of the temperature of a metal piece using the optical pyrometer
- Heat exchanger evaluation.
- Study of surface properties of two tubes in steam condensation

**References**

- Bird, R. B.; Steward, W. E. and Lishtbast, E. N., Transport Phenomena, John Wiley, and Sons Inc., 1960.
- Incroperal David, P. Devitt, Introduction to Heat Transfer, John Wiley, and Sons, 1990.
- Holman, J. P., Heat Transfer, McGraw Hill Book Co., 1990.

**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

# Program 1: Intelligent and Sustainable Civil Engineering Program

- ## Program Description

The purpose of this program is to provide students with the necessary skills and knowledge for a successful career in civil engineering. The program is designed with a holistic approach that focuses on the development of both industry-relevant skills and academic competencies. Students will learn advanced concepts in designing main concrete, steel structures and infrastructure, as well as basics of site investigation. They will gain skills in laboratory, office, and site engineering, including preparation of specifications, project scheduling, design, quality control planning, and construction supervision processes. Additionally, the program aims to produce well-educated civil engineers with special expertise in sustainable utilities and infrastructure planning, surveying engineering, water and wastewater networks, solid waste management, highway and airport engineering, transportation planning, traffic engineering, and railway engineering. Graduates will be responsible for the life-cycle of the systems they create and must be capable of optimizing the total system performance of projects, considering their social and environmental impacts.

- ## Career Prospects

Radiates of this department has a variety of opportunities to work in design companies, construction companies, consulting firms, research entities and educational institutes or other similar organizations. They will be qualified for positions at companies specializing in the design, analysis, operation, construction, and management of a wide range of residential, commercial, industrial building and infrastructure projects. Possible jobs are design engineer, field engineer, construction developer, research assistant, quality engineer, and technical sales engineer.
Graduates of this department has a variety of opportunities to work, for example:

- Civil engineering contractors and project managers,
- Consulting firms in civil engineering and construction,
- Government authorities,
- Environmental engineering organizations.
- Water and sanitation utility companies.
- Road and bridge construction companies
- General Authority of Railways

- **Relation to Sustainable Development Goals**

| | | | | | |
|---|---|---|---|---|---|
| GOAL 1: No Poverty | GOAL 2: Zero Hunger | GOAL 3: Good Health & Well-being | ☒ GOAL 4: Quality Education | GOAL 5: Gender Equality | ☒ GOAL 6: Clean Water & Sanitation |
| ☒ GOAL 7: Affordable & Clean Energy | GOAL 8: Decent Work & Economic Growth | ☒ GOAL 9: Industry, Innovation & Infrastructure | GOAL 10: Reduced Inequality | GOAL 11: Sustainable Cities & Communities | ☒ GOAL 12: Responsible Consumption & Production |
| ☒ GOAL 13: Climate Action | GOAL 14: Life Below Water | GOAL 15: Life on Land | GOAL 16: Peace & Justice Strong Institutions | GOAL 17: Partnerships to achieve. the Goal | |

- **Program Concentrations**

The program provides the undergraduate student with a thorough foundation and technologies in the basic tenets of civil engineering and technologies. The program provides three different fields in which the students in this program can specialize. These three fields are:
1.Structural Engineering
2.Public Works Engineering
3.Irrigation and Water Resources Engineering

1. Structural Engineering is concerned with the structural design and structural analysis of buildings, bridges, towers and other structures. This involves identifying the loads which act upon a structure and the forces and stresses which arise within that structure due to those loads, and then designing the structure to successfully support and resist those loads. The loads can be self-weight of the structures, other dead load, live loads, moving (wheel) load, wind load, earthquake load, load from temperature change etc. The structural engineer must design structures to be safe for their users and to successfully fulfil the function they are designed for (to be serviceable). Due to the nature of some loading conditions, sub-disciplines within structural engineering have emerged, including wind engineering and earthquake engineering.

2. Public Works Engineering is concerned with public utilities and infrastructure development programs in cities as well as national levels. Also, design, construction, operation and maintenance of Utilities and Infrastructure systems. These systems include roads, airports, highway networks, transport systems, railway systems, traffic management, water and wastewater networks, water and wastewater treatment facilities and solid waste management.

3. Irrigation and Water Resources Engineering is concerned with the collection and management of water (as a natural resource). As a discipline it therefore combines elements of hydraulic, hydrology, environmental science, meteorology, conservation, and resource management. This area of civil engineering relates to the prediction and management of both the quality and the quantity of water in both underground (aquifers) and above ground (lakes, rivers, and streams, Canals and Drains) resources. Water resource engineer analysis and model very small to very large areas of the earth to predict the amount and content of water as it flows into, though, or out of a facility. Although the actual design of the facility may be left to other engineers. Also concerned with design of bridges, dams, canals, culverts, storm sewers. Irrigation and water resources engineers design these facilities using the concepts of fluid mechanics, and hydraulics, among others.

- ## Program Competences

**According to the National Academic Reference Standards (NARS-2018), the competences for Graduates from NHADA University and all Engineering Programs, graduate must be able to (A-Level):**

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
A5. Practice research techniques and methods of investigation as an inherent part of learning.
A6. Plan supervises and monitors implementation of engineering projects.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

**In addition to the above Competencies for All Engineering Programs the Basic Civil Engineering graduate must be able to (B-Level):**

B1. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics, Hydrology and Fluid Mechanics.

B2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.

B3. Plan and manage construction processes; address construction defects, instability and quality issues; maintain safety measures in construction and materials; and assess environmental impacts of projects.

B4. Deal with biddings, contracts and financial issues including project insurance and guarantees.

**In addition to the competences for all Engineering Programs (A-Level), the competences for the Basic Civil Engineering Programs (B-Level), the competences for the Intelligent and sustainable Engineering Program, graduate must be able to (D-Level):**

D1. Utilize technological and professional tools to design and execute components, modules, subsystems, or entire systems within the realm of Civil Engineering.

- **Required Courses**

## List of Intelligent and Sustainable Civil Engineering Program Requirements Courses

| Course Title | Weight | | | Contact Hours | | | | % |
|---|---|---|---|---|---|---|---|---|
| | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Nahda University Requirements | 11 | 18 | 450 | 11 | 0 | 0 | 11 | 8 % |
| Faculty of Engineering Requirements | 33 | 64 | 1600 | 23 | 17 | 12 | 52 | 23 % |
| Major Requirements of Intelligent and Sustainable Civil Engineering | 58 | 96 | 2400 | 45 | 33 | 9 | 87 | 40 % |
| Minor Requirements of Intelligent and Sustainable Civil Engineering | 42 | 72 | 1800 | 31 | 26 | 11 | 68 | 29 % |
| Total | 144 | 250 | 6250 | 110 | 76 | 32 | 218 | 100 |

## Major Requirements of Intelligent and Sustainable Civil Engineering

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| BAS212 | Applied Engineering Mathematics for Civil Systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| CVE211 | Structural Analysis (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| CVE271 | Engineering Surveying | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CVE261 | Principle of Building Construction & Civil Drawing | 4 | 8 | 200 | 2 | 6 | 0 | 8 | |
| CVE212 | Structural Analysis (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE211 |
| CVE272 | Topographic and Photogrammetric Surveying. | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE271 |
| CVE121 | Properties of Materials | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| CVE131 | Engineering Geology | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| CVE231 | Soil Mechanics (1) | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CVE131 |
| CVE262 | Fluid Mechanics | 2 | 3 | 75 | 2 | 1 | 1 | 4 | |
| CVE361 | Hydraulics | 2 | 3 | 75 | 2 | 1 | 1 | 4 | CVE262 |
| CVE241 | Design of Concrete Structures (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE211 & CVE121 |
| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| CVE301 | Introduction to Machine Learning for Civil Engineers | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CVE201 |
| CVE405 | Introduction to Deep Learning for Civil Engineers | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE301 |
| CVE232 | Soil Mechanics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE231 |
| CVE281 | Transportation and Traffic Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE362 | Irrigation and drainage Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262 |
| CVE351 | Design of Steel Structures (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE212 |
| CVE341 | Design of Concrete Structures (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE241& CVE212 |
| CVE331 | Foundations Engineering (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE232 |
| CVE382 | Highway Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE281 |
| CVE491 | Environment Risk Management | 1 | 2 | 50 | 1 | 1 | 0 | 2 | |
| CVE461 | Design of Irrigation Structures (1) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE361 |
| Total | | 58 | 96 | 2400 | 45 | 33 | 9 | 87 | |

## Minor Requirements of Intelligent and Sustainable Civil Engineering

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CVE311 | Structural Analysis (3) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE212 |
| CVE492 | Green Building systems and Infrastructure | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE362 |
| CVE451 | Design of Steel Structures (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE351 |
| CVE343 | Design of Concrete Structures (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE341 |
| CVE332 | Foundations Engineering (2) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE331 |
| CVE492 | Wastewater Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE391 |
| CVE481 | Railway Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE281 |
| CVE441 | Design of Concrete Structures (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE343 |
| CVE324 | Introduction to BIM | 3 | 6 | 150 | 2 | 1 | 2 | 5 | CVE341 |
| CVE421 | Risk Management in Construction Projects | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE401 | Thermal Analysis and sustainable systems for building | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| CVE452 | Design of Bridges | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE451& CVE343 |
| - | Civil Elective (1) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| - | Civil Elective (2) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| - | Civil Elective (3) | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| - | Civil Elective (4) | 3 | 6 | 150 | 1 | 3 | 3 | 7 | 101 Cr. hrs. |
| - | Civil Elective (5) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| - | Civil Elective (6) | 3 | 6 | 150 | 1 | 3 | 3 | 7 | |
| Total | | 42 | 72 | 1800 | 31 | 26 | 11 | 68 | |

## Elective Courses of Intelligent and Sustainable Civil Engineering is distributed in five elective

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Civil Elective (1) Select 2 Credit hrs. (one course) | | | | | | | | | |
| CVE381 | Transportation Planning | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE281 |
| CVE371 | Maps, GIS & Remote Sensing | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE271 |
| CVE391 | Solid wastes | 2 | 3 | 75 | 1 | 2 | 0 | 1 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Civil Elective (1) Select 2 Credit hrs. (one course) | | | | | | | | | |
| CVE363 | Hydrology | 2 | 3 | 75 | 1 | 2 | 0 | 1 | |
| CVE312 | Structural Dynamics and Seismic analysis | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE311 |
| CVE342 | Design of Wall Bearing Structures | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE241 |
| CVE321 | Quality Control in Construction Engineering | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE241& CVE121 |
| CVE322 | Recycling of Construction Materials | 2 | 3 | 75 | 1 | 2 | 0 | 1 | |
| CVE323 | Management of Construction Projects | 2 | 3 | 75 | 1 | 2 | 0 | 1 | CVE223 |
| Civil Elective (2) Select 2 Credit hrs. (one course) | | | | | | | | | |
| CVE383 | Airport Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE381 |
| CVE384 | Intelligent transportation systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE381 |
| CVE392 | Plumbing Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262 |
| CVE372 | Geometric Geodesy and Geodetic Astronomy | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE271 |
| CVE364 | Hydraulic Machines | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262& CVE361 |
| CVE344 | Design of High-Rise Buildings | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE311& CVE341 |
| CVE345 | Pre-stressed Concrete | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE341 |
| CVE325 | Advanced Materials | 2 | 3 | 75 | 2 | 1 | 0 | 3 | - |
| CVE326 | Quantities and specifications | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE341& CVE311 |
| Civil Elective (3) Select 1 Credit hrs. (one course) | | | | | | | | | |
| CVE302 | Software application in structural engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE303 | Software application in Public Works engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE304 | Software application in water resources engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| Civil Elective (4) Select 4 Credit hrs. (one course) | | | | | | | | | |
| CVE402 | Graduation Project (1) and Computer Applications - Structural Engineering | 3 | 6 | 150 | 1 | 2 | 3 | 6 | 101 hr & CVE311 & CVE341 |
| CVE403 | Graduation Project (1) and Computer Applications - Public Works | 3 | 6 | 150 | 1 | 2 | 3 | 6 | 101 hr & CVE382 |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CVE404 | Graduation Project (1) and Computer Applications - Water Resources | 3 | 6 | 150 | 1 | 2 | 3 | 6 | 101 hr & CVE262& CVE361 |
| Civil Elective (5) Select 2 Credit hrs. (one course) | | | | | | | | | |
| CVE442 | Design of Special reinforced concrete structures | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE343 |
| CVE422 | Repair & Strengthening of Structures | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE241 |
| CVE423 | Advanced BIM | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE321 |
| CVE424 | Construction Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE341 |
| CVE431 | Tunnels and underground structures | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE332 |
| CVE482 | Highways Construction Material and Pavement Design | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE382 |
| CVE494 | Construction of Water and Wastewater Infrastructure | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE392 |
| CVE495 | Quality and chemistry of water | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE492 |
| CVE471 | Advanced Topographic Surveying | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE272 |
| CVE462 | Design of Irrigation Structures (2) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE461 |
| CVE463 | Harbor Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE332 |
| CVE464 | Water Resources Management | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE461 |
| Civil Elective (6) Select 4 Credit hrs. (one course) | | | | | | | | | |
| CVE406 | Graduation Project (2) - Structural Engineering | 4 | 8 | 200 | 1 | 6 | 1 | 8 | CVE402 |
| CVE407 | Graduation Project (2) - Public Works | 4 | 8 | 200 | 1 | 6 | 1 | 8 | CVE403 |
| CVE408 | Graduation Project (2) - water resources | 4 | 8 | 200 | 1 | 6 | 1 | 8 | CVE404 |

## Elective Courses of Intelligent and Sustainable Civil Engineering is distributed in three Fields

### I. Structural Engineering requirements

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CVE312 | Structural Dynamics and Seismic analysis | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE311 |
| CVE342 | Design of Wall Bearing Structures | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE241 |
| CVE321 | Quality Control in Construction Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE241& CVE121 |
| CVE322 | Recycling of Construction Materials | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE323 | Management of Construction Projects | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE223 |
| CVE344 | Design of High-Rise Buildings | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE311& CVE341 |
| CVE345 | Pre-stressed Concrete | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE341 |
| CVE325 | Advanced Materials | 2 | 3 | 75 | 2 | 1 | 0 | 3 | - |
| CVE326 | Quantities and specifications | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE341& CVE331 |
| CVE302 | Software application in structural engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE403 | Graduation Project (1) and Computer Applications - Structural Engineering | 3 | 6 | 150 | 1 | 3 | 3 | 7 | 101 hr CVE311& CVE342 |
| CVE442 | Design of Special reinforced concrete structures | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE343 |
| CVE422 | Repair & Strengthening of Structures | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE241 |
| CVE423 | Advanced BIM | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE321 |
| CVE424 | Construction Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE341 |
| CVE431 | Tunnels and underground structures | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE332 |
| CVE406 | Graduation Project (2) - Structural Engineering | 3 | 6 | 150 | 1 | 3 | 3 | 7 | CVE402 |

## II. Public Works engineering requirements

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CVE381 | Transportation Planning | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE281 |
| CVE371 | Maps, GIS & Remote Sensing | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE271 |
| CVE391 | Solid wastes | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE383 | Airport Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE381 |
| CVE384 | Intelligent transportation systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE381 |
| CVE392 | Plumbing Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262 |
| CVE372 | Geometric Geodesy and Geodetic Astronomy | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE271 |
| CVE303 | Software application in Public Works engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE403 | Graduation Project (1) and Computer Applications - Public Works | 3 | 6 | 150 | 1 | 3 | 3 | 7 | 101 hr &CVE382 |
| CVE482 | Highways Construction Material and Pavement Design | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE382 |
| CVE494 | Construction of Water and Wastewater Infrastructure | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE392 |
| CVE495 | Quality and chemistry of water | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE492 |
| CVE471 | Advanced Topographic Surveying | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE272 |
| CVE407 | Graduation Project (2) - Public Works | 3 | 6 | 150 | 1 | 3 | 3 | 7 | CVE403 |

## III. Water resources engineering requirements

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CVE363 | Hydrology | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE364 | Hydraulic Machines | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262& CVE361 |
| CVE304 | Software application in water resources engineering | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE405 | Graduation Project (1) and Computer Applications - Water Resources | 3 | 6 | 150 | 1 | 3 | 3 | 7 | 101 hr &CVE261 &CVE361 |
| CVE462 | Design of Irrigation Structures (2) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE461 |
| CVE463 | Harbor Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE332 |
| CVE464 | Water Resources Management | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE461 |
| CVE408 | Graduation Project (2) - water resources | 3 | 6 | 150 | 1 | 3 | 3 | 7 | CVE404 |

- **Proposed Study Plan**

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 1 | | | | | | | | | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS121 | Vibration and Waves | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| | NUB Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| | NUB Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | 18 | 30 | 750 | 13 | 11 | 2 | 26 | |
| Semester 2 | | | | | | | | | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| BAS142 | Dynamics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| BAS113 | Probability and statistics | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE121 | Properties of Materials | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| - | Spatial Perception and Design Elective | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| CVE131 | Engineering Geology | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 13 | 7 | 6 | 26 | |
| Semester 3 | | | | | | | | | |
| BAS212 | Applied Engineering Mathematics for Civil Systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| CVE261 | Principle of Building Construction & Civil Drawing | 4 | 8 | 200 | 2 | 6 | 0 | 8 | - |
| CVE211 | Structural Analysis (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| CVE271 | Engineering Surveying | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CVE231 | Soil Mechanics (1) | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CVE131 |
| - | Structures and Properties of Materials Elective | 2 | 3 | 75 | 2 | 0 | 1 | 3 | - |
| - | Engineering Technology Elective (Modern Building Material) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | - |
| Total | | 18 | 30 | 750 | 14 | 11 | 3 | 28 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 4 | | | | | | | | | |
| CVE262 | Fluid Mechanics | 2 | 3 | 75 | 2 | 1 | 1 | 4 | |
| CVE241 | Design of Concrete Structures (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE211 & CVE121 |
| CVE212 | Structural Analysis (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE211 |
| CVE272 | Topographic and Photogrammetric Surveying | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE271 |
| CVE232 | Soil Mechanics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE231 |
| CVE281 | Transportation and Traffic Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| CVE223 | Project Management Essentials | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| Total | | 19 | 30 | 750 | 15 | 10 | 3 | 28 | |
| Semester 5 | | | | | | | | | |
| CVE361 | Hydraulics | 2 | 3 | 75 | 2 | 1 | 1 | 4 | CVE262 |
| CVE341 | Design of Concrete Structures (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE241 |
| CVE362 | Irrigation and drainage Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE262 |
| CVE331 | Foundations Engineering (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE232 |
| CVE301 | Introduction to Machine Learning for Civil Engineers | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CVE201 |
| CVE311 | Structural Analysis (3) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE212 |
| - | Civil Elective (1) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| - | NUB Elective (3) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 14 | 9 | 3 | 27 | |

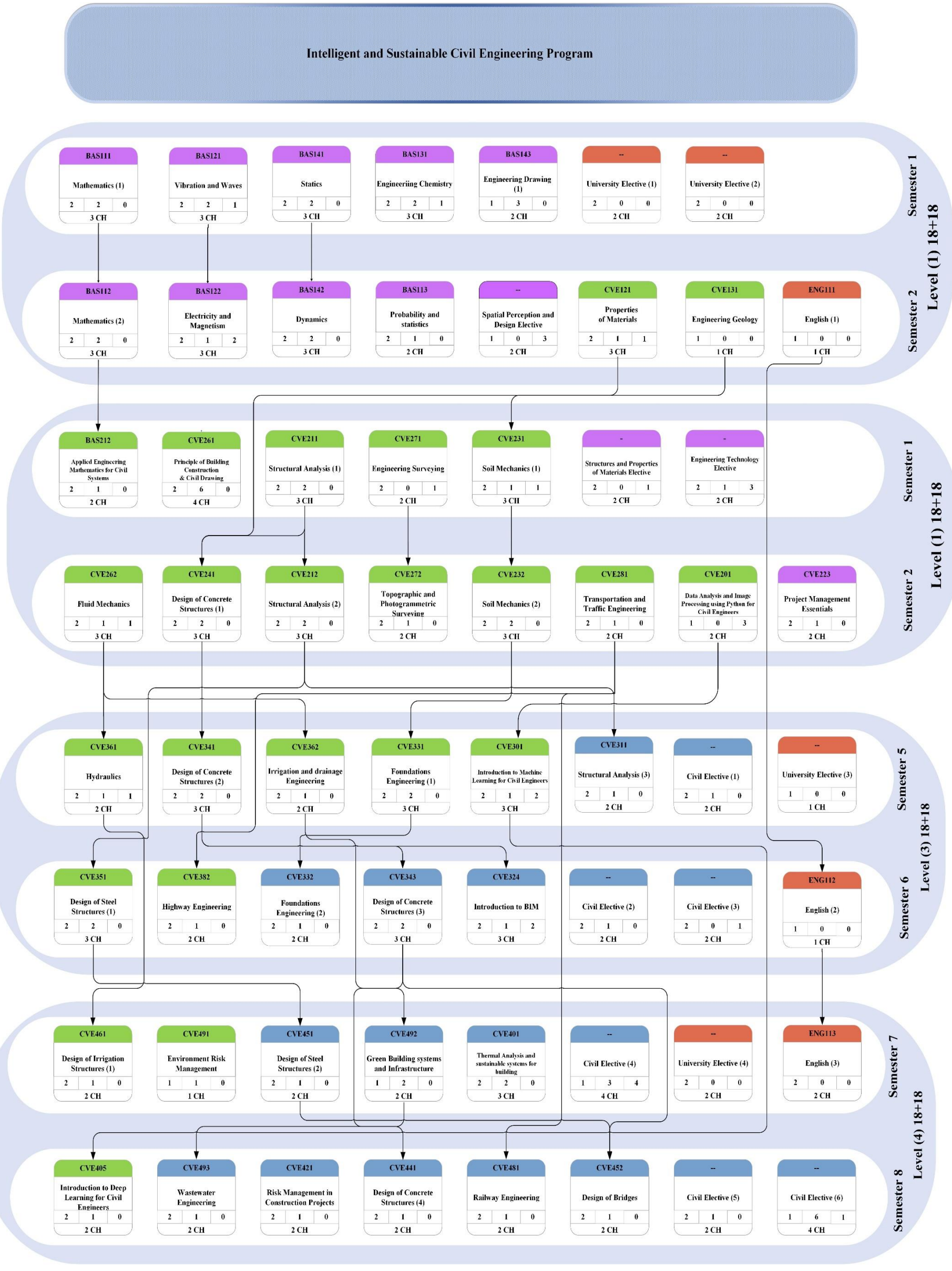
| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 6 | | | | | | | | | |
| CVE351 | Design of Steel Structures (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE212 |
| CVE382 | Highway Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE281 |
| CVE332 | Foundations Engineering (2) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE331 |
| CVE343 | Design of Concrete Structures (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE341 |
| CVE324 | Introduction to BIM | 3 | 6 | 150 | 2 | 1 | 2 | 5 | CVE341 |
| - | Civil Elective (2) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| - | Civil Elective (3) | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | ENG111 |
| Total | | 18 | 30 | 750 | 14 | 8 | 4 | 27 | |
| Semester 7 | | | | | | | | | |
| CVE461 | Design of Irrigation Structures (1) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE361 |
| CVE491 | Environment Risk Management | 1 | 2 | 50 | 1 | 1 | 0 | 2 | |
| CVE451 | Design of Steel Structures (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CVE351 |
| CVE492 | Green Building systems and Infrastructure | 2 | 3 | 75 | 1 | 2 | 0 | 3 | CVE362 |
| CVE401 | Thermal Analysis and sustainable systems for building | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| - | Civil Elective (4) | 3 | 6 | 150 | 1 | 3 | 3 | 7 | 101 Cr. hrs. |
| - | NUB Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | ENG112 |
| Total | | 18 | 30 | 750 | 14 | 10 | 3 | 28 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 8 | | | | | | | | | |
| CVE405 | Introduction to Deep Learning for Civil Engineers | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CVE301 |
| CVE493 | Wastewater Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE492 |
| CVE421 | Risk Management in Construction Projects | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE322 |
| CVE441 | Design of Concrete Structures (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE343 |
| CVE481 | Railway Engineering | 2 | 4 | 100 | 2 | 1 | 1 | 3 | CVE281 |
| CVE452 | Design of Bridges | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CVE451& CVE343 |
| - | Civil Elective (5) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| - | Civil Elective (6) | 3 | 6 | 150 | 1 | 3 | 3 | 7 | |
| Total | | 17 | 30 | 750 | 15 | 10 | 3 | 28 | |

- ## Graduate Attributes

**The graduates from Civil Engineering Program:**

- Master a wide spectrum of civil engineering knowledge and specialized skills.
- Apply acquired knowledge using theories and abstract thinking in real life situations.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Enhance comprehension of project management principles to proficiently strategize and implement engineering projects while adhering to budgetary and timeline limitations.
- Use techniques, skills and modern engineering tools necessary for civil engineering practice.


Intelligent and Sustainable Civil Engineering Program
Level (1) 18+18
Semester 1
BAS111 Mathematics (1) 2 2 0 3 CH
BAS121 Vibration and Waves 2 2 1 3 CH
BAS141 Statics 2 2 0 3 CH
BAS131 Engineeriing Chemistry 2 2 1 3 CH
BAS143 Engineering Drawing (1) 1 3 0 2 CH
-- University Elective (1) 2 0 0 2 CH
-- University Elective (2) 2 0 0 2 CH
Semester 2
BAS112 Mathematics (2) 2 2 0 3 CH
BAS122 Electricity and Magnetism 2 1 2 3 CH
BAS142 Dynamics 2 2 0 3 CH
BAS113 Probability and statistics 2 1 0 2 CH
-- Spatial Perception and Design Elective 1 0 3 2 CH
CVE121 Properties of Materials 2 1 1 3 CH
CVE131 Engineering Geology 1 0 0 1 CH
ENG111 English (1) 1 0 0 1 CH
Level (2) 18+18
Semester 3
BAS212 Applied Engineering Mathematics for Civil Systems 2 1 0 2 CH
CVE261 Principle of Building Construction & Civil Drawing 2 6 0 4 CH
CVE211 Structural Analysis (1) 2 2 0 3 CH
CVE271 Engineering Surveying 2 0 1 2 CH
CVE231 Soil Mechanics (1) 2 1 1 3 CH
- Structures and Properties of Materials Elective 2 0 1 2 CH
- Engineering Technology Elective 2 1 3 2 CH
Semester 4
CVE262 Fluid Mechanics 2 1 1 3 CH
CVE241 Design of Concrete Structures (1) 2 2 0 3 CH
CVE212 Structural Analysis (2) 2 2 0 3 CH
CVE272 Topographic and Photogrammetric Surveying 2 1 0 2 CH
CVE232 Soil Mechanics (2) 2 2 0 3 CH
CVE281 Transportation and Traffic Engineering 2 1 0 2 CH
CVE201 Data Analysis and Image Processing using Python for Civil Engineers 1 0 3 2 CH
CVE223 Project Management Essentials 2 1 0 2 CH
Level (3) 18+18
Semester 5
CVE361 Hydraulics 2 1 1 2 CH
CVE341 Design of Concrete Structures (2) 2 2 0 3 CH
CVE362 Irrigation and drainage Engineering 2 1 0 2 CH
CVE331 Foundations Engineering (1) 2 2 0 3 CH
CVE301 Introduction to Machine Learning for Civil Engineers 2 1 2 3 CH
CVE311 Structural Analysis (3) 2 1 0 2 CH
-- Civil Elective (1) 2 1 0 2 CH
-- University Elective (3) 1 0 0 1 CH
Semester 6
CVE351 Design of Steel Structures (1) 2 2 0 3 CH
CVE382 Highway Engineering 2 1 0 2 CH
CVE332 Foundations Engineering (2) 2 1 0 2 CH
CVE343 Design of Concrete Structures (3) 2 2 0 3 CH
CVE324 Introduction to BIM 2 1 2 3 CH
-- Civil Elective (2) 2 1 0 2 CH
-- Civil Elective (3) 2 0 1 2 CH
ENG112 English (2) 1 0 0 1 CH
Level (4) 18+18
Semester 7
CVE461 Design of Irrigation Structures (1) 2 1 0 2 CH
CVE491 Environment Risk Management 1 1 0 1 CH
CVE451 Design of Steel Structures (2) 2 1 0 2 CH
CVE492 Green Building systems and Infrastructure 1 2 0 2 CH
CVE401 Thermal Analysis and sustainable systems for building 2 2 0 3 CH
-- Civil Elective (4) 1 3 4 4 CH
-- University Elective (4) 2 0 0 2 CH
ENG113 English (3) 2 0 0 2 CH
Semester 8
CVE405 Introduction to Deep Learning for Civil Engineers 2 1 0 2 CH
CVE493 Wastewater Engineering 2 1 0 2 CH
CVE421 Risk Management in Construction Projects 2 1 0 2 CH
CVE441 Design of Concrete Structures (4) 2 1 0 2 CH
CVE481 Railway Engineering 2 1 0 2 CH
CVE452 Design of Bridges 2 1 0 2 CH
-- Civil Elective (5) 2 1 0 2 CH
-- Civil Elective (6) 1 6 1 4 CH
CVE
TRN 2x1 Field Training (1) 0 5 8 0 CH
TRN 3x1 Field Training (2) 0 5 8 0 CH
- The maximum allowed study duration is 8 academic years
- Cumulative GPA at any main semester < 2.0
- 10 Weeks of Field
- Training can be Started at the end of level 2 (Sophomore level)
University Req. 11 CH
Program. Major Req 58 CH
Faculty Req. 33 CH
Program. Minor Req 42 CH
Course Code
Course Title
Lec Tut Lab
# CH

- **Intelligent and Sustainable Civil Engineering Program Courses Content**

- **Courses offered by Intelligent and Sustainable Civil Engineering Program (CVE)**

| CVE211 | Structural Analysis (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Basics of Statics – Loads and Reactions – Axial Forces – Shear Forces- Determination of Statically Determinate and Statically Indeterminate Structures- Normal Forces - Shear Forces and Bending Moments in Beams and Frames – Statically Determinate Trusses – Influence Lines for Beams , Frames and Trusses – Properties of Plan Areas. |
| References |
| • Hibbeler (2012), Structural Analysis, 8ed, Prentice Hall, Pearson<br>• Theory of structures Vol. 1, W.M.El-Dakhakhni, Dar El-Maaref, Cairo.<br>• Theory of structures Vol. 2, by prof. Fayez Kaiser ,1975 , Egypt<br>• Leet, Uang, Gilbert (2010), Fundamentals of Structural Analysis, McGraw<br>• Emam, H., Mondial Press (2004)" Fundamental Theory of Structures.<br>• Kenneth Leet "Fundamentals of Structural Analysis"<br>• Russell Hibbeler "Structural Analysis"<br>• Aslam Kaasimali "Structural Analysis" |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE212 | Structural Analysis (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (1) - CVE211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Normal stress, shear stress and combined stresses- Classical methods for beam deflection- Three moments' equations – Moving loads – Buckling in columns and thin plates. |
| References |

- Theory of structures Vol. 2, W.M.El-Dakhakhni, Dar El-Maaref, Cairo
- Theory of structures Vol. 2, by prof. Fayez Kaiser , Egypt
- Salah Khalafallah "Structural Analysis: analysis of indeterminate structures"
- 4- K. U. Muthu "Indeterminate Structural Analysis"


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE311 | Structural Analysis (3) | | 2 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (2) - CVE212 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Virtual work methods for deflection calculation, Graphical method for trusses, Virtual work methods for indeterminate structures, Influence lines for forces and displacements in indeterminate structures, Plastic center method, Moment distribution method, Bases of stiffness method, Stiffness method for computer analysis.

References


- Colin Caprani, Internet Book, 2010," Structural Analysis III: Moment Distribution.
- Theory of structures Vol. 2, by prof. Fayez Kaiser, 1975, Egypt.
- Theory of structures Vol. 2, W.M.El-Dakhakhni, Dar El-Maaref, Cairo.
- Russell Hibbeler "Structural Analysis"
- Aslam Kaasimali "Structural Analysis"
- Aslam Kaasimali "Matrix Analysis of Structure"


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE312 | Structural Dynamics and Seismic analysis | | 2 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (3) - CVE311 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Introduction to Dynamic Analysis, Classification of Structural Systems According to Dynamic Analysis, Dynamic Analysis of Structural System with One Degree of Freedom, Approximate Methods of Analysis of Indeterminate Structures: Portal Frame, Cantilever Method, Hollow Vierendeel Girders, Introduction to Finite Element Method.

References

- A. K. Chopra, Dynamics of Structures: Theory and Applications to Earthquake Engineering, 5th Edition, Prentice Hall, Englewood Cliffs, New Jersey, 2017.
- Dynamics of Structures, R. W. Clough and J. Penzien 3rd Edition 2003

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE121 | Properties of Materials | 3 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Material science Material properties, stresses and strain, Poisson ratio, method of testing, testing machines, tensile test, compression test properties of ductile materials, brittle materials semiductile materials. Concrete materials: Cement, Aggregate, Mixing water, Admixtures. Concrete manufacturing: Storage, Mixing, Transportation, Pouring, Compacting, Curing, Construction Joints, Shrinkage and movement joints, Formwork, Ready mixed concrete.

Laboratory

- Tensile strength of mild steel.
- Cement testing (Fineness Test, Standard Consistency Test, Initial and Final Setting Time Test, Compressive Strength Test, Autoclave Test for Soundness, Tensile Strength Test, Specific Gravity Test, Heat of Hydration Test)
- Aggregate testing (Sieve Analysis Test, Crushing Test, Impact Test, Abrasion Test, Flakiness Index Test, Elongation Index Test, Angularity Test, Soundness Test, Specific Gravity and Water Absorption Test)

References

- Materials for Civil and Construction Engineers, Michael Mamlouk and John P.
- Zaniewski, Prentice Hall, Second Ed., ISBN: 0-13-147714-5 Second edition – 2012
- Construction materials for civil engineering projects

- Egyptian codes of practice for reinforced concrete (2021) & Steel structures
- Egyptian Standard Specifications for different construction materials (Updated versions)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE223 | Project Management Essentials | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Definition of Projects and Project Management, Project management techniques, models, and knowledge to enable students to design and operate an effective project management system, Project Life Cycle in Construction, Project Scope Management, Quality Management, Introduction to Procurement Management, Introduction to Equipment Management, Introduction to Risk Management, Human Resources Management including Charts and staff motivation, Communication, and stakeholder management, Construction method statements and constructability, introduction to operation research. Topics are aligned with the Project Management Body of Knowledge (PMBOK).

References

- PMI, A guide to the project management body of knowledge, 5th edition, PMI, USA
- Hinze, Jimmie, Construction Planning and Scheduling, 4th edition, Person Prentice Hall, New Jersey, USA, 2011
- Sears, S. et al., Construction Project Management, 6th edition, John Wiley and Sons, New York, 2015
- Mubarak, Saleh A., Construction Project Scheduling and Control, 3rd edition, John Wiley and Sons, New York, 2015

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE324 | Introduction to BIM | | 3 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (2) - CVE341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 150 | | 6 | |

**Course Content**

Overview of the BIM Process. BIM history and definition. BIM benefits. BIM challenges Autodesk Revit. The use of BIM in the planning and design phase. The use of BIM in the construction phase. BIM Concepts. BIM Principles and practices for construction. Tools and Techniques for BIM Implementation. Collaborative Nature of BIM. BIM Standards ISO 19650. Introduction to Revit. Introduction to relevant BIM Software, and Applications.

**References**

- Building information modeling: a strategic implementation guide for architects, engineers, constructors, and real estate asset managers by Dana K. Smith
- Building Information Management. A Standard Framework and Guide to BS 1192
- BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE321 | Quality Control in Construction Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (1) - CVE241<br>Properties of Materials - CVE121 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Technical inspection - procedures for quality control – components of quality assurance - basics for quality control plans and the assurance of their success - statistical control using computer programs

**References**

- Quality control of concrete structures. proceedings of the International Symposium held by RILEM
- Quality control of concrete structures, L. Taerwe, H. Lambotte

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE322 | Recycling of Construction Materials | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Recycling of wastes in construction: Types of waste materials, Agricultural wastes, Industrial wastes and by-products, Construction and demolition wastes, Solid waste materials (Glass, Rubber Tires, Saw dust, Paper, Carpet fibers……). Sustainability: Definition, Environmental, social, and economic aspects of sustainability, Sustainability in civil engineering, Environmental problems related to construction, Environmental impact of building materials. Green building: Building codes and green building rating systems, environmentally friendly cements and concretes (Green cements, Green concrete, Pervious concrete, Geo-polymer concrete).

References

- Materials for Civil and Construction Engineers, Michael Mamlouk and John P.
- Zaniewski, Prentice Hall, Second Ed., ISBN: 0-13-147714-5 Second edition – 2012
- Construction materials for civil engineering projects
- Egyptian codes of practice for reinforced concrete (2019) & Steel structures
- Egyptian Standard Specifications for different construction materials (Updated versions)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE323 | Management of Construction Projects | | 2 CH |
|---|---|---|---|
| Prerequisites | Project Management Essentials – CVE223 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

This course is intended to provide an introduction to many facts of the construction management. This course intent is to provide a practical demonstration of the basic management techniques commonly used or encountered on a construction project. Course Outlines: Project need determination and feasibility studies; Project Cost Evaluation and Estimating; Project Schedule development; Design/Construction Contract Development; Project Engineering/Design; Engineering Procurement Specification development; Cost Accounting and Control; Labor availability Evaluation; Quality Assurance and Control; Safety; Project Closeout.

**References**

- Project Management Institute Essential books ( text books ), 2008 , Construction Engineering and management, PMBOK
- Frederick Gould and Nancy E. Joyce, Construction Project Management, Prentice Hall, 3rd. ed., 2008

**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CVE325 | Advanced Materials | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Stress analysis and Strain and theory's of failure - Lightweight concrete and fiber reinforced concrete - Additives to concrete and High strength concrete - Nano materials and its application in concrete, and Ferro cement – Materials for Protecting

**References**

- Mechanics of Advanced Composite Materials, Gibson, 1998
- Egyptian Code of practice for FRP Code 208 – 2006

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE326 | Quantities and Specifications | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (2) – CVE341<br>Foundation Engineering (1) – CVE331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Elements of contract documents. Writing of specifications documents that complement the working drawings. Defining the scope of work and detailed description of items and materials. Quality surveyor; rules and methods. The techniques of calculating the quantities of building items. Check listing the finished work and detecting faulty items.

**References**


- Building and Engineering Contracts, 7th Edition. B.S. Patil and S.P. Woolhouse.CRC Press, 2019.
- Abdullatif Abu Al-Ata Al-Bukhari, Engineering Encyclopedia for the Construction of Buildings and Public Utilities, Dar majed Printing, Cairo, Third Edition 1999.
- Mohammed Majed Abbas Khulusi, Quantities, Specifications and Performance Rates for Construction Work, part I, sixth edition


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE421 | Risk Management in Construction Projects | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Introduction to risk management, Plan Risk Management, Identify Risks (due to consult-ants, owners, contractors or due to management), Perform Quantitative Risk Analysis, Perform Qualitative Risk Analysis, Force majeure risks, Plan Risk Responses and Control Risks, Safety in

| |
|---|
| Construction and Personal Protective Equipment, Accidents Investigation |

References


- Practice Standard for Project Risk Management: PMI, Project Management Institute Institute, P. M. (2009)
- Managing risk in construction projects, Smith, Nigel J,erna, Tony, Jobling, Paul, 2014
- PMI, A guide to the project management body of knowledge, 5th edition, PMI, USA
- Hinze, Jimmie, Construction Planning and Scheduling, 4th edition, Person Prentice Hall, New Jersey, USA, 2011
- Hegazy, T., Computer-Based Construction Project Management, Prentice Hall, 2002.
- Sears, S. et al., Construction Project Management, 6th edition, John Wiley and Sons, New York, 2015
- Mubarak, Saleh A., Construction Project Scheduling and Control, 3rd edition, John Wiley and Sons, New York, 2015
- Rita Mulcahy's Risk Management Tricks of the Trade for Project Managers: And PMI-RMP Exam Prep Guide: a Course in a Book, 2010.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE422 | Repair & Strengthening of Structures | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (1) - CVE241 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Causes of deterioration of concrete structures, Evaluation of concrete structures, Repair and strengthening materials (types, selection and testing), Bond between repair and strengthening materials and substrate concrete, Different repair and strengthening techniques, Protection and maintenance of concrete structures, Repair and strengthening of different concrete elements (footing – column – beam – slab …. etc.), Structural analysis of repair and strengthening, Design of repair and strengthening, Case studies.

References


- Emmons, Peter H., Concrete repair and Maintenance, R.S. Means Co., Inc.,1993.
- Allen, R. T. L.; Edwards, S. C. and Shaw, J. D. N., The Repair of Concrete Structures, Blackie Academic and Professional, 1993.
- ACI Committee 440, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures, American Concrete Institute, 2017.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE423 | Advanced BIM | | 2 CH |
|---|---|---|---|
| Prerequisites | Introduction to BIM - CVE324 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Introduce advanced BIM concepts and terminologies. Examine implementing BIM in an organization while introducing practical applications within a live project environment. Determining BIM capability and future goals within an organization. Developing a BIM roadmap. Developing a BIM execution plan. Identifying appropriate BIM tools and required technology infrastructure Managing change within the organization Identifying required changes to the business process. Managing Projects using Revit. Revit for Architecture and Structures. Developing 4D, 5D, and nDs, BIM Models and extracting time and cost from BIM Models, Developing training advanced applications by relevant BIM software.

**References**

- Building information modeling: a strategic implementation guide for architects, engineers, constructors, and real estate asset managers by Dana K. Smith
- Building Information Management. A Standard Framework and Guide to BS 1192
- BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Student Activities | Student Activities | Student Activities |
| 40% | 20% | 0% | 40% |

| CVE424 | Construction Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (2) - CVE341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| The major factors involved in heavy and building construction projects. The material is presented from the point of view of a field engineer with several assignments to illustrate the production planning required for construction projects. Course outline: Operational planning assignment; Project plans and specification; Earthwork fundamentals and calculations; Equipment production fundamentals; Tractors, Dozers, Rippers, Scarpers, Haulers, Loaders, Excavators; Aggregate production systems; Conveying systems; Formwork; Concrete pumps. |
| References |
| • Mamlouk, M and Zaniewski, J, Materials for Civil and Construction Engineers, Prentice Hall, 3rd. Ed., 2006. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Student Activities | Student Activities | Student Activities |
| 40% | 20% | 0% | 40% |

| CVE131 | Engineering Geology | | 1 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 50 | | 2 | |

| Course Content |
|---|
| Rock forming minerals; Rock types and soil types; Soil and rock properties; Geological structure analysis; Plate tectonics; Geological time (relative and absolute geological age(; Geological maps and sections; Discontinuities analysis (Hemispherical projection); Weathering and soils; Surface processes (Floodplains and Alluvium, Glacial Deposits, Climatic Variants), Coastal processes; Groundwater flow; Geological and geophysical site Investigation; Engineering geophysics; Assessment of difficult grounds; Rock excavation; Rock as construction materials. |
| References |
| • Bell F. G, Engineering Geology and Construction, Spon Press, Taylor & Francis Group, London, 2004.<br>• Waltham T., Foundtions of Engineering Geology, Spon Press, 3rd. Ed., 2009 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE231 | Soil Mechanics (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | Engineering Geology - CVE131 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Soil properties and preliminary definitions; soil investigation; soil classification; soil compaction; soil permeability; stresses, strains, and elastic deformations of soils; stress path; laboratory compaction tests; relative density; field compaction; compaction equipment; and site control of compaction. Seepage: flow net diagram, uplift pressure, and critical hydraulic gradient.

**References**

- Braja M. Das, Khaled Sobhan , ISBN 13- 978-1305970953 , 2017 “Principles of Geotechnical Engineering”, 9 edition,.
- K. R. Arora, ISBN 13- 978-8180141126 , 2020, " SOIL MECHANICS AND FOUNDATION ENGINEERING",

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE232 | Soil Mechanics (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Soil Mechanics (1)- CVE 231 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Soil consolidation; prediction of settlement of structures; lateral earth pressure and shear strength of soil. Bearing capacity: modes of failure, shear strength parameters, bearing capacity equations, eccentric loads, and inclined loads. Contact pressure and settlement of foundations.

**References**

- Braja M. Das, Khaled Sobhan , ISBN 13- 978-1305970953 , 2017 “Principles of Geotechnical Engineering”, 9 edition,.
- K. R. Arora, ISBN 13- 978-8180141126 , 2020, " SOIL MECHANICS AND FOUNDATION ENGINEERING",

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE331 | Foundations Engineering (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | Soil Mechanics (2) - CVE232 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Analysis and design of shallow foundations: isolated and combined footings, strip foundations, and strap beams. Interaction of shallow foundations with elastic soil. Deep foundations: types, classification of piles, bearing capacity of a single pile, settlement of a single pile, pile load tests, design of pile caps, and subgrade reaction model.

**References**

- Egyptian code of practice for foundations, Cairo, 2020.
- Baraja, Das, Cengage Learning, ISBN 13- 978-0357684658 ,2023 “Principles of Foundation Engineering”, 10th Ed.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE332 | Foundations Engineering (2) | | 2 CH |
|---|---|---|---|
| Prerequisites | Foundations Engineering (1) - CVE331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Stability analysis of retaining walls: action forces, rotational sliding, block stability, and foundation stresses. Laterally loaded piles. Slope stability: infinite slopes, finite slopes, mass methods, method of slices, and design charts. Stability analysis and design of sheet pile walls: cantilever and anchored sheet pile walls, free and fixed earth support, tie-backs, braced cuts, and site dewatering.

**References**

- Egyptian code of practice for foundations, Cairo, 2020.
- Baraja, Das, Cengage Learning, ISBN 13- 978-0357684658 ,2023 “Principles of Foundation Engineering”, 10th Ed.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE241 | Design of Concrete Structures (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (1)- CVE211<br>Properties of Materials - CVE121 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Theories of Design - The Codes of Practice in Reinforced concrete structures)-Ultimate limit strength method - Analysis of Sections (Stress-strain relations – the distribution of strains and stresses across a section - Analysis of the Section under Bending (single and double reinforcement) (rectangular –L and T section) , Shear- Analysis of the structure (Loads – load combinations – straining action)-Design of beams – (Loads distributions – straining action - design of section –details of steel reinforcement code requirements)- Analysis of Sections under centric and eccentric compression force based on limit state strength method and permissible stress method) - Design of short column.

References

- الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم ٢٠٣-٢٠١٨
- مساعدات التصميم مع أمثلة طبقًا للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (اخر تحديث
- Reinforced Concrete Mechanics and Design, seventh edition, 2015
- Mashhour Ghoneim & Mahmoud El-Mihilmy: Design of Reinforced Concrete Structures, Volume 1, 2 & 3, second edition, 2008.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE341 | Design of Concrete Structures (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (1) - CVE241<br>Structural Analysis (2) - CVE212 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Design the roof of structures (beam slab type- Hollow block slabs – ribbed stabs – flat slabs – paneled beams slabs) -Design of reinforced concrete elements under torsion, shear and moment and axial force – stairs. |
| References |
| • الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم ٢٠٣-٢٠١٨<br>• مساعدات التصميم مع أمثلة طبقًا للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (اخر تحديث)<br>• Reinforced Concrete Mechanics and Design, seventh edition, 2015<br>• James Mac Gregor & James K. Wight, Reinforced Concrete: Mechanics and design, 6th Ed., Prentice Hall, July 2013.<br>• Mashhour Ghoneim & Mahmoud El-Mihilmy: Design of Reinforced Concrete Structures, Volume 2, second edition, 2008.Rita Mulcahy's Risk Management Tricks of the Trade for Project Managers: And PMI-RMP Exam Prep Guide: a Course in a Book, 2010 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE343 | Design of Concrete Structures (3) | | 3 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (2)- CVE341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Serviceability limit state - Design the reinforced concrete long columns -Design of reinforcement concrete shear wall - Big span systems (Frames - Arch slabs and Arch girders,)- Behavior and design of short cantilever and R.C Hinges supports. |
| References |
| • الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم ٢٠٣-٢٠١٨<br>• Reinforced Concrete Mechanics and Design, seventh edition, 2015<br>• مساعدات التصميم مع أمثلة طبقًا للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (اخر تحديث)<br>• James Mac Gregor & James K. Wight, Reinforced Concrete: Mechanics and design, 6th Ed., Prentice Hall, July 2013.<br>• Mashhour Ghoneim & Mahmoud El-Mihilmy: Design of Reinforced Concrete Structures, Volume 2, second edition, 2008. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE342 | Design of Wall Bearing Structures | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (1) - CVE241 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Introduction: History of masonry, Masonry elements, Types of masonry construction, Analysis and design methods. Masonry materials: Masonry units, Mortar, Grout, Reinforcement. Masonry assemblages: Compression, Flexural, Shear in plane tensile strength. Reinforced beams and lintels: Flexural behavior and design, Shear behavior and design, Load distribution on lintel beams. Flexural walls: Load resisting mechanisms, Flexural behavior, Analysis and design of reinforced flexural walls. Load bearing walls under axial load and out of plane bending: Overview, Effects of bending on the capacity of walls, Effect of wall height, Interaction between axia l load an bending, Linear elastic analysis of unreinforced and reinforced sections, Effects of slenderness, Moment magnification, Special provisions for slender reinforced walls.

References


- Drysdale, Hamid, and Baker, Masonry Structures: Behavior and Design, Brick Institute of America and National Concrete Masonry Association, 1993
- Klingner, Masonry Structural Design, McGraw-Hill Education, 2010
- Richard E. Klingner 2010 Masonry Structure Design McGraw Hill Companies.
- Aita Danila Orietta Pedemonte and Kim Williams eds. Masonry Structures Between Mechanics and Architecture. Springer International Publishing 2015.
- Ohtsu Masayasu and D. G. Aggelis. Innovative AE and NDT techniques for on site measurement of concrete and masonry structures. RILEM State Art Rep 20 2016 89 103
- ECP 204 2005 Egyptian Code of Practice for Masonry Structures Housing and Building Research Center.
- Masonry Standards Joint Committee 2005 Building Code Requirements for Masonry Structures ACI 530 05 ASCE 5 05 TMS 402 05 American Concrete Institute American Society of Civil Engineers and The Masonry Society Detroit New York.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE344 | Design of High-Rise Buildings | | 2 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (3) - CVE311<br>Design of Concrete Structures (2) - CVE341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |

| | | |
|---|---|---|
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

Examines structural aspects of high-rise buildings, particularly fundamental approaches to the analysis of the behavior of different forms of building structures including frame, shear wall, tubular, core and outrigger - braced systems. Introducing the forces to which the structure is subjected, design criteria which are of the greatest relevance to tall buildings, and various structural forms which have developed over the years since the first skyscrapers were built at the turn of the century. Modeling of real structures for both preliminary and final analyses. Assessment of the stability of the structure, and the significance of creep and shrinkage. Dynamic response of structures subjected to wind and earthquake forces. Includes both accurate computer - based and approximate methods of analysis, Applications using structural analysis software programs.

References


- Taranath, Tall Building Design: Steel, Concrete, and Composite Systems, CRC Press, 2016
- Smith, Tall Building Structures: Analysis and Design, John Wiley & Sons, 1991


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE345 | Pre-stressed Concrete | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Concrete Structures (2)-CVE341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Principles of prestressing- methods of prestressing – analysis of section under working loads – Design for serviceability limit state - Design for ultimate limit state.

References


- Egyptian Code for Design and Construction of Reinforced Concrete Structures ECP-203-18, 2nd edition, 2020
- Guide of structural engineering (part seven), Abdel- Rahman Megahed
- Reinforced concrete design, W.H. Mosley and J.H.Bungey ,MACMILLAN
- Reinforced concrete design handbook- Prof, Dr. Shaker El Behairy (sixth edition)

- Design of Reinforced Concrete Structure, Prof. Mashhour gheneim & Prof. Mahmoud El Mihilmy, Third Edition 2012, Volume 1
- Egyptian code for the design of concrete structures 203-2007

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE441 | Design of Concrete Structures (4) | 2 CH |
|---|---|---|
| Prerequisites | Design of Concrete Structures (3)-CVE343 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Serviceability limit and crack control, Design of water structures, Water tanks and its shapes, tanks rested on soil, semi embedded tanks, embedded tanks, elevated tanks, calculation of loads distributions, Analysis for straining action design of sections -circular beams and deep beams).

**References**

- Egyptian Code of Practice for the Design and Construction of Reinforced Concrete Structures. ECP 203 18
- Mashour Ghoneim & Mahmoud EL-Mihilmy, Design of Reinforced Concrete Structures, 2nd Ed., volume 1,2 & 3, 2008
- James Mac Gregor & James K. Wight, Reinforced Concrete: Mechanics and design, 5th Ed., Prentice Hall, July 2008.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE442 | Design of Special reinforced concrete structures | 2 CH |
|---|---|---|
| Prerequisites | Design of Concrete Structures (3) - CVE343 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

Thin Shell Structures - Folded Plates - Yield Line Theory for Plates

| References | | | |
|---|---|---|---|
| • Egyptian Code of Practice for the Design and Construction of Reinforced Concrete Structures. (ECP 203-20).<br>• M. Hilal Theory and Design of Reinforced Concrete Tanks, 1988<br>• Mashour Ghoneim & Mahmoud EL-Mihilmy, Design of Reinforced Concrete Structures, 2nd Ed., volume 3, 2020 | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE431 | Tunnels and underground structures | | 2 CH |
|---|---|---|---|
| Prerequisites | Foundations Engineering (2) - CVE332 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |
| Course Content | | | |
| Classification of Tunnels – Tunneling Techniques, Soil-Structure Interaction, Application of Finite Element Method to tunneling problems, Soil Settlement due to Tunneling, Analysis and Design of Tunnels and Under-ground Structures using Specialized Computer Programs. | | | |
| References | | | |
| • Columbs, Springer, 2008 “Design and Analysis of Tunnels ”<br>• Mohsen Razevy, World Scientific Publishing, 2003 “Quantom Theory of Tunnels”<br>• R. C. Hibbeler, Pearson Prentice Hall, 2010,” Structural Analysis” | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE351 | Design of Steel Structures (1) | | 2 CH |
|---|---|---|---|
| Prerequisites | Structural Analysis (2) - CVE212 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |

Structural steel technology: Introduction to steel design theories, Steel fracture, Steel grades. Design elements: structural systems and General layout for multipurpose halls, Lateral resistance and bracing systems, Codes and specifications, Load calculations. Member design: Structural behavior, cross section classification (rolled section), Truss Tension members, Truss Compression members, Design of Purlins, Types of connections, Analysis and design of Bolted connections (Bearing-Type), Analysis and design of welded connections, Steel details for trusses, Steel details for wind bracing.

References

- Egyptian Code of Practice for Loads of Structural Works and Buildings, code No. 201 – 2011.
- Egyptian Code of Practice for Steel Construction and Bridges (Allowable Stress Design – ASD) Code No: (205) Ministerial Decree No 279 – 2001.
- Egyptian Code of Practice for Steel Construction and Bridges (Load and Resistance Factors Design) – 2008.
- Salmon C.G., Johnson J.E., and Malhas F.A. Steel Structures: Design and Behaviour, Prentice Hall, 5th ed. 2009.
- Design of Steel Structures to Eurocodes https://08102uegj-1106-y-https-link-springer-com.mplbci.ekb.eg/book/10.1007/978-3-319-95474-5.
- Jack C. McCormac and Stephen F. Csernak. Structural Steel Design, 6th edition – 2018.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE451 | Design of Steel Structures (2) | 3 CH |
|---|---|---|
| Prerequisites | Design of Steel Structures (1) - CVE351 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Design of members: Compression members (columns) Lacing Bars and Batten Plates, Beams under bending, Torsion on beams, Beam-columns, Local buckling. Analysis and design of bolted connections (friction bolts), Design of Torsion and Tension Bracket Connection (Friction-Type) Steel details for frames, Design of Splice, Connection Design of Fixed Base Fatigue considerations, Fabrication and errection considerations, Introduction to composite beams and columns.

References

- Egyptian Code of Practice for Loads of Structural Works and Buildings, code No. 201 – 2011.
- Egyptian Code of Practice for Steel Construction and Bridges (Allowable Stress Design – ASD) Code No: (205) Ministerial Decree No 279 – 2001.
- Egyptian Code of Practice for Steel Construction and Bridges (Load and Resistance Factors Design) – 2008.
- Salmon C.G., Johnson J.E., and Malhas F.A. Steel Structures: Design and Behaviour, Prentice Hall, 5th ed. 2009.
- Design of Steel Structures to Eurocodes https://08102uegj-1106-y-https-link-springer-com.mplbci.ekb.eg/book/10.1007/978-3-319-95474-5.
- Jack C. McCormac and Stephen F. Csernak. Structural Steel Design, 6th edition – 2018.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE452 | Design of Bridges | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Steel Structures (2) - CVE451<br>Design of Concrete Structures (3) - CVE343 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Structural system of bridges. Types of bridges: Structural systems in longitudinal and transverse directions, Material of construction, Design philosophy. Design loads: Roadway loading, Railway loading, other loads on bridges. Design of concrete bridges (types of Reinforced concrete bridges - elements of the bridge – typed of loads -solid slab type bridge- Box slab type). Design of steel floor beams systems: Stringer, Cross girders, Floor connections. Design of plate girder bridges: General design considerations. Design of truss bridges.

References


- Reinforced Concrete Mechanics and Design, seventh edition, 2015 .
- James Mac Gregor & James K. Wight, Reinforced Concrete: Mechanics and design, 6th Ed., Prentice Hall, July 2013.
- Mashhour Ghoneim & Mahmoud El-Mihilmy: Design of Reinforced Concrete Structures, Volume 2, second edition, 2008.
- A guide of structural engineer for the design and implementation of concrete structures -Prof. Abdul Rahman Mujahid Ahmed Egyptian Code of Practice for Steel Construction and

Bridges (Allowable Stress Design – ASD) Code No: (205) Ministerial Decree No 279 – 2001.
- Egyptian Code of Practice for Steel Construction and Bridges (Allowable Stress Design – ASD) Code No: (205) Ministerial Decree No 279 – 2001.
- Egyptian Code for Planning, Design, and Construction of Bridges and Elevated Intersection ECP No. 207, Part 4 – Loads and Forces on Bridges and Elevated Intersection, 2015.
- Egyptian Code for Planning, Design, and Construction of Bridges and Elevated Intersection ECP No. 207, Part 6 – Analysis and design of Steel Bridges (LRFD), 2015.
- Salmon, C., Johnson, J., and Malhas, F., Steel Structures Design and Behavior Pearson Education, Inc., ISBN:0-13-188556-1, Fifth Edition 2012.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE261 | Principle of Building Construction & Civil Drawing | | 4 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 6 | - | |
| Required SWL | | Equivalent ECTS | |
| 200 | | 8 | |

Course Content

Historical introduction to building construction- The sequences of construction work - Types of buildings foundations- Build by fired bricks and stones - Build by fired bricks and stones Bearing walls, retaining walls and arches - Types of buildings slabs and ceilings - Different types of buildings insulation materials An Introduction to architectural working drawings (Plans – Facades – Sections) - Vertical movement elements (Stairs design)–Notation, dimensions and scale -Earth works (cross sections of canals, drains, roads, railways and non-rigid dams)– Irrigation structures (bridges– weirs– regulators– syphons– aqueducts–culverts)– Retaining structures –Drawing of simple steel structures and connections of steel bridges– Drawing of concrete structures (cross sections for columns, beams, slabs frames, and foundations– reinforcement details).

References

- Mohamed Abdallah, Working Drawings and Architectural Details, Egyptian Anglo Library, Cairo 1989.
- Novak, P., Moffat, A., Nalluri, C. and Narayanan, R., Hydraulic Structures, 4th Edition, Taylor & Francis, 2007. ISBN 0-203-96463-2 Master e-book ISBN.
- Perry S. Green, Thomas Sputo, Patrick Veltri A Teaching Guide for Structural Steel Connections, American Institute of Steel Construction, Civilax, 2016.
- Singh, Gurcharan. "Civil Engineering Drawing". Standard publications-Delhi, 2009.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE262 | Fluid Mechanics | | 2 CH |
|---|---|---|---|
| Prerequisites | Fluid Mechanics CVE262 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Introduction to Irrigation and Drainage Engineering- Soil- Water Interaction- Water Duties- When Irrigation is needed- Agriculture and Irrigation Cycles- Irrigation Systems and their Areas in Egypt- Irrigation Methods- New Irrigation Systems- Sprinkler Irrigation – Drip Irrigation- Drainage- Drainage Systems- Alignment and Design of Irrigation Projects.

**References**


- Principles of Irrigation & Drainage engineering.
- Irrigation and Drainage Engineering,Waller,Peter,Yitayew,Muluneh,2016.
- Educational sites on water resources & irrigation engineering.
- Egyptian code of practice for irrigation design, Cairo, 2009.
- P. Novak, A.I.B. Moffat, C. Nalluri, and R. Narayanan. 2007. “Hydraulic Structures. Taylor & Francis, New York”.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE262 | Fluid Mechanics | | 2 CH |
|---|---|---|---|
| Prerequisites | Fluid Mechanics CVE262 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

The properties of fluids - Forces in static fluids - Fluid pressure measurement -Hydrostatic pressure forces on surfaces - Kinematics of fluid motion - Energy equation - Momentum equation - Dimensional analysis, similitude, and models - Fluid Flow in pipes.

**References**

- Elementary Fluid Mechanics, Vennard & street, John Wiley & sons.
- Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch& Alric P. Rothmayer 'Fluid Mechanics' © 2013, 2010 John Wiley & Sons Singapore Pte. Ltd.
- Wiley - Fluid Mechanics - http://app.kortext.com/read/6310/?page=iv]
- French, R. H, Open Channel Hydraulics; Water Resources Pubns, 2007. ISBN 13: 9781887201445
- Chow V.T.; Open Channel Hydraulics; McGraw-Hill Education-Europe, 1981. ISBN 13: 9780070859067
- Frank M. White, Fluid Mechanics, 8th Edition, McGraw Hill, 2013. ISBN13: 9780073398273 Copyright: 2016


Laboratory

12. Centre of pressure
13. Flow through a Venturi meter
14. Orifice meters
15. Impact of jet
16. Dispersion of a freely discharge jet
17. Flow over a rectangular and vee notches.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE361 | Hydraulics | 2 CH |
|---|---|---|
| Prerequisites | Fluid Mechanics - CVE262 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

Liquid flows in open channels - Gradually varied flow in open channels - Hydraulic turbines - Non-steady flow in pipes and water hammer - Pumping machinery.

References


18. Open channel hydraulics. Prof M. Hanif Chaudhry, 2008.
19. Open Channel hydraulics. Ven Chow, 7th Edition.
20. Open channel hydraulics. Prof. French


Laboratory

21. Shallow Water Wave Celerity
22. Venturi Flume
23. Uniform Flow in Open Channels
24. Parshall Flume

25. The Hydraulic Jump
26. Flow Over a Broad Crested Weir
27. Axial Flow Pump

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE362 | Irrigation and drainage Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | Fluid Mechanics - CVE262 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Introduction to Irrigation and Drainage Engineering- Soil- Water Interaction- Water Duties- When Irrigation is needed- Agriculture and Irrigation Cycles- Irrigation Systems and their Areas in Egypt- Irrigation Methods- New Irrigation Systems- Sprinkler Irrigation – Drip Irrigation- Drainage- Drainage Systems- Alignment and Design of Irrigation Projects.

References


- Principles of Irrigation & Drainage engineering.
- Irrigation and Drainage Engineering,Waller,Peter,Yitayew,Muluneh,2016.
- Educational sites on water resources & irrigation engineering.
- Egyptian code of practice for irrigation design, Cairo, 2009.
- P. Novak, A.I.B. Moffat, C. Nalluri, and R. Narayanan. 2007. “Hydraulic Structures. Taylor & Francis, New York”.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE461 | Design of Irrigation Structures (1) | | 2 CH |
|---|---|---|---|
| Prerequisites | Irrigation and drainage Engineering - CVE362 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

| |
|---|
| Design of canal cross sections with different bed material - Design of Bridges - Design of culverts - Design of syphons -Design of aqueducts - Design of tail escape - lining methods of irrigation channels. |
| References |
| • Hydraulic Structures, Novak, P.; Moffat, A.; Nalluri, C. & Narayanan, R., Fourth edition 2007.<br>• Irrigation and Water Resources Engineering, G.L. Asawa, 2008.<br>• Irrigation Engineering and Hydraulic Structures, S.R. Sahasrabudhe, 2013.<br>• Design of Irrigation Works (1) I.S.B.N. 977-5248-95, 2015.<br>• Egyptian code of practice for irrigation design, Cairo, 2009.<br>• Novak, P., Moffat, A., Nalluri, C. and Narayanan, R., Hydraulic Structures, 1996.<br>• Nazeih Assaad Younan, Design Textbooks in Civil Engineering – Irrigation Structures. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE363 | Hydrology | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Introduction: Hydrologic cycle, Environment and hydrology, Importance of hydrology. Hydrometeorology: Solar energy, Temperature, Vapor pressure, Humidity, Wind, Evaporation, Evapotranspiration. Precipitation: Conditions and types, Rainfall measurements and estimates, Rainfall statistical analysis, Design storm. Infiltration: Effective factors, Measurements, Estimates. Hydro-morphology: Watershed characteristics, Morphological parameters, Time parameters. Surface runoff: Peak flow estimate, Storm hydrograph, Unit hydrograph, Mass curves, Flow and water level measurements. Soil erosion and sedimentation: Effective factors, Soil loss, Sediment yield. Protection works against flash floods: Storage and detention works, Roads crossing works, Direction change works, Sediment traps, Storm water Drainage systems. Subsurface hydrology: Soil - water relations, Characteristics and types of aquifers, Flow through porous media, Well hydraulics, , Sea water intrusion in coastal aquifers. |
| References |
| • Shaw E. M., "Hydrology in Practice", Van Nostrand Reinhold (UK) Co. Ltd., 4th edition, August 29, 2010.<br>• André Musy, Benoit Hingray, Cécile Picouet “Hydrology A Science for Engineers Edite”, Copyright Year 2015. |

- Kevin Sene, "Flash Floods Forecasting and Warning", Springer Science + Business Media Dordrecht 2013.
- Mostafa M. Soliman, "Engineering Hydrology of Arid and Semi-Arid Regions", CRC Press 2017.
- K Subramanya, Engineering Hydrology, Tata McGraw - Hill, 3rd. Ed., 2008.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE364 | Hydraulic Machines | 2 CH |
|---|---|---|
| Prerequisites | Fluid Mechanics CVE262 & Hydraulics – CVE361 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Hydraulics turbines – types of turbines – properties of turbines – similarity in turbines – turbines performance – selection of turbines – non steady flow in pipes and water hammer – basic equation of water hammer – pressure wave in a conduit due to sudden closure of valve - Slow closing of a wave – surge tanks – pumping machinery – types of pumps – properties of pumps – limits of suction life - Pumps in series – pumps in parallel - performance curves of a pump.

**References**


- French, R. H, Open Channel Hydraulics; Water Resources Pubns, 2007. ISBN 13: 9781887201445
- Chow V.T.; Open Channel Hydraulics; McGraw-Hill Education-Europe, 1981. ISBN 13: 9780070859067
- Frank M. White, Fluid Mechanics, 8th Edition, McGraw Hill, 2013. ISBN13: 9780073398273 Copyright: 2016.
- P. Kumari, Hydraulic Machines: Fundamentals of Hydraulic Power Systems, CRC Press; 1 edition (December 27, 2012).


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE462 | Design of Irrigation Structures (2) | 2 CH |
|---|---|---|
| Prerequisites | Design of Irrigation Structures (1) - CVE461 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 100 | 4 |

**Course Content**

Water Control Structures- Weirs and Regulators- Design of Floors for the Water Control Structures- Navigation Locks- Storage Lakes- Dams: Classifications- Types- Ecological Studies- Stability of Dams- Protection of Dams.

**References**


- Hydraulic Structures, Novak, P.; Moffat, A.; Nalluri, C. & Narayanan, R., Fourth edition 2007.
- Irrigation and Water Resources Engineering, G.L. Asawa, 2008.
- Irrigation Engineering and Hydraulic Structures, S.R. Sahasrabudhe, 2013.
- Design of Irrigation Works (1) I.S.B.N. 977-5248-95, 2015.
- Egyptian code of practice for irrigation design, Cairo, 2009.
- Novak, P., Moffat, A., Nalluri, C. and Narayanan, R., Hydraulic Structures, 1996.
- Nazeih Assaad Younan, Design Textbooks in Civil Engineering – Irrigation Structures.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CVE463 | Harbor Engineering | 2 CH |
|---|---|---|
| Prerequisites | Foundations Engineering (2) - CVE332 | |

**Number of Weekly Contact Hours**

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 100 | 4 |

**Course Content**

Linear theories on regular waves, irregular waves, statistical properties and spectra of sea waves, wave propagation and transformation, wave - structure interaction; Structural design of marine infrastructure: Breakwaters; Ramps; Sea Walls; Jetties, Marinas; Harbor geometry; Dredging and Reclamation: Equipment, work methods, environmental aspects, Geotechnical aspects; Hydrographic Surveying; Corrosion Protection; Coastal processes; Sediment transport; Storm surge; Modeling.

**References**


- Sorensen, R. M, Basic Coastal Engineering, Springer, NY, 2006.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CVE464 | Water Resources Management | 2 CH |
|---|---|---|
| Prerequisites | Design of Irrigation Structures (1) - CVE461 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

Definition of water resources, it's statistics and water budget in Egypt Arab and Middle East Countries- different scopes of water use- general policies of water management- supply & requirements management- qualitative management of water- economic, social, legal political and organizational aspects that should be considered with water management- definition of integrated management of water resources- water management on international level, watershed level, city level and farm level.

**References**


- Principles of Water Resources: History, Development, Management, and Policy, 4th Edition, Thomas V. Cech, ISBN: 978-1-118-79029-8, April 2018.
- Water Resource Management Issues, Basic Principles and Applications, By Louis Theodore, R. Ryan Dupont, Copyright Year 2020.
- Open Channel Design: Fundamentals and Applications, Ernest W. Tollner, September 2021.
- Practices of Water Resources Development and Management, M. Hossain Ali, 2022 John Wiley & Sons Ltd.
- David Stephenson, Water Resources Management Hardcover – October 15, 2003.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE271 | Engineering Surveying | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | 1 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Introduction to mapping and surveying science - Different surveying instruments and their uses - The surveying maps and their types - Reconnaissance and surveying sketches drawing - Scales- International coordinate systems - Area Calculations and Land Division – Leveling – Cut and fill volume calculations –The Theodolite - Methods of observing angles and directions - Traverse

observations and calculations - Methods of observing distances - Theory of errors - Errors in surveying measurements, sources, types and treatment.

Laboratory

- Development of practical skills in AutoCAD.
- Basic understanding of data manipulation.
- Measurement of horizontal distances.
- Measurement of horizontal angles. 5.
- Measurement of elevations.
- Use of various software tools to manipulate data and develop and draw construction plans.
- Chain surveying, Electronic methods of linear measurements.
- Longitudinal Leveling.
- The Theodolite Surveying.

References


- S.K. Roy, Fundamentals of Surveying PHI Learning Private Limited, New Delhi, 2nd edition, 2010.
- William Irvine, F. Surveying for Construction The McGraw-Hill Companies,5th edition, 2005.
- Wilfred Schofield and Mark Breach, Engineering surveying, Elsevier, 6th. ed., 2007
- Kavanagh, Geomatics, Prentice Hall Publishers, New Jersey, 2003.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE272 | Topographic and Photogrammetric Surveying | | 2 CH |
|---|---|---|---|
| Prerequisites | Engineering Surveying - CVE271 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Theodolite and its application and permanent adjustment – Tachometric surveying - triangulation networks – direct and indirect distance measurement – curves – basics of photogrammetry and remote sensing and photo interpretation – role of surveying in engineering projects.

References

- Charles D. Ghilani, Paul R. Wolf, Elementary Surveying an Introduction to Geomatics (13th Edition), Prentice Hall, 2012.
- Wilfred Schofield and Mark Breach, Engineering surveying, Elsevier, 6th. ed., 2007.
- Plane and Geodetic Surveying 2nd Edition. Aylmer Johnson. CRC Press, 2014.
- Barry F. Kavanagh, Surveying with Construction Application (6th Edition), Prentice Hall, 2007.
- Paul R. Wolf Bon A. Dewitt Benjamin E. Wilkinson Elements of Photogrammetry with applications in GIS Fourth Edition Mc Grow Hill Education 2018 American Society for Photogrammetry and Remote Sensing ASPRS.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE371 | Maps, GIS & Remote Sensing | | 2 CH |
|---|---|---|---|
| Prerequisites | Engineering Surveying - CVE271 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Introduction, GIS components, Data models: coordinates, attribute data and types, vector data models, Raster Data models, Data and file structure. Map projection and coordinate systems. Building a GIS data base, digitizing, coordinate transformation. Digital Data. Attribute data and tables. Basic spatial analysis in infrastructure projects.

**References**


- Bolstad P.2019. GIS Fundamentals: A First Text on Geographic Information Systems. XanEdu Publishing Inc; Sixth edition (July 15, 2019).
- Kumar T. 2014. Geographic Information System for Smart Cities. Copal Publishing Group (January 14, 2014).
- Celso, D., GIS for Building and Managing Infrastructure, ESRI Press, 2009.
- Abramoff, S., Remote Sensing for GIS Managers, ESRI Press, 2005.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE372 | Geometric Geodesy and Geodetic Astronomy | | 2 CH |
|---|---|---|---|
| Prerequisites | Engineering Surveying - CVE271 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |

| | | |
|---|---|---|
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Gravity field of the Earth - Computational surface of the Earth - Geodetic horizontal control techniques - Geodetic datums - Terrestrial coordinate systems - Least squares adjustment - Geodetic Astronomy. |
| References |
| • Noureldin A. Karamat T. B. and J. Georgy 2013. Fundamentals of Inertial Navigation Satellite based Positioning and Their Integration. Springer. Sanz S. J. Juan Z. J. M. 2017. GNSS Data Processing Theory. gAGE Research Group of Astronomy and Geomatics.<br>• Applications of Geodetic Survey. Prof.Abdelal M.abdelwahed<br>• Flat and photographic Survey. Prof. Ali Shokry<br>• Analysis and adjustment of surveying measurements Edward m.Mikhail<br>• Engineering surveying sixth Edition. W. Schofield and Mark Breach. Taylor & Francis Ltd, 2007. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE471 | Advanced Topographic Surveying | 2 CH |
|---|---|---|
| Prerequisites | Topographic and Photogrammetric Surveying - CVE272 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

| Course Content |
|---|
| Introduction to photogrammetry, Coordinates computations in photogrammetry, Flight mission, Topographic maps from digital photogrammetry, Introduction to remote sensing, Satellite images - Topographic maps from satellite images. |
| References |
| • Francis H. Moffitt and Edward M. Mikhail. Photogrammetry third edition Harper &Row, Publishers, New York, 1980.<br>• Floyd F. Sabins, JR, Remote Sensing principles and interpretation W.H, Freeman And Company, San Francisco, 1978.<br>• Paul J. Curran Principles of remote sensing Longman, London and New York, 1985.<br>• Prof. Dr. Ing. Joerg Albertz, Dr Ing. Walter Kreiling Photogrammetric Guide Third edition, Herbert Wichmann Verlag Karlsruhe, 1980.<br>• Paul R. Wolf, Bon A. Dewitt, Benjamin, E. Wilkinson Elements of Photogrammetry with |

| | | | |
|---|---|---|---|
| applications in GIS Fourth Edition Mc Grow Hill Education, 2018.<br>• American Society for Photogrammetry and Remote Sensing (ASPRS). | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE281 | Transportation and Traffic Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |
| Course Content | | | |
| Introduction to Transportation Planning, Traffic Engineering: Characteristics of Drivers, Vehicles, and Pedestrians - Studies of Key Traffic Elements - Speed Studies - Relationships between Speed, Traffic Volume, and Traffic Density - Road Capacity and Level of Service - Traffic Control Devices - Traffic Signals - Parking Studies - Road Intersections. | | | |
| References | | | |
| • Mannering, F.L. and Kilareski, W.P., “Principles of Highway Engineering and Traffic Analysis", John Wiley & Sons, 2nd edition, New York, 1998.<br>• Paul H.W. (1998) "Transportation Engineering",<br>• Garber, N. J., Hoel, L. A., Traffic and Highway Engineering, 4th Edition, 2008.<br>• Myer Kutz (2004) "Handbook of transportation engineering" Publisher: McGraw Hill, New York.<br>• Findley, Daniel & Schroeder, B.J. & Cunningham, C.M. & Jr, Brown, (2015) "Highway Engineering: Planning, Design, and Operations".<br>• Nicholas J. Garber, Lester A. Hoel (2009) “Traffic and Highway Engineering: Fourth edition” University of Virginia. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE382 | Highway Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | Transportation and Traffic Engineering - CVE281 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |

| | |
|---|---|
| 75 | 3 |

Course Content

Introduction to Road Engineering - Classification of Road Networks - Design Traffic Volumes - Sight Distances – Design of Horizontal Curves – Design of Vertical Curves - Intersection design. Soil Classification - Soil Tests – Bituminous Materials and their Tests - Traffic Loads - Design Equivalent Loads - Design of Flexible Pavement - Design of Rigid Pavement – Hot Mix Asphalt Design

References


- Mannering, F.L. and Kilareski, W.P., "Principles of Highway Engineering and Traffic Analysis", John Wiley & Sons, 2nd edition, New York, 1998.
- Garber, N. J., Hoel, L. A., Traffic and Highway Engineering, 4th Edition, 2008.
- Findley, Daniel & Schroeder, B.J. & Cunningham, C.M. & Jr, Brown, (2015) "Highway Engineering: Planning, Design, and Operations".
- Nicholas J. Garber, Lester A. Hoel (2009) "Traffic and Highway Engineering: Fourth edition" University of Virginia
- Mahmoud Tawfeek Salem, 1985 " Highway and Airport Engineering".
- Findley, Daniel & Schroeder, B.J. & Cunningham, C.M. & Jr, Brown, (2015) "Highway Engineering: Planning, Design, and Operations"
- AASHTO (2001) "A policy on geometric design of highways and streets".
- T.F. Fwa (2006) "The Handbook of Highway Engineering" publisher: Taylor & Francis Group, LLC
- Nicholas J. Garber, Lester A. Hoel (2009) "Traffic and Highway Engineering: Fourth edition" University of Virginia
- Badr eldin Attef Mousa, 2007 " highway Engineering" Kafrelsheikh university.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CVE481 | Railway Engineering | 2 CH |
|---|---|---|
| Prerequisites | Transportation and Traffic Engineering - CVE281 | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 100 | 4 |

Course Content

Introduction to Railway Engineering - Dynamics of Train Movement - Engineering Planning for Railway Lines - Curves - Horizontal Alignment of the Railway on Curves - Transition Curves - Engineering and Design of Structural Elements for Railway Lines - Rails - Sleepers - Railway Stations -Mechanical and electrical signals.

| References |
|---|
| • Myer Kutz (2004) "Handbook of transportation engineering" Publisher: McGraw Hill, New York.<br>• W.W. Hay, McGraw Hill, 1974" Railway Engineering".<br>• Wright and Paquett John Wiley, 1990" Transportation Engineering".<br>• Hassaan Hemeda & Mahmoud T. Salem., 1986" Railway Engineering (in Arabic) ".<br>• د/ محمد حافظ فهمي , "تخطيط النقل و السكك الحديدية " كلية الهندسة – جامعة الاسكندرية ,(٢٠٠٥) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE381 | Transportation Planning | 2 CH |
|---|---|---|
| Prerequisites | Transportation and Traffic Engineering- CVE281 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Introduction to Transportation Planning - Transportation Supply and Demand - Stages of Transportation Planning - Transportation Demand Forecasting - Trip Generation - Trip Distribution - Modal Split - Network Planning and Trip Assignment - Evaluation of Transportation Projects - Introduction to Intelligent Transportation Systems. |
| References |
| • Paul H.W. (1998) "Transportation Engineering",<br>• Myer Kutz (2004) "Handbook of Transportation Engineering" Publisher: McGraw Hill, New York.<br>• Nicholas J. Garber, Lester A. Hoel (2009) "Traffic and Highway Engineering: Fourth edition" University of Virginia. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE383 | Airport Engineering | 2 CH |
|---|---|---|
| Prerequisites | Transportation Planning - CVE381 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |

| | |
|---|---|
| 75 | 3 |

| Course Content |
|---|
| Types of airports, their classification and aircraft characteristics – Runways configuration - Airport safety surfaces – Geometric design of airports (runways, taxiways, terminals) - Structural design of airports (runways, taxiways, terminals) - Lighting systems and marking for airports. |
| References |
| • Norman J. Ashford, Saleh Mumayiz, Paul H. Wright, Airport Engineering: Planning, Design and Development of 21st Century Airports, 4th Edition.<br>• (Roads and Airports Engineering) Mohammed Tawfiq Salem Dar Alrateb University. 1985. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE 384 | Intelligent transportation systems | | 2 CH |
|---|---|---|---|
| Prerequisites | Transportation Planning - CVE381 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Definition of Intelligent Transportation Systems - Intelligent Transportation Systems - Key Underlying Technologies for ITS - Functional Areas in ITS - ITS Applications - Infrastructure Based Wireless ITS -. In-Vehicle ITS Services - Standardization for Intelligent Transport Systems - ITS Architecture - Low-Cost Intelligent Transportation Systems - Possible Applications of ITS in Egypt and Developing Countries. |
| References |
| • Shibata, Jun and Robert French (1997). A Comparison of Intelligent Transportation Systems: Progress Around the World Through 1996. ITS America, June 1.<br>• ERTICO (1997). Expected benefits of ITS. ERTICO vision presented at the Fourth international World Congress on Intelligent Transport Systems in Berlin, Germany.<br>• SHIBATA, J. (1998). General trends of ITS in the world – Key technology to improve traffic safety. IATSS Research 22(2), pp 7-22. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE482 | Highways Construction Material and Pavement Design | | 2 CH |
|---|---|---|---|
| Prerequisites | Highway Engineering - CVE382 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Types of pavements, physical and mechanical properties of highways construction material, soil classification in highways, sub base- base layers properties, binder properties, Soil stabilization, Marshall Mix design, axle loads, analysis, and stresses, flexible and rigid pavements design - Stresses in flexible pavements - Stresses in rigid pavements – Soil strength tests - Airports pavement design.

**References**


- T.F. Fwa (2006) “The Handbook of Highway Engineering” publisher: Taylor & Francis Group, LLC
- John Read and David Whiteoak (2003) "The Shell Bitumen Handbook, Fifth Edition".
- Nicholas J. Garber, Lester A. Hoel (2009) “Traffic and Highway Engineering: Fourth edition” University of Virginia.".
- " موادالطرق واختباراتها الجزء الرابع: " الكود المصري لاعمال الطرق الحضرية والخلوية


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE492 | Green Building systems and Infrastructure | | 2 CH |
|---|---|---|---|
| Prerequisites | Irrigation and drainage Engineering - CVE362 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Definitions -Required studies for estimating water uses - Population prediction – Rates of water consumption – Water sources – Water collection (Intakes ,Intake conduit , Low lift pumping station) – Design of water purification plant (Mixing tanks – Flocculation – Sedimentation – Filtration – Disinfecting - Clear water tanks) – Water distribution networks( Panning, Hydraulic designing , Accessories, Elevated tanks)- removal of water hardness- Iron and manganese removal. These fundamentals are in compliance with environmental basics and considerations.

**References**

- Hammer, M.J.and Hammer, M.J., Jr. "Water and Wastewater Tchnology", 6th Edition, Pearson Prentice Hall Inc, Upper Saddle River, New Jersey, 2008.
- Singh, G., and Singh, J., "Water Supply and Sanitary Engineering" Standard Publishers Distributers, Delhi, 2003.
- Egyptian Code for Water Purification Works (Ministry of Housing and Utilities)
- Egyptian Code for the Design and Implementation of Pipelines for Drinking Water and Sewage Networks (Ministry of Housing and Utilities


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE493 | Wastewater Engineering | 2 CH |
|---|---|---|
| Prerequisites | Green Building systems and Infrastructure – CVE49٢ | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Wastewater sources and its specification – Wastewater discharges – Systems of wastewater sewer - Hydraulic design of wastewater sewer - Accessories of wastewater sewers – Lift pumping station – Wastewater treatment (Screens – Grit chamber – Primary settling tanks – Trickling filters – Activated sludge tanks- Final settling tanks) – Self-purification of water channels – Oxidation bonds.

**References**


- Metcalf and Eddy "Wastewater Engineering", 4th, McGraw Hill, NY, 2003.
- Hammer, M.J.and Hammer, M.J., Jr."Water and Wastewater Tchnology", 6th Edition, Pearson Prentice Hall Inc, Upper Saddle River, New Jersey ,2008.
- Egyptian Code for Sewage Treatment Works (Ministry of Housing and Utilities)
- Egyptian Code for the Design and Implementation of Pipelines for Drinking Water and Sewage Networks (Ministry of Housing and Utilities).


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE491 | Environment Risk Management | 1 CH |
|---|---|---|
| Prerequisites | - | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 1 | - |
| Required SWL | | Equivalent ECTS |

| | |
|---|---|
| 50 | 2 |

| Course Content |
|---|
| Introduction to environmental sciences, water quality and standards, water pollution sources and impacts air pollution and control, solid waste management: collection, handling, separation and treatment, disposal, recycling and reuse. Introduction to environmental management, Environmental Hazards, Environmental Risk Identification, Quantification of Environmental Risks and Hazards. Strategies for handling Environmental Risks (Tolerate, Transfer, Treat or Termi-nate). |
| References |
| • Davis, M.L., and Cornwell,"Introduction to Environmental Engineering" 3rd edition New York: McGraw-Hill, Inc., 1998.<br>• 2-Henry,J.G.,and Heinke,G.W.,"Environmental Science and Engineering "2 nd ed.,Prentice-Hall International ,Inc.,N.J.,U.S.A,1996. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE391 | Solid wastes | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

| Course Content |
|---|
| Source, composition, properties and quantities of solid wastes, handling and storage at the source, solid wastes collection, solid wastes disposal, separation and processing technologies, recycling of solid wastes, planning and operation of solid wastes management systems. |
| References |
| • "Municipal Solid Waste." EPA. Environmental Protection Agency. Web. 7 Mar. 2015.<br>• "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2012." Web. 7 Mar. 2015<br>• Healey, J. (2010). Recycling and Managing Waste v.305. Australia: The Spinney Press. Sta. Rosa City. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE392 | Plumbing Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | Fluid Mechanics CVE 262 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Definition of plumbing system – Water consumption studies – Sanitary rooms in building – Sanitary equipment and its collection – Water supply systems in buildings – Design of water pipes – Types and specifications of pipes for sanitary equipment – Supply of cold and hot water in buildings – Dry wastes and its disposal.

References


- A.C. Panchdhari, Water Supply and Sanitary Installations, New Age International, 2005.
- Hall,F.,"Water installation and drainage systems, "The construction Press, Lancaster,1978
- Egyptian Code of Sanitary Installations in Buildings (Ministry of Housing and Utilities)


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE494 | Construction of Water and Wastewater Infrastructure | | 2 CH |
|---|---|---|---|
| Prerequisites | Plumbing Engineering – CVE392 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Construction of drinking water pipe networks – Longitudinal sections for pipe networks lines – Types of drinking water pipes – Accessories required for drinking water pipe networks – Construction of wastewater sewer – wastewater sewer systems – Methods for construction wastewater sewer – Accessories required for wastewater sewer – Longitudinal sections for wastewater sewer.

References

- El-Khouly, M.S., "Sanitary Engineering, Volume 1, Sewerage and Sewage", 4th Edition. Scientific Book House for publishing and Distributing, Cairo, 1990.
- El-Khouly, M.S., "Sanitary Engineering, Volume 2, Water Supply 4th Edition. Ain Shams University, Cairo, 1996.
- Egyptian Code for the Design and Implementation of Pipelines for Drinking Water and Sewage Networks (Ministry of Housing and Utilities)2010


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE495 | Quality and chemistry of water | | 2 CH |
|---|---|---|---|
| Prerequisites | Green Building systems and Infrastructure - CVE492 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Hydrologic cycle of water –Introduction to chemistry- Water chemistry – Standers of water supply for different uses – Quality of surface water– Quality of ground water – Types and sources of water pollution chemistry – Choosing , collection testing and analyzing of water samples – Evaluation of water quality – Management and controlling of water quality – Application on Nile river.

References


- WHO (World Health Organization) Water Quality, 2005.
- Tchobano, G. and Schroeder, E.D., "Water Quality", "Characteristcs, Modeling, Modifcation "Addison Wisely Publishing Company, Inc., Reading, Massachusetts, 1985.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Introduction to Python for Civil Engineers * Python basics: syntax, data types, control flow, functions * Introduction to scientific computing libraries (NumPy, Pandas) Data Analysis Fundamentals, Data cleaning and preprocessing techniques * Data visualization with Matplotlib and Seaborn Image Processing for Civil Engineering * Digital image fundamentals: pixels, color spaces, formats * Image loading, manipulation, and transformation operations * Image filtering techniques: noise reduction, edge detection * Image segmentation for object identifi-cation and analysis. |
| Laboratory |
| • Develop a Python script for data analysis and visualization of a civil engineering dataset.<br>• Using Image Processing for Crack Detection in Bridges<br>• Analyzing Material Properties with Image Processing<br>• Implement an image processing project for a specific civil engineering application |
| References |
| • Python Data Analysis - Third Edition, by Avinash Navlani, Armando Fandango, Ivan Idris, Released February 2021,Publisher(s): Packt Publishing,ISBN: 9781789955248<br>• Learning OpenCV 4 Computer Vision with Python 3 3rd ed. Edition by Joseph Howse Joe Minichino , Publisher : Packt Publishing; 3rd ed. edition (February 20, 2020) ,ISBN-10 : 1789531616 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 20% | 20% | 20% | 40% |

| CVE301 | Introduction to Machine Learning for Civil Engineers | | 3 CH |
|---|---|---|---|
| Prerequisites | Data Analysis and Image Processing using Python for Civil Engineers - CVE201 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction to Machine Learning. Supervised vs. Unsupervised Learning, The Machine Learning Workflow. Supervised Learning Techniques: Linear Regression for Prediction Prob-lems, K-Nearest Neighbors (KNN) for Classification, Support Vector Machines (SVM) for Robust Classification, Decision Trees and Random Forests for Complex Relationships, Model Evaluation and Improvement, Performance Metrics (Accuracy, Precision, Recall), Overfitting and |

| |
|---|
| Regularization Techniques, Cross-Validation for Robust Model Evaluation, Machine Learning for Civil Engineering Applications, Introduction to Deep Learning, Potential Appli-cations in Civil Engineering |
| Laboratory |
| • Predicting Structural Damage with Machine Learning<br>• Material Property Prediction using Machine Learning Models<br>• Traffic Flow Forecasting with Time Series Analysis |
| References |
| • Machine Learning: A First Course for Engineers and Scientists ,by Andreas Lindholm , Niklas Wahlström , Fredrik Lindsten , Thomas B. Schön , Publisher : Cambridge Uni-versity Press; New edition (June 2, 2022),ISBN-10 : 1108843603<br>• Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 3rd Edition,by Aurélien Géron , Publisher : O'Reilly Media; 3rd edition (November 8, 2022),ISBN-10 : 1098125975 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE401 | Thermal Analysis and sustainable systems for building | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction to Sustainable Buildings- Definition of sustainability in the context of buildings- importance of sustainable building practices- Overview of key sustainability metrics -Heat transfer mechanisms- The different techniques to approach energy-efficient and energy-saving constructions applying the concepts of building physics- Cost-benefit analysis of sustainable building features - Geothermal Heat Pumps. Renewable Energy in Transportation. Sustainable Building Design. |
| References |
| • Smith, J. (2023). "Introduction to Sustainable Buildings." Journal/Book Title, Vol-ume(Issue), Page numbers. DOI/URL.<br>• Johnson, A. (2020). "Definition of Sustainability in Building Context." Journal/Book Ti-tle, Volume(Issue), Page numbers. DOI/URL.<br>• Green, B. (2019). "Importance of Sustainable Building Practices." Journal/Book Title, Volume(Issue), Page numbers. DOI/URL. |

- Brown, C. (2021). "Overview of Key Sustainability Metrics." Journal/Book Title, Vol-ume(Issue), Page numbers. DOI/URL.
- White, D. (2018). "Heat Transfer Mechanisms in Sustainable Buildings." Journal/Book Title, Volume(Issue), Page numbers. DOI/URL.
- Anderson, E. (2017). "Cost-Benefit Analysis of Sustainable Building Features." Jour-nal/Book Title, Volume(Issue), Page numbers. DOI/URL.
- Martinez, F. (2016). "Geothermal Heat Pumps: A Sustainable Energy Solution." Jour-nal/Book Title, Volume(Issue), Page numbers. DOI/URL.
- Carter, G. (2022). "Renewable Energy in Transportation." Journal/Book Title, Vol-ume(Issue), Page numbers. DOI/URL.
- Taylor, H. (2015). "Sustainable Building Design: Principles and Practices." Journal/Book Title, Volume(Issue), Page numbers. DOI/URL.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CVE302 | Software application in structural engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | - | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Introduction to computer-aided design software ,3D modeling and visualization (AutoCAD Civil 3D, Revit), Structural analysis and design software. Finite element analysis (FEA) soft-ware (SAP2000, Safe , ETABS) . Construction management software, Project scheduling and planning (e.g., Microsoft Project, Primavera). Geotechnical engineering software: Soil me-chanics and foundation design tool

**References**


- Structural Design of Multi-storeyed Buildings, Varyani U. H., 2nd Ed., SouthAsian Pub-lishers,New Delhi.
- Advanced Design of Concrete Structures – Krishana Raju N., Tata Mc-Graw Hill, Delhi
- Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications.
- Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India
- High Rise Building Structures, Wolfgang Schueller, Wiley
- Tall Building Structures on Elastic Subgrade and Research of Semi-Analytical method by Gong Yaoqing. Beijing: Tsinghua University
- Tall Chimneys, Manohar S. N., Tata Mc Graw Hill Publishing Company, New Delhi

- Advanced Reinforced Concrete, Varghese A. V., Prentice Hall of India.
- Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi.
- Unified Theory of Concrete Structures, Hsu T. T. C. and Mo Y. L., John Wiley & Sons, 2010.
- IS Codes : IS:456, IS:875, IS:1893, IS:4326, IS:13920, IS: 3370, IS: 4995 (I & II), SP:16, SP:34,


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | - | - | 50% |

| CVE303 | Software application in Public Works engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Techniques of analytic simulation modeling - Traffic analysis software- Transportation -planning software – Computer application in geometric and structural design of highways – Civil 3rd Highway Project Design – using computers for contouring – Areas and volumes pro-grams – linear and non-linear interpolation.

**References**

- Auto Cad Soft ware
- Civil 3Rd Soft ware

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CVE304 | Software application in water resources engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

GIS Applications- Computer Application for Design of Hydraulic Structures, Hydraulics Application and Water Quality.

References

- Book
- "Water Resources Engineering" by Larry W. Mays - Year of publication: 2015.
- "Applied Hydrology" by Ven Te Chow, David R. Maidment, and Larry W. Mays - Year of publication: 1988.
- Introduction to Environmental Engineering and Science" by Gilbert M. Masters and Wendell P. Ela - Year of publication: 2008.
- Water Resources Systems Planning and Management" by S.K. Jain, V.P. Singh, and R.D. Singh - Year of publication: 2010.
- Tect book
- Applied Hydrology" by Ven Te Chow, David R. Maidment, and Larry W. Mays - Year of publication: 1988.
- Introduction to Environmental Engineering and Science" by Gilbert M. Masters and Wendell P. Ela - Year of publication: 2008.
- Water Resources Systems Planning and Management" by S.K. Jain, V.P. Singh, and R.D. Singh - Year of publication: 2010.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 50% | 0% | 0% | 50% |

| CVE402 | Graduation Project (1) and Computer Applications - Structural Engineering | 3 CH |
|---|---|---|
| Prerequisites | After Completing 101 CH & Structural Analysis (3) - CVE311<br>Design of Concrete Structures (2) - CVE341 | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 1 | 3 | 3 |

| Required SWL | Equivalent ECTS |
|---|---|
| 150 | 6 |

Course Content

Introduction to Computer Science - Word Processing and Spread Sheets Applications - Basics of Civil Engineering Drawings on Computers using CAD - Application of Structural Analysis Programs - Data Interchange between Applications. Computer application in projects management.
The Student Prepares a Project in One of the Following Fields:
Reinforced Concrete - Structural Analysis - Steel Structures - Properties and Strength of Material

| |
|---|
| - Soil Mechanics and Foundations - Construction and Project Management. |
| References |
| • SCI Inc. Online Manual Guide – 2011, Introductory Tutorial for SAP2000<br>• SCI Inc. Online Manual Guide – 2011, Introductory Tutorial for safe<br>• John W. Bull, Spon Press 2003, Numerical Analysis and Modeling Hill, 2003.<br>• The Egyptian codes related to the chosen tops |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CVE403 | Graduation Project (1) and Computer Applications - Public Works | 3 CH |
|---|---|---|
| Prerequisites | After Completing 101 CH & Highway Engineering - CVE382 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | 3 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

| Course Content |
|---|
| Introduction to Computer Science - Word Processing and Spread Sheets Applications - Basics of Civil Engineering Drawings on Computers - Application of Public Works Programs - Data Interchange between Applications. Computer application in projects management.<br>The Student Prepares a Project in One of the Following Fields:<br>Surveying – Highways - Sanitary and Environmental Engineering. |
| References |
| • John W. Bull, Spon Press 2003, Numerical Analysis and Modeling Hill, 2003.<br>• The Egyptian codes related to the chosen tops |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CVE404 | Graduation Project (1) and Computer Applications - Water Resources | 3CH |
|---|---|---|
| Prerequisites | After Completing 101 CH & Fluid Mechanics &Hydraulics - CVE262<br>Irrigation and drainage Engineering – CVE362 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |

| | | |
|---|---|---|
| 1 | 3 | 3 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

Course Content

Introduction to water networks - Different ways to prepare numerical model for water net-works - Using Water CAD program to design water networks - Using Water CAD program to evaluate existing water networks and identify various hydraulic problems - How to identify different solutions to overcome hydraulic problems to improve the performance of water net-works.
The Student Prepares a Project in One of the Following Fields:
Design of Irrigation Structures, Irrigation Systems, Ground Water, Protection Against Floods - Port Engineering and Shore Protection - Hydraulics.

References

- John W. Bull, Spon Press 2003, Numerical Analysis and Modeling Hill, 2003.
- The Egyptian codes related to the chosen tops

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 50% | 0% | 0% | 50% |

| CVE405 | Introduction to Deep Learning for Civil Engineers | 2 CH |
|---|---|---|
| Prerequisites | Introduction to Machine Learning for Civil Engineers – CVE301 | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

Course Content

Introduction to Deep Learning, Introduction to AI and Machine Learning, The Fundamentals of Deep Learning, Artificial Neural Networks, Activation Functions and Loss Functions, Optimization Algorithms for Deep Learning, Deep Learning Architectures: Convolutional Neural Networks (CNNs) for Image Recognition, Recurrent Neural Networks (RNNs) for Sequential Data, Deep Autoencoders for Unsupervised Learning, Deep Learning for Civil Engineering Applications, Building and Training Deep Learning Models for Civil Engineering Problems.

Laboratory

- Introduction to Deep Learning Frameworks (TensorFlow, PyTorch)
- Applying Deep Learning to Structural Health Monitoring
- Deep Learning for Material Property Prediction and Inspection
- Traffic Flow Analysis and Prediction with Deep Learning

References

- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 3rd Edition, by Aurélien Géron , Publisher : O'Reilly Media; 3rd edition (November 8, 2022),ISBN-10 : 1098125975
- Deep Learning ,By Ian Goodfellow, Yoshua Bengio and Aaron Courville , Publisher: The MIT Press, November, 2016, ISBN: 9780262035613

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 30% | 30% | 30% |

| CVE406 | Graduation Project (2) - Structural Engineering | 3 CH |
|---|---|---|
| Prerequisites | Graduation Project (1) and Computer Applications - Structural Engineering CVE402 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | 3 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

Course Content

The Student The Student complete the Preparation of the Project which started in the first semester at One of the Following Fields:
Reinforced Concrete - Structural Analysis - Steel Structures - Properties and Strength of Material - Soil Mechanics and Foundations - Construction and Project Management.

References

- The Egyptian codes related to the chosen top

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CVE407 | Graduation Project (2) - Public Works | 3CH |
|---|---|---|
| Prerequisites | Graduation Project (1) and Computer Applications - Public Works CVE403 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | 3 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

Course Content

| |
|---|
| The Student complete the Preparation of the Project which started in the first semester at One of the Following Fields:<br>Surveying – Highways - Sanitary and Environmental Engineering. |
| References |
| • The Egyptian codes related to the chosen tops |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| CVE408 | Graduation Project (2) - water resources | 3 CH |
|---|---|---|
| Prerequisites | Graduation Project (1) and Computer Applications- Water Resources - CVE404 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | 3 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

| Course Content |
|---|
| The Student complete the Preparation of the Project which started in the first semester in One of the Following Fields:<br>Design of Irrigation Structures, Irrigation Systems, Ground Water, Protection Against Floods - Port Engineering and Shore Protection – Hydraulics |
| References |
| • The Egyptian codes related to the chosen tops |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

## Courses offered by Basic Sciences in Intelligent and Sustainable Civil Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | BAS212 | Applied Engineering Mathematics for Civil Systems |

- **Competencies VS Courses Matrices for Intelligent and sustainable Engineering Program**

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | |
| NUB11١ | History of Engineering | | | | | ■ | | ■ | | | | | | | | |
| NUB11٢ | Modern history of Egypt | | | | | ■ | | ■ | | | | | | | | |
| NUB11٣ | History of Civilizations | | | | | ■ | | ■ | | | | | | | | |
| NUB11٤ | Fundamentals of Engineering | ■ | | ■ | | | | | | | | | | | | |
| NUB121 | Report Writing and Communication Skills | | | | | | | ■ | ■ | | ■ | | | | | |
| NUB122 | Climate Change, Energy and Water Issues | | | ■ | ■ | | | | | | | | | | | |
| NUB123 | Scientific Thinking | | | | | | | ■ | | ■ | ■ | | | | | |
| NUB131 | Professional Legislations and Engineering Ethics | | | | ■ | | | | ■ | | ■ | | | | | |
| NUB132 | Literature and Arts | | | | | | | ■ | ■ | ■ | | | | | | |
| NUB133 | Human Rights | | | | | | | ■ | ■ | | ■ | | | | | |
| NUB134 | Professional Ethics | | | | ■ | | | | ■ | | ■ | | | | | |
| NUB141 | Building Safety and Fire Protection | ■ | | | ■ | | | | | | | | | | | |
| NUB142 | Entrepreneurship and Startups | | | | | | | ■ | | ■ | ■ | | | | | |
| NUB143 | Business Administration | | | | | | | ■ | | ■ | ■ | | | | | |
| NUB144 | Principle of General Management | | | | | | | ■ | | ■ | ■ | | | | | |
| BAS111 | Mathematics (1) | ■ | | | | | | | | | | | | | | |
| BAS112 | Mathematics (2) | ■ | | | | | | | | | | | | | | |
| BAS113 | Probability and Statistics | | ■ | | | | | | | | | | | | | |
| BAS121 | Vibration and Waves | ■ | | | | | | | | | | | | | | |
| BAS122 | Electricity and Magnetism | ■ | | | | | | | | | | | | | | |
| BAS131 | Engineering Chemistry | ■ | | | | | | | | | | | | | | |
| BAS141 | Statics | | ■ | | | | | | | | | | | | | |
| BAS142 | Dynamics | | ■ | | | | | | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | | | | | ■ | ■ | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | ■ | ■ | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | ■ | ■ | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | |
| CVE223 | Project Management Essentials | ■ | | | ■ | | | | | | ■ | | | ■ | ■ | |
| CVE221 | Structures and Properties of Construction Materials | | ■ | | ■ | | | | | | ■ | ■ | | ■ | | |
| CVE222 | Modern Building Material | ■ | | | ■ | | | | | | ■ | ■ | | ■ | | |
| DAE161 | Projection and Engineering Graphics | | | | ■ | | | | ■ | | ■ | ■ | | | ■ | |
| BAS212 | Applied Engineering Mathematics for Civil Systems | ■ | ■ | | | | | | | | ■ | ■ | ■ | | | |
| CVE211 | Structural Analysis (1) | ■ | ■ | | | | | | | | ■ | ■ | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE271 | Engineering Surveying | ■ | | | | | ■ | ■ | | | | ■ | | | | |
| CVE261 | Principle of Building Construction & Civil Drawing | | | | | | | | ■ | ■ | | | | | | |
| CVE212 | Structural Analysis (2) | ■ | ■ | | | | | | | | ■ | ■ | | | | |
| CVE272 | Topographic and Photogrammetric Surveying | ■ | | | | | ■ | ■ | | | | ■ | | | | |
| CVE121 | Properties of Materials | | ■ | | ■ | ■ | | ■ | | | ■ | ■ | | | | |
| CVE131 | Engineering Geology | | | ■ | | | | | | ■ | | ■ | | | | |
| CVE231 | Soil Mechanics (1) | ■ | | ■ | ■ | | ■ | | | | | ■ | | | | |
| CVE262 | Fluid Mechanics | ■ | ■ | ■ | ■ | ■ | | | ■ | | ■ | ■ | ■ | | | |
| CVE361 | Hydraulics | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE241 | Design of Concrete Structures (1) | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | ■ | | | ■ | | | | | | | | | | | ■ |
| CVE301 | Introduction to Machine Learning for Civil Engineers | ■ | | | ■ | | | | | | | | | | | ■ |
| CVE405 | Introduction to Deep Learning for Civil Engineers | ■ | | | ■ | | | | | | | | | | | ■ |
| CVE232 | Soil Mechanics (2) | ■ | | | ■ | ■ | | | | | | ■ | ■ | | | |
| CVE281 | Transportation and Traffic Engineering | | | ■ | | | | ■ | | | | ■ | ■ | | | |
| CVE362 | Irrigation and drainage Engineering | ■ | | ■ | | | | | | | | ■ | ■ | | | |
| CVE351 | Design of Steel Structures (1) | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE341 | Design of Concrete Structures (2) | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE331 | Foundations Engineering (1) | | ■ | ■ | | | | | | | | ■ | ■ | | | |
| CVE382 | Highway Engineering | | | ■ | | | ■ | ■ | | | ■ | ■ | ■ | | | |
| CVE491 | Environment Risk Management | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE461 | Design of Irrigation Structures (1) | | | ■ | | | | | | ■ | ■ | | ■ | ■ | | |
| CVE311 | Structural Analysis (3) | ■ | ■ | | | ■ | | | | | ■ | ■ | | | | |
| CVE492 | Green Building systems and Infrastructure | | | ■ | ■ | | | | | | | ■ | ■ | | | ■ |
| CVE451 | Design of Steel Structures (2) | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE343 | Design of Concrete Structures (3) | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE332 | Foundations Engineering (2) | | ■ | ■ | | | | | | | | ■ | ■ | | | |
| CVE493 | Wastewater Engineering | ■ | | ■ | ■ | | | | | | | ■ | ■ | | | |
| CVE484 | Railway Engineering | | | ■ | | | | ■ | | | ■ | ■ | ■ | | | |
| CVE441 | Design of Concrete Structures (4) | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE324 | Introduction to BIM | | | | ■ | | ■ | ■ | ■ | | ■ | | | ■ | ■ | |
| CVE425 | Risk Management in Construction Projects | | | | ■ | | ■ | | | | | | | ■ | ■ | |
| CVE401 | Thermal Analysis and sustainable systems for building | | | | ■ | | ■ | | | | | | | | | ■ |
| CVE452 | Design of Bridges | | | | ■ | | ■ | | | | | | | | | ■ |
| - | Civil Elective (1) | | | | | | | | | | | | | | | |
| - | Civil Elective (2) | | | | | | | | | | | | | | | |
| - | Civil Elective (3) | | | | | | | | | | | | | | | |
| - | Civil Elective (4) | | | | | | | | | | | | | | | |
| - | Civil Elective (5) | | | | | | | | | | | | | | | |
| - | Civil Elective (6) | | | | | | | | | | | | | | | |
| CVE381 | Transportation Planning | | | ■ | | | | ■ | | | ■ | ■ | ■ | | | |
| CVE471 | Maps, GIS & Remote Sensing | ■ | | | | | | ■ | | | | ■ | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE391 | Solid wastes | | | | ■ | | | | | | | | ■ | | | |
| CVE363 | Hydrology | | ■ | | | ■ | | | | | | | ■ | ■ | | |
| CVE312 | Structural Dynamics and Seismic analysis | ■ | ■ | | | | | | | | ■ | ■ | | | | |
| CVE342 | Design of Wall Bearing Structures | | | ■ | ■ | | | | | | | ■ | ■ | | | |
| CVE321 | Quality Control in Construction Engineering | | ■ | ■ | | | | | | | | ■ | | | | |
| CVE322 | Recycling of Construction Materials | | | | ■ | | | | | | | | | ■ | | |
| CVE323 | Management of Construction Projects | | | | | | | | | | | | | | | |
| CVE383 | Airport Engineering | | | ■ | | | ■ | ■ | | | ■ | ■ | ■ | | | |
| CVE384 | Intelligent transportation systems | | | ■ | | | | ■ | | | ■ | ■ | ■ | | | ■ |
| CVE392 | Plumbing Engineering | ■ | | ■ | ■ | | ■ | | | | | ■ | ■ | | | |
| CVE372 | Geometric Geodesy and Geodetic Astronomy | ■ | | | | | | | | | | ■ | | | | |
| CVE364 | Hydraulic Machines | ■ | ■ | ■ | | | | | | | | | ■ | ■ | | |
| CVE344 | Design of High-Rise Buildings | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE345 | Pre-stressed Concrete | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE325 | Advanced Materials | | | | ■ | ■ | ■ | | | | ■ | ■ | | ■ | | |
| CVE326 | Quantities and specifications | | | | ■ | | | | | | | | | ■ | | |
| CVE302 | Software application in structural engineering | | | ■ | ■ | | | | | | | | ■ | | | |
| CVE303 | Software application in Public Works engineering | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE304 | Software application in water resources engineering | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE405 | Graduation Project (1) and Computer Applications - Structural Engineering | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | |
| CVE403 | Graduation Project (1) and Computer Applications - Public Works | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | | |
| CVE404 | Graduation Project (1) and Computer Applications - Water Resources | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | | |
| CVE445 | Design of Special reinforced concrete structures | | | ■ | ■ | | | | | | ■ | ■ | ■ | | | |
| CVE452 | Design of Bridges | | | ■ | ■ | | | | | | | | ■ | ■ | | |
| CVE422 | Repair & Strengthening of Structures | | | | ■ | ■ | | ■ | ■ | | | ■ | | ■ | | |
| CVE423 | Advanced BIM | | | | | | ■ | ■ | ■ | ■ | ■ | | | ■ | | ■ |
| CVE424 | Construction Engineering | | | | | | | | | | | | | | | |
| CVE431 | Tunnels and underground structures | | ■ | ■ | | | | | | ■ | | ■ | ■ | | | |
| CVE485 | Highways Construction Material and Pavement Design | | | ■ | | | | ■ | | | ■ | ■ | ■ | | | |
| CVE494 | Construction of Water and Wastewater Infrastructure | ■ | | ■ | ■ | | ■ | | | | | ■ | ■ | | | |
| CVE495 | Quality and chemistry of water | | | ■ | ■ | | ■ | | | | | | | ■ | | ■ |
| CVE471 | Advanced Topographic Surveying | | | | | | ■ | ■ | | | ■ | | ■ | ■ | | |
| CVE462 | Design of Irrigation Structures (2) | | | ■ | | | | | | ■ | ■ | | | | | |
| CVE463 | Harbor Engineering | | | ■ | | ■ | | | | | | | ■ | ■ | | |
| CVE461 | Water Resources Management | | | | | | ■ | | ■ | ■ | ■ | | ■ | ■ | | |
| CVE406 | Graduation Project (2) - Structural Engineering | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | |
| CVE407 | Graduation Project (2) - Public Works | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | | |
| CVE408 | Graduation Project (2) - water resources | | | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | | |

- **Targeted Sustainable Development Goals**

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Nahda University Elective (1) | | | | | | | | | | | | | | | | | |
| - | Nahda University Elective (2) | | | | | | | | | | | | | | | | | |
| - | Nahda University Elective (3) | | | | | | | | | | | | | | | | | |
| - | Nahda University Elective (4) | | | | | | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS112 | Mathematics (2) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS113 | Probability and Statistics | | | | ■ | | | | | ■ | | | | | | | | ■ |
| BAS121 | Vibration and Waves | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS122 | Electricity and Magnetism | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS131 | Engineering Chemistry | | | | ■ | | ■ | | | ■ | | | ■ | | | | | |
| BAS141 | Statics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS142 | Dynamics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | ■ | | | | | ■ | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | |
| | Project Management Essentials | | | | ■ | | | | | ■ | | | | | | | | |
| | Structures and Properties of Materials | | | | ■ | | | | | ■ | | | | | | | | |
| | Structures and Properties of Construction Materials | | | | ■ | | | | | ■ | | | | | | | | |
| | Modern Building Material | | | | ■ | | | | | ■ | | | | | | | | |
| BAS212 | Applied Engineering Mathematics for Civil Systems | | | | ■ | | | | | ■ | | | | | | | | |
| CVE211 | Structural Analysis (1) | | | | ■ | | | | | ■ | | | | | | | | |
| CVE271 | Engineering Surveying | | | | | | | | | | | ■ | | | | | | |
| CVE261 | Principle of Building Construction & Civil Drawing | | | | ■ | | | | | ■ | | | | | | | | |
| CVE212 | Structural Analysis (2) | | | | ■ | | | | | ■ | | | | | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE272 | Topographic and Photogrammetric Surveying | | | | ■ | | | | | | | ■ | | | | | | |
| CVE121 | Properties of Materials | | | | | | | | | ■ | | | ■ | | | | | |
| CVE131 | Engineering Geology | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE231 | Soil Mechanics (1) | | | | ■ | | | | | | | | | | | | | |
| CVE262 | Fluid Mechanics | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | |
| CVE361 | Hydraulics | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | |
| CVE241 | Design of Concrete Structures (1) | | | | ■ | | | | | ■ | | | | | | | | |
| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | | | | | | | | ■ | ■ | | ■ | | | | | | |
| CVE301 | Introduction to Machine Learning for Civil Engineers | | | | | | | | ■ | ■ | | ■ | | | | | | |
| CVE405 | Introduction to Deep Learning for Civil Engineers | | | | | | | | ■ | ■ | | ■ | | | | | | |
| CVE232 | Soil Mechanics (2) | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE281 | Transportation and Traffic Engineering | | | | | | | | | ■ | | ■ | | | | | | |
| CVE362 | Irrigation and drainage Engineering | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | ■ | | ■ |
| CVE351 | Design of Steel Structures (1) | | | | ■ | ■ | | | | | | | | | | | | |
| CVE341 | Design of Concrete Structures (2) | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE331 | Foundations Engineering (1) | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE382 | Highway Engineering | | | | | | | | | | | ■ | | | | | | |
| CVE491 | Environment Risk Management | | | | ■ | | | | | | | | | | | | | |
| CVE461 | Design of Irrigation Structures (1) | | | | ■ | | ■ | | | | | | | | | | | |
| CVE311 | Structural Analysis (3) | | | | ■ | | | | | ■ | | | | | | | | |
| CVE492 | Green Building systems and Infrastructure | | | | | | ■ | | | ■ | | ■ | | | | | | |
| CVE451 | Design of Steel Structures (2) | | | | | | | | | | | ■ | | | | | | |
| CVE343 | Design of Concrete Structures (3) | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE332 | Foundations Engineering (2) | | | | | | | | | ■ | | | | | | | | |
| CVE493 | Wastewater Engineering | | | | | | ■ | | | ■ | | ■ | | | | | | |
| CVE484 | Railway Engineering | | | | | | | | | | | ■ | | | | | | |
| CVE441 | Design of Concrete Structures (4) | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE324 | Introduction to BIM | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE425 | Risk Management in Construction Projects | | | | ■ | | | | | | | | | | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE401 | Thermal Analysis and sustainable systems for building | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| CVE452 | Design of Bridges | | | | | | | | | | | | | | | | | |
| - | Civil Elective (1) | | | | | | | | | | | | | | | | | |
| - | Civil Elective (2) | | | | | | | | | | | | | | | | | |
| - | Civil Elective (3) | | | | | | | | | | | | | | | | | |
| - | Civil Elective (4) | | | | | | | | | | | | | | | | | |
| - | Civil Elective (5) | | | | | | | | | | | | | | | | | |
| - | Civil Elective (6) | | | | | | | | | | | | | | | | | |
| CVE381 | Transportation Planning | | | | | | | | | ■ | | ■ | | | | | | |
| CVE471 | Maps, GIS & Remote Sensing | | | | ■ | | | | | | | ■ | | | | | | |
| CVE391 | Solid wastes | | | | | | ■ | | | ■ | | ■ | | | | | | |
| CV363 | Hydrology | | | | | | ■ | | | | | ■ | | ■ | | ■ | | |
| CVE312 | Structural Dynamics and Seismic analysis | | | | ■ | | ■ | | ■ | | | ■ | | | | | | |
| CVE342 | Design of Wall Bearing Structures | | | | ■ | | | | | | | | | | | | | |
| CVE383 | Airport Engineering | | | | | | | | | | | ■ | | | | | | |
| CVE484 | Intelligent transportation systems | | | | | | | | | ■ | | ■ | | | | | | |
| CVE392 | Plumbing Engineering | | | | | | ■ | | | ■ | | ■ | | | | | | |
| CVE472 | Geometric Geodesy and Geodetic Astronomy | | | | ■ | | | | | | | ■ | | | | | | |
| CVE364 | Hydraulic Machines | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | |
| CVE344 | Design of High-Rise Buildings | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE321 | Quality Control in Construction Engineering | | | | ■ | | ■ | | | | | ■ | | | | | | |
| CVE345 | Pre-stressed Concrete | | | | ■ | | | | | | | | | | | | | |
| CVE322 | Recycling of Construction Materials | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE323 | Management of Construction Projects | | | | | | | | | | | | | | | | | |
| CVE325 | Advanced Materials | | | | | | | | | ■ | | ■ | | | | | | |
| CVE326 | Quantities and specifications | | | | | | | | | ■ | | ■ | | | | | | |
| CVE302 | Software application in structural engineering | | | | | | | ■ | | ■ | | ■ | | ■ | | | | |
| CVE303 | Software application in Public Works engineering | | | | ■ | | | ■ | | ■ | ■ | ■ | | | | | | |
| CVE304 | Software application in water resources engineering | | | | ■ | | | ■ | | ■ | ■ | | | | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE405 | Graduation Project (1) and Computer Applications - Structural Engineering | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE403 | Graduation Project (1) and Computer Applications - Public Works | | | | | | ■ | ■ | | ■ | | | | ■ | | | | |
| CVE404 | Graduation Project (1) and Computer Applications - Water Resources | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | ■ | | ■ |
| CVE445 | Design of Special reinforced concrete structures | | | | | | | | | ■ | | ■ | | | | | | |
| CVE452 | Design of Bridges | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE424 | Repair & Strengthening of Structures | | | | | | | | | ■ | | | | | | | | |
| CVE424 | Construction Engineering | | | | | | | | | ■ | | | | | | | | |
| CVE423 | Advanced BIM | | | | | | | | | ■ | | | | | | | | |
| CVE431 | Tunnels and underground structures | | | | | | | | | | | ■ | | | | ■ | | |
| CVE485 | Highways Construction Material and Pavement Design | | | | | | | | | | | ■ | | | | | | |
| CVE494 | Construction of Water and Wastewater Infrastructure | | | | | | ■ | | | ■ | | ■ | | | | | | |
| CVE495 | Quality and chemistry of water | | | | ■ | | ■ | | | | | ■ | | | | | | |
| CVE471 | Advanced Topographic Surveying | | | | | | | | | | | ■ | | | | | | |
| CVE462 | Design of Irrigation Structures (2) | | | | ■ | | ■ | | | | | | | | | | | |
| CVE463 | Harbor Engineering | | | | ■ | | | | | | | ■ | | | | | | |
| CVE461 | Water Resources Management | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | | ■ | | ■ | | ■ |
| CVE406 | Graduation Project (2) - Structural Engineering | | | | ■ | | | | | ■ | | ■ | | | | | | |
| CVE407 | Graduation Project (2) - Public Works | | | | | | ■ | ■ | | ■ | | ■ | | ■ | | | | |
| CVE408 | Graduation Project (2) - water resources | | ■ | ■ | | | ■ | ■ | | | | | ■ | ■ | | ■ | | |

- **Courses VS Teaching and Learning Methods Intelligent and Sustainable Civil Engineering**

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (2) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (3) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (4) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| BAS111 | Mathematics (1) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS112 | Mathematics (2) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS113 | Probability and Statistics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS121 | Vibration and Waves | ■ | ■ | | | | ■ | | | | ■ | |
| BAS122 | Electricity and Magnetism | ■ | ■ | | | | ■ | | | | ■ | |
| BAS131 | Engineering Chemistry | ■ | ■ | | | | ■ | | | | ■ | |
| BAS141 | Statics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS142 | Dynamics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS143 | Engineering Drawing (1) | ■ | ■ | ■ | | | | | | | | |
| TRN2x1 | Field training (1) | | | ■ | ■ | ■ | | ■ | ■ | | | ■ |
| TRN3x1 | Field Training (2) | | | ■ | ■ | ■ | | ■ | ■ | | | ■ |
| - | Engineering Economy and Project Management Elective | ■ | ■ | | ■ | ■ | | | | ■ | ■ | ■ |
| - | Structures and Properties of Materials Elective Courses | ■ | ■ | | ■ | ■ | | | | ■ | ■ | |
| - | Engineering Technology Elective Courses | ■ | ■ | | ■ | ■ | | | | ■ | ■ | ■ |
| - | Spatial Perception and Design Elective Courses | ■ | ■ | | ■ | ■ | | | | ■ | ■ | |
| | Project Management Essentials | ■ | ■ | | | | ■ | | | | ■ | |
| | Structures and Properties of Materials | ■ | ■ | | | | ■ | | | | ■ | |
| | Structures and Properties of Construction Materials | ■ | ■ | | | | ■ | | | | ■ | |
| | Modern Building Material | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| BAS212 | Applied Engineering Mathematics for Civil Systems | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE211 | Structural Analysis (1) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE271 | Engineering Surveying | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE261 | Principle of Building Construction & Civil Drawing | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE212 | Structural Analysis (2) | ■ | ■ | | | ■ | ■ | | | | ■ | |
| CVE272 | Topographic and Photogrammetric Surveying | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE121 | Properties of Materials | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE131 | Engineering Geology | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE231 | Soil Mechanics (1) | ■ | ■ | | | ■ | ■ | | | | ■ | |

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE262 | Fluid Mechanics &Hydraulics | ■ | ■ | | | ■ | ■ | | | | ■ | |
| CVE241 | Design of Concrete Structures (1) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE201 | Data Analysis and Image Processing using Python for Civil Engineers | ■ | ■ | | | ■ | ■ | | | | ■ | |
| CVE301 | Introduction to Machine Learning for Civil Engineers | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE404 | Introduction to Deep Learning for Civil Engineers | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE232 | Soil Mechanics (2) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE281 | Transportation and Traffic Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE361 | Irrigation and drainage Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE351 | Design of Steel Structures (1) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE341 | Design of Concrete Structures (2) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE331 | Foundations Engineering (1) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE382 | Highway Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE425 | Environment Risk Management | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE461 | Design of Irrigation Structures (1) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE311 | Structural Analysis (3) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE391 | Green Building systems and Infrastructure | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE451 | Design of Steel Structures (2) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE342 | Design of Concrete Structures (3) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE332 | Foundations Engineering (2) | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE491 | Wastewater Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE484 | Railway Engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| CVE441 | Design of Concrete Structures (4) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| CVE321 | Introduction to BIM | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE425 | Risk Management in Construction Projects | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE302 | Thermal Analysis and sustainable systems for building | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (1) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (2) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (3) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (4) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (5) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| - | Civil Elective (6) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE481 | Transportation Planning | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE471 | Maps, GIS & Remote Sensing | ■ | ■ | | | ■ | | ■ | | | ■ | |
| CVE492 | Solid wastes | ■ | ■ | | | ■ | | ■ | | | ■ | |
| CVE462 | Hydrology | ■ | ■ | | | ■ | | ■ | | | ■ | |
| CVE411 | Structural Dynamics and Seismic analysis | ■ | ■ | | | ■ | | ■ | | | ■ | |
| CVE442 | Design of Wall Bearing Structures | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVE482 | Airport Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE483 | Intelligent transportation systems | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE493 | Plumbing Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE472 | Geometric Geodesy and Geodetic Astronomy | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE463 | Hydraulic Machines | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE443 | Design of High-Rise Buildings | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CVE421 | Quality Control in Construction Engineering | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| CVE444 | Pre-stressed Concrete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ |
| CVE422 | Recycling of Construction Materials | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CVE423 | Advanced Materials | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CVE401 | Software application in structural engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE402 | Software application in Public Works engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE403 | Software application in water resources engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE405 | Graduation Project (1) and Computer Applications - Structural Engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE407 | Graduation Project (1) and Computer Applications - Public Works | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE409 | Graduation Project (1) and Computer Applications - Water Resources | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE445 | Design of Special reinforced concrete structures | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE452 | Design of Bridges | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE424 | Repair & Strengthening of Structures | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE426 | Advanced BIM | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE431 | Tunnels and underground structures | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE485 | Highways Construction Material and Pavement Design | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE495 | Construction of Water and Wastewater Infrastructure | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE496 | Quality and chemistry of water | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE473 | Advanced Topographic Surveying | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE464 | Design of Irrigation Structures (2) | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE465 | Harbor Engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE466 | Water Resources Management | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE406 | Graduation Project (2) - Structural Engineering | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE408 | Graduation Project (2) - Public Works | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CVE400 | Graduation Project (2) - water resources | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |

## Graduate attributes (GA):

- Master a wide spectrum of civil engineering knowledge and specialized skills.
- Apply acquired knowledge using theories and abstract thinking in real life situations.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Enhance comprehension of project management principles to proficiently strategize and implement engineering projects while adhering to budgetary and timeline limitations.
- Use techniques, skills and modern engineering tools necessary for civil engineering practice.

- **Competencies VS Graduate Attributes Matrix for Intelligent and sustainable Engineering Program**

| Graduate attribute | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master a wide spectrum of civil engineering knowledge and specialized skills. | ■ | | ■ | ■ | ■ | | | | | | ■ | ■ | | | ■ |
| Apply acquired knowledge using theories and abstract thinking in real life situations. | ■ | ■ | ■ | | | | | | | | ■ | ■ | ■ | | ■ |
| Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance | | | | | | ■ | ■ | ■ | ■ | | | | ■ | ■ | |
| Value the importance of the environment, both physical and natural, and work to promote sustainability principles. | | | ■ | ■ | | | | | | | ■ | | ■ | | |
| Enhance comprehension of project management principles to proficiently strategize and implement engineering projects while adhering to budgetary and timeline limitations | | | | | | ■ | | | | | | | ■ | ■ | |
| Use techniques, skills and modern engineering tools necessary for civil engineering practice | | | | ■ | | | | | | | ■ | | | | ■ |

# Program 2: Digital Architecture Engineering Program

- ## Program Description

In today's world, architects are compelled to challenge critical global issues through holding responsibility of the built environment, responding to societal needs, and conserving natural resources and the sustainable development goals according to Egypt's Vision 2030. The program is committed to offering well-rounded future generations of skilled professional architects through an education that is rooted in culture, sustained with theory and progressive with technologically advanced methods. The digital architecture program offers. a unique learning experience that blends computational modeling and digital fabrication to solve the emerging global issues of architectural problems. Benefit from the vernacular entities and the expert lecturers to enable the graduate to gain the skills necessary to excel in this growing field and call for better design solutions on applying digital technologies and software as design aiding tools and AI architecture generators to generate parametrically designed sophisticated architectural forms and production, manufacture these points digitally and using computer programing such as VR technology and AI applications in designing buildings.

- ## Career Prospects

It is intended that graduates of the Architecture Engineering program will acquire critical thinking and enhance design creativity to take a leading role in professional practice. Graduates will be eligible to work in architectural design firms, in design, building Information modeling, architecture interior design and decoration, architecture project management, architecture marketing, tender documents, as well as urban design and detailed planning. Apply digital technologies and software as design aiding tools to generate parametrically designed sophisticated architectural forms and production/ manufacture these points digitally and using computer programing such as VR technology and AI generators applications in designing buildings.

- ## Relation to Sustainable Development Goals

| | | | | | |
|---|---|---|---|---|---|
| ☒ GOAL 1: No Poverty | GOAL 2: Zero Hunger | ☒ GOAL 3: Good Health & Well-being | ☒ GOAL 4: Quality Education | ☒ GOAL 5: Gender Equality | ☒ GOAL 6: Clean Water & Sanitation |
| ☒ GOAL 7: Affordable & Clean Energy | ☒ GOAL 8: Decent Work & Economic Growth | ☒ GOAL 9: Industry, Innovation & Infrastructure | ☒ GOAL 10: Reduced Inequality | ☒ GOAL 11: Sustainable Cities & Communities | ☒ GOAL 12: Responsible Consumption & Production |
| ☒ GOAL 13: Climate Action | GOAL 14: Life Below Water | ☒ GOAL 15: Life on Land | ☒ GOAL 16: Peace & Justice Strong Institutions | ☒ GOAL 17: Partnerships to achieve. the Goal | |

- ## Program Concentrations

There are no specified concentrations in this Program.

- ## Program Competences

**According to the National Academic Reference Standards (NARS-2018), the competencies for Graduates from NHADA University and all Engineering Programs, graduate must be able to (A-Level):**

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs, considering global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within sustainable design and development principles and contexts.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
A5. Practice research techniques and methods of investigation as an inherent part of learning.
A6. Plan, supervise, and monitor the implementation of engineering projects.
A7. Function efficiently as an individual and member of multi-disciplinary and multi-cultural teams.
A8. Communicate effectively – graphically, verbally, and in writing – with a range of audiences using contemporary tools.
A9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10. Acquire and apply new knowledge and practice self, lifelong, and other learning strategies

**In addition to the above Competencies for All Engineering Programs the Architecture Engineering graduate must be able to (B-Level):**

B1. Create architectural, urban, and planning designs that satisfy aesthetic and technical requirements, using adequate knowledge of history and theory, related fine arts, local culture and heritage, technologies, and human sciences.
B2. Produce designs that meet building users' requirements by understanding the relationship between people and buildings and between buildings and their environment and the need to relate buildings and the spaces between them to human needs and scale.
B3. Generate ecologically responsible environmental conservation and rehabilitation designs by understanding structural design, construction, technology, and engineering problems associated with building designs.
B4. Transform design concepts into buildings and integrate plans into overall planning within the constraints of project financing, project management, cost control, and project delivery

methods while having adequate knowledge of the industries, organizations, regulations, and procedures involved.

B5. Prepare design project briefs and documents and understand the context of the architect in the construction industry, including the architect's role in bidding, procurement of architectural services, and building production.

**In addition to the competences for all Engineering Programs (A-Level) and the competencies for the (B-Level), The Digital Architecture Engineering Program graduate must be able to**

**(C-Level):**

C1. Utilize advanced digital technologies and software as design support tools to create parametrically designed complex architectural forms, leveraging building information modeling (BIM) for digital production and manufacturing.

C2. Incorporate computer programs, including virtual reality VR technique and artificial intelligence (AI) applications, to enhance building design processes.

- ## Required Courses

To get a Bachelor of Science Degree in this program and to satisfy the Program Competencies, the following set of courses need to be completed.

### List of Digital Architecture Engineering Program Requirements Courses

| Course Title | Weight | | | Contact Hours | | | | % |
|---|---|---|---|---|---|---|---|---|
| | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Nahda University Requirements | 11 | 18 | 450 | 11 | 0 | 0 | 11 | 8% |
| Faculty of Engineering Requirements | 28 | 56 | 1400 | 20 | 15 | 9 | 44 | 19% |
| General Requirements of Digital Architecture Engineering | 68 | 115 | 2875 | 30 | 70 | 16 | 116 | 47% |
| Requirements of Digital Architecture Engineering | 37 | 61 | 1525 | 25 | 18 | 8 | 51 | 26% |
| Total | 144 | 250 | 6250 | 86 | 103 | 33 | 222 | 100% |

# General Requirements of Digital Architecture Engineering Program

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| DAE111 | Design Basics | 3 | 5 | 125 | 1 | 5 | 0 | 5 | |
| DAE211 | Creativity Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 5 | DAE111 |
| DAE212 | Architecture and Dwelling Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE211 |
| DAE311 | Building Types and Legislations Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE212 |
| DAE312 | Architectural Technology Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE311 |
| DAE411 | Architectural Sustainable Rehabilitation Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE312 |
| DAE412 | Interior Design by VR Technique | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE413 | Digital architecture and design technology GRAD 1 | 2 | 4 | 100 | 2 | 0 | 0 | 2 | DAE312<br>10 CH |
| DAE414 | Digital architecture and design technology GRAD 2 | 6 | 11 | 275 | 2 | 10 | 0 | 12 | DAE411<br>DAE413 |
| DAE221 | Construction (1): Conventional Construction Systems | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE222 | Construction (2): Finishing Works and wood construction | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE221 |
| DAE321 | Construction (3): Advanced Construction and finishing systems | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE222 |
| DAE322 | Working Design (1): Execution Drawings Coordination, Annotation and Coding | 3 | 5 | 125 | 1 | 4 | 0 | 6 | DAE321 |
| DAE421 | Working Design (2): Detailing and BOQs | 3 | 5 | 125 | 1 | 4 | 0 | 6 | DAE322 |
| DAE422 | Advanced Working Drawing/BIM Systems | 3 | 5 | 125 | 1 | 0 | 3 | 4 | DAE421<br>DAE351 |
| DAE142 | History of Arts and Architecture (1): Ancient Civilizations | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE241 | History of Arts and Architecture (2): Islamic Architecture and western architecture | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE142 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DAE242 | Theories of Contemporary Architecture and design methods | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE241 |
| DAE151 | Visual Communication in Architecture | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE251 | Digital Architecture technology 1 and History of Digital Architecture and Design | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE151 |
| DAE252 | Digital Architecture technology 2 and History of Digital Architecture and Design | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE251 |
| DAE253 | Programming for Design and Digital Fabrication | 2 | 4 | 100 | 2 | 0 | 2 | 4 | |
| DAE353 | AI in Architecture design | 2 | 4 | 100 | 1 | 0 | 3 | 4 | |
| DAE461 | Digital Media Studio | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Total | | 68 | 115 | 2875 | 30 | 70 | 16 | 116 | |

## Requirements of Digital Architecture Engineering Program

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| DAE141 | Human Behavior and the Built Environment | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| DAE231 | Sustainable Architecture | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| DAE331 | Landscape Architecture | 3 | 5 | 125 | 1 | 3 | 0 | 4 | |
| DAE332 | Introduction to Urban Planning, Design, and housing | 3 | 5 | 125 | 2 | 2 | 0 | 4 | DAE331 |
| DAE351 | Building information modelling BIM | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE252 |
| DAE352 | Architectural Computational Design | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE354 | Parametric Design Studio | 3 | 6 | 150 | 2 | 0 | 2 | 4 | DAE252 |
| DAE451 | Digital Design & Fabrication | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE353 |
| DAE361 | Technical installation in buildings | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CCE372 | Acoustic and Illumination Systems in Buildings | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE213 | Structure Analysis for Architecture Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CVE346 | Reinforced Concrete and foundation for Architecture Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE453 | Steel Structures for Architecture Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| | Digital Architecture Elective (A) | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| | Digital Architecture Elective (B) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| | Digital Architecture Elective (C) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Total | | 37 | 61 | 1525 | 25 | 18 | 8 | 51 | |

**Elective Courses of Digital Architecture Engineering Program is distributed in Three electives.**

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Digital Architecture Elective (A) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE323 | Digital Knowledge Based Systems | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE324 | Smart Building Information Systems | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE325 | Advanced Building Integration Systems/BIM and Execution Documents | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| Digital Architecture Elective (B) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE431 | Architecture, Culture & Heritage | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE432 | Housing | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE433 | History and Theory of Planning | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE434 | Introduction to Regional Urban Planning | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Digital Architecture Elective (C) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE462 | Architectural & Urban Legislations and Sustainable | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE463 | Digital Marketing | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE464 | Thermal Control | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE465 | Digital Sustainable Architecture | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE466 | Feasibility studies for architecture and urban projects | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |

- **Proposed Study Plan**

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 1 | | | | | | | | | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS121 | Vibration and Waves | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 4 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 5 | |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| | University Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| | University Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | 18 | 30 | 750 | 13 | 11 | 2 | 26 | |
| Semester 2 | | | | | | | | | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| DAE111 | Design Basics | 3 | 5 | 125 | 1 | 5 | 0 | 6 | |
| DAE141 | Human Behavior and the Built Environment | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| DAE142 | History of Arts and Architecture (1): Ancient Civilizations | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE151 | Visual Communication in Architecture | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| - | Spatial Perception and Design Elective | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 11 | 12 | 5 | 28 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 3 | | | | | | | | | |
| DAE211 | Creativity Design Studio | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE111 |
| DAE221 | Construction (1): Conventional Construction Systems | 3 | 5 | 125 | 1 | 5 | 0 | 6 | |
| DAE241 | History of Arts and Architecture (2): Islamic Architecture and western architecture | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE142 |
| DAE251 | Digital Architecture technology 1 and History of Digital Architecture and Design | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE151 |
| DAE231 | Sustainable Architecture | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| CVE213 | Structural Analysis for Architecture Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| - | Engineering Technology Elective | 2 | 3 | 75 | ٢ | ١ | 0 | 3 | |
| Total | | 18 | 30 | 750 | 11 | 13 | 4 | 28 | |
| Semester 4 | | | | | | | | | |
| DAE212 | Architecture and Dwelling Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE211 |
| DAE222 | Construction (2): Finishing Works and wood construction | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE221 |
| DAE242 | Theories of Contemporary Architecture and design methods | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE241 |
| DAE252 | Digital Architecture technology 2 and History of Digital Architecture and Design | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE251 |
| DAE253 | Programming for Design and Digital Fabrication | 2 | 4 | 100 | 2 | 0 | 2 | 4 | |
| - | Structures and Properties of Materials Elective | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | University Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 12 | 9 | 7 | 28 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 5 | | | | | | | | | |
| DAE311 | Building Types and Legislations Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE212 |
| DAE321 | Construction (3): Advanced Construction and finishing systems | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE222 |
| DAE331 | Landscape Architecture | 3 | 5 | 125 | 1 | 3 | 0 | 4 | |
| DAE351 | Building information modeling BIM | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE252 |
| DAE352 | Architectural Computational Design | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE353 | AI in Architecture design | 2 | 4 | 100 | 1 | 0 | 3 | 4 | |
| DAE361 | Technical installation in buildings | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Total | | 18 | 30 | 750 | 9 | 14 | 5 | 28 | |
| Semester 6 | | | | | | | | | |
| DAE312 | Architectural Technology Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE311 |
| DAE322 | Working Design (1): Execution Drawings Coordination, Annotation and Coding | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE321 |
| DAE332 | Introduction to Urban Planning, Design, and housing | 3 | 5 | 125 | 2 | 2 | 0 | 4 | DAE331 |
| DAE354 | Parametric Design Studio | 3 | 6 | 150 | 2 | 0 | 2 | 4 | DAE252 |
| CCE372 | Acoustic and Illumination Systems in Buildings | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE34٦ | Reinforced Concrete and foundation for Architecture Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| | Digital Architecture Elective (A) | 2 | 3 | 75 | 1 | ٠ | ٢ | 3 | |
| Total | | 18 | 30 | 750 | 10 | 16 | ٤ | 28 | |

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 7 | | | | | | | | | |
| DAE411 | Architectural Sustainable Rehabilitation Design Studio | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE312 |
| DAE412 | Interior Design by VR Technique | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE413 | Digital architecture and design technology GRAD 1 | 2 | 4 | 100 | 2 | 0 | 0 | 2 | DAE312& 101 CH |
| DAE421 | Working Design (2): Detailing and BOQs | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE322 |
| DAE451 | Digital Design & Fabrication | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE352 |
| DAE461 | Digital Media Studio | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE453 | Steel Structures for Architecture Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| Total | | 18 | 30 | 750 | 10 | 16 | 2 | 28 | |
| Semester 8 | | | | | | | | | |
| DAE414 | Digital architecture and design technology GRAD 2 | 6 | 11 | 275 | 2 | 10 | 0 | 12 | DAE413& DAE411 |
| DAE422 | Advanced Working Drawing/BIM Systems and Execution Documents | 3 | 5 | 125 | 1 | 0 | 3 | 4 | DAE421& DAE351 |
| | Digital Architecture Elective (B) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| | Digital Architecture Elective (C) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| - | Engineering Economy and Project Management Elective | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| | University Elective (3) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 10 | 15 | 3 | 28 | |

- ## Graduate Attributes

The graduates from the Digital Architecture Engineering Program:

**GA1.** Master a wide spectrum of Architecture Engineering knowledge and specialized skills, specifically in environmental aspects and sustainability, and apply acquired knowledge using theories and abstract thinking in real-life situations.

**GA2.** Apply analytic critical and systemic thinking to identify, diagnose and solve Architecture Engineering problems with a wide range of complexity and variation.

**GA3.** Behave professionally and adhere to Architecture Engineering and sustainability ethics and standards.

**GA4.** Worked in and led a heterogeneous team of professionals from different engineering specialties and assumed responsibility for own and team performance.

**GA5.** Recognize his/her role in promoting the Architecture Engineering field and contribute to developing the architecture profession and the community.

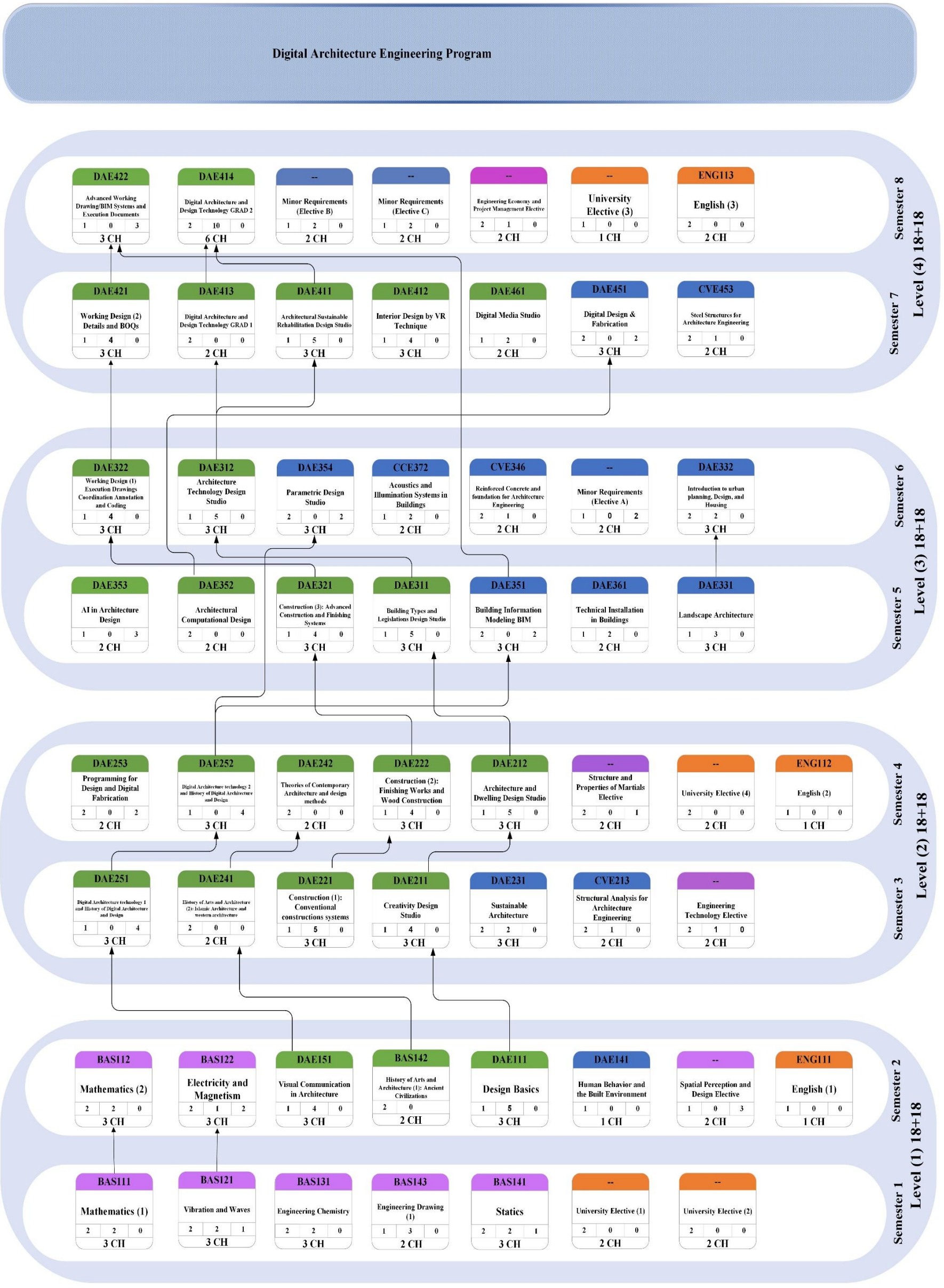
**GA6.** Value the importance of the physical and natural environment and work to promote sustainability principles.

**GA7.** Use techniques, skills, and modern engineering tools for Architecture Engineering practice. In addition to applying his/her knowledge and practical skills to create and develop architectural designs from the briefing phase to beyond the construction and operating phase.

**GA8.** Assume full responsibility for own learning and self-development, engage in lifelong learning, and demonstrate the capacity to engage in post-graduate and research studies.

**GA9.** Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges critically and creatively.

**GA10.** Demonstrate leadership qualities, business and project administration, and entrepreneurial skills.


Digital Architecture Engineering Program
Level (4) 18+18
Semester 8
DAE422 Advanced Working Drawing/BIM Systems and Execution Documents 1 0 3 3 CH
DAE414 Digital Architecture and Design Technology GRAD 2 2 10 0 6 CH
-- Minor Requirements (Elective B) 1 2 0 2 CH
-- Minor Requirements (Elective C) 1 2 0 2 CH
-- Engineering Economy and Project Management Elective 2 1 0 2 CH
-- University Elective (3) 1 0 0 1 CH
ENG113 English (3) 2 0 0 2 CH
Semester 7
DAE421 Working Design (2) Details and BOQs 1 4 0 3 CH
DAE413 Digital Architecture and Design Technology GRAD 1 2 0 0 2 CH
DAE411 Architectural Sustainable Rehabilitation Design Studio 1 5 0 3 CH
DAE412 Interior Design by VR Technique 1 4 0 3 CH
DAE461 Digital Media Studio 1 2 0 2 CH
DAE451 Digital Design & Fabrication 2 0 2 3 CH
CVE453 Steel Structures for Architecture Engineering 2 1 0 2 CH
Level (3) 18+18
Semester 6
DAE322 Working Design (1) Execution Drawings Coordination Annotation and Coding 1 4 0 3 CH
DAE312 Architecture Technology Design Studio 1 5 0 3 CH
DAE354 Parametric Design Studio 2 0 2 3 CH
CCE372 Acoustics and Illumination Systems in Buildings 1 2 0 2 CH
CVE346 Reinforced Concrete and foundation for Architecture Engineering 2 1 0 2 CH
-- Minor Requirements (Elective A) 1 0 2 2 CH
DAE332 Introduction to urban planning, Design, and Housing 2 2 0 3 CH
Semester 5
DAE353 AI in Architecture Design 1 0 3 2 CH
DAE352 Architectural Computational Design 2 0 0 2 CH
DAE321 Construction (3): Advanced Construction and Finishing Systems 1 4 0 3 CH
DAE311 Building Types and Legislations Design Studio 1 5 0 3 CH
DAE351 Building Information Modeling BIM 2 0 2 3 CH
DAE361 Technical Installation in Buildings 1 2 0 2 CH
DAE331 Landscape Architecture 1 3 0 3 CH
Level (2) 18+18
Semester 4
DAE253 Programming for Design and Digital Fabrication 2 0 2 2 CH
DAE252 Digital Architecture technology 2 and History of Digital Architecture and Design 1 0 4 3 CH
DAE242 Theories of Contemporary Architecture and design methods 2 0 0 2 CH
DAE222 Construction (2): Finishing Works and Wood Construction 1 4 0 3 CH
DAE212 Architecture and Dwelling Design Studio 1 5 0 3 CH
-- Structure and Properties of Martials Elective 2 0 1 2 CH
-- University Elective (4) 2 0 0 2 CH
ENG112 English (2) 1 0 0 1 CH
Semester 3
DAE251 Digital Architecture technology 1 and History of Digital Architecture and Design 1 0 4 3 CH
DAE241 History of Arts and Architecture (2): Islamic Architecture and western architecture 2 0 0 2 CH
DAE221 Construction (1): Conventional constructions systems 1 5 0 3 CH
DAE211 Creativity Design Studio 1 4 0 3 CH
DAE231 Sustainable Architecture 2 2 0 3 CH
CVE213 Structural Analysis for Architecture Engineering 2 1 0 2 CH
-- Engineering Technology Elective 2 1 0 2 CH
Level (1) 18+18
Semester 2
BAS112 Mathematics (2) 2 2 0 3 CH
BAS122 Electricity and Magnetism 2 1 2 3 CH
DAE151 Visual Communication in Architecture 1 4 0 3 CH
BAS142 History of Arts and Architecture (1): Ancient Civilizations 2 0 2 CH
DAE111 Design Basics 1 5 0 3 CH
DAE141 Human Behavior and the Built Environment 1 0 0 1 CH
-- Spatial Perception and Design Elective 1 0 3 2 CH
ENG111 English (1) 1 0 0 1 CH
Semester 1
BAS111 Mathematics (1) 2 2 0 3 CH
BAS121 Vibration and Waves 2 2 1 3 CH
BAS131 Engineering Chemistry 2 2 0 3 CH
BAS143 Engineering Drawing (1) 1 3 0 2 CH
BAS141 Statics 2 2 1 3 CH
-- University Elective (1) 2 0 0 2 CH
-- University Elective (2) 2 0 0 2 CH
DAE
TRN 2x1 Field Training (1) 0 5 0 0 CH
TRN 3x1 Field Training (2) 0 5 0 0 CH
- The maximum allowed study duration is 8 academic years
- Cumulative GPA at any main semester < 2.0
- 10 Weeks of Field
- Training can be Started at the end of level 2 (Sophomore level)
University Req. 11 CH
Program. Major Req 68 CH
Faculty Req. 28 CH
Program. Minor Req 37 CH
Course Code
Course Title
Lec Tut Lab
# CH

- **Digital Architecture Engineering Program Requirements Courses Content**

**Courses offered by Digital Architecture Engineering Program**

| DAE111 | Design Basics | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 5 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| This course includes a study of the elements and foundations of design with an emphasis on the constructive idea of two-dimensional design, as well as a study of the foundations of abstract composition and their distribution on the spatial surface to organize them visually to develop the creative and expressive ability of students. | | | |
| References | | | |
| – Ching, F. D. (2023). **Architecture: Form, space, and order**. John Wiley & Sons.<br>– Bielefeld, B. (2021). **Basics Design Ideas**. Birkhäuser<br>– Aspelund, K. (2014). **Designing: an introduction**. Bloomsbury Publishing USA.<br>– White, A. W. (2011). The elements of graphic design: space, unity, page architecture, and type. Skyhorse Publishing, Inc.<br>– Anderson, J. (2010). **Basics architecture 03: Architectural design** (Vol. 3). AVA Publishing. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
| 60% | 0% | 20% | 20% |

| DAE211 | Creativity Design Studio | | 3 CH |
|---|---|---|---|
| Prerequisites | Design Basics - DAE111 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 5 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| Creative problem-solving application & Perception of architectural spaces in terms of user's experience. Designing small scale projects with simple spatial requirements involving concepts of design, ideas and imagination (projects could be private residence, kinder gardens, activity centers and libraries for children and simple service buildings in public places). Considerations of circulation, orientation, spatial compositions and structure. | | | |

References

- Ching, F. D. (2023). ***Architecture: Form, space, and order***. John Wiley & Sons
- Cordua, C. H., & Sandness, S. (2023). Design Build with the Scarcity and Creativity Studio. Routledge.
- Temple, S. (Ed.). (2019). Developing creative thinking in beginning design. Routledge.
- Levitt, A. (2018). Listening to Design: A Guide to the Creative Process. Reaktion Books.
- Dabner, D., Stewart, S., & Vickress, A. (2017). ***Graphic design school: the principles and practice of graphic design***. John Wiley & Sons.
- Salama, A. M. (2016). Spatial design education: New directions for pedagogy in architecture and beyond. Routledge.
- Dudek, M. (2007). Schools and kindergartens: A design manual. DE GRUYTER.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
| 60% | 0% | 20% | 20% |

| DAE212 | Architecture and Dwelling Design Studio | | 3 CH |
|---|---|---|---|
| Prerequisites | Creativity Design Studio - DAE211 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 5 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | ٥ | |

Course Content

Global challenges include affordable housing, sustainable development, social and environmental justice, and the complexity of urban conditions. The relationship between dwelling units and residential buildings is reciprocal, with functional demands like daylight, ventilation, and accessibility competing with social inclusion, aesthetics, and economic efficiency. Savings options

References

- Ching, F. D. (2023). ***Architecture: Form, space, and order***. John Wiley & Sons.
- Phillips, S., Hoey, S., Mitchell, J. R., McKeown, H., Alexander, I., Platt, C., ... & Webster, M. (2022). Architects on DwellinMalpas, J. (2021). ***Rethinking dwelling: Heidegger, place, architecture***. Bloomsbury Publishing.
- Bloom, N. D., & Lasner, M. G. (Eds.). (2019). Affordable housing in New York: The people, places, and policies that transformed a city. Princeton University Press.
- Yigitcanlar, T., & Kamruzzaman, M. L. (Eds.). (2019). ***Planning, Development and Management of Sustainable Cities*****.** MDPI.
- Kleit, R. G., & Page, S. B. (2015). The changing role of public housing authorities in the affordable housing delivery system. ***Housing Studies***, *30*(4), 621-644.
- Singha, S. (2013). Architecture for rapid change and scarce resources. Routledge.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
| 60% | 0% | 20% | 20% |

| DAE311 | Building Types and Legislations Design Studio | | 3 CH |
|---|---|---|---|
| Prerequisites | Architecture and Dwelling Design Studio - DAE212 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 5 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | ٥ | |

Course Content

Public building identity with consideration to cultural, recreational, or institutional aspects pursuing a complex program with divergent functions, circulations, and construction systems. Site limitations, context, and the application of specified codes. Local building codes and legislations criticize project legality in the light of local laws, legislations and building codes. Examples of selected projects: office buildings, museums, libraries, etc.

References


- Hmood, K. (Ed.). (2023). Conservation of Urban and Architectural Heritage: Past, Present and Future. BoD–Books on Demand.
- Iano, J., & Allen, E. (2022). The architect's studio companion: rules of thumb for preliminary design. John Wiley & Sons.
- De Wilde, P. (2018). ***Building performance analysis***. John Wiley & Sons.
- Self, R. (2014). The architecture of art museums: a decade of design: 2000-2010. Routledge.
- Yarrow, A., Clubb, B., & Draper, J. L. (2008). ***Public libraries, archives, and museums: Trends in collaboration and cooperation***. International Federation of Library Associations and Institutions (IFLA).
- Kwon, M. (2004). One place after another: Site-specific art and locational identity. MIT press.
- Fountain, J. E. (2004). Building the virtual state: Information technology and institutional


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
| 60% | 0% | 20% | 20% |

| DAE312 | Architectural Technology Design Studio | | 3 CH |
|---|---|---|---|
| Prerequisites | Building Types and Legislations Design Studio - DAE311 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 5 | - | |
| Required SWL | | Equivalent ECTS | |

| | |
|---|---|
| 125 | 5 |

Course Content

Progressive technical design approaches are adopted embracing the intelligent adaptively of buildings to cope with dynamic environment. Applying passive and active environmental control principles to create comfortable and healthy indoor environments. Integrating building systems into a comprehensive design that meets the functional, aesthetic and environmental requirements of the project. Different types of building systems, considering Building Management System (BMS), Building Energy Management System (BEMS). Examples of selected projects hospitals.

References


- Wagenaar, C., Mens, N., Manja, G., Niemeijer, C., & Guthknecht, T. (2018). ***Hospitals: A design manual***. Birkhäuser.
- Jaskiewicz, T. J. (2013). Towards a methodology for complex adaptive interactive architecture. Technische Universiteit Delft.
- Levermore, G. (2013). Building energy management systems: An application to heating, natural ventilation, lighting and occupant satisfaction. Routledge.
- Bradshaw, V. (2010). The building environment: Active and passive control systems. John Wiley & Sons.
- Bachman, L. R. (2004). Integrated buildings: The systems basis of architecture (Vol. 9). John Wiley & Sons.
- So, A. T. P., & Chan, W. L. (1999). ***Intelligent building systems*** (Vol. 5). Springer Science & Business Media.


Assessment Criteria

| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
|---|---|---|---|
| 60% | 0% | 20% | 20% |

| DAE411 | Architectural Sustainable Rehabilitation Design Studio | 3 CH |
|---|---|---|
| Prerequisites | Architectural Technology Design Studio - DAE312 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 1 | 5 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | ٥ |

Course Content

Applying technological systems to a comprehensive design project that is functionally, aesthetically, and environmentally sound. The rehabilitation principles with respect to conservation and energy efficiency. Building's technical inspection and architectural management. The critical analysis of rehabilitation and applying effective methods and solutions. The evaluation and rehabilitation methods of heritage and vernacular architecture.

References

- Desideri, U., & Asdrubali, F. (Eds.). (2018). ***Handbook of energy efficiency in buildings: a life cycle approach***. Butterworth-Heinemann.
- Chwieduk, D. A. (2017). Towards modern options of energy conservation in buildings. ***Renewable Energy***, *101*, 1194-1202.
- Martani, C. (2015). Risk Management in Architectural Design: control of uncertainty over building use and maintenance. Springer International Publishing.
- Correia, M., Dipasquale, L., & Mecca, S. (2014). ***Versus: heritage for tomorrow: vernacular knowledge for sustainable architecture*** (p. 288). Firenze University Press.
- Rabun, J. S., & Kelso, R. M. (2009). ***Building evaluation for adaptive reuse and preservation***. John Wiley & Sons.
- Wimmer, W., Züst, R., & Lee, K. M. (2004). Ecodesign implementation: a systematic guidance on integrating environmental considerations into product development (Vol. 6). Springer Science & Business Media.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Oral Jury | Final Exam |
| 60% | 0% | 20% | 20% |

| DAE412 | Interior Design by VR Technique | 3 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 4 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

An overview of interior design principles and concepts; including perspective, color theory, design aesthetic and presentation methods. It tackles interior space elements through project-based activities (walls, ceilings, floors, windows, doors, furniture and accessories). It also focuses on the stages of concept development and presentation toward the goal of creating a beginning interior design portfolio.

References


- Ramstedt, F. (2020). *The Interior Design Handbook*. Penguin UK.
- Mitton, M. (2012). Interior design visual presentation: a guide to graphics, models and presentation techniques. John Wiley & Sons.
- Ching, F. D., & Binggeli, C. (2018). ***Interior design illustrated***. John Wiley & Sons.
- Sully, A. (2015). Interior Design: conceptual basis. Springer.
- Moxon, S., & Moxon, S. (2012). ***Sustainability in interior design***. Hachette UK.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 0% | 40% |

| DAE413 | Digital architecture and design technology GRAD 1 | | 2CH |
|---|---|---|---|
| Prerequisites | After completing 101CH,<br>Architectural Technology Design Studio - DAE312 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Scientific background of design studios, experimental design, digital architecture, environmental and sustainable design, human aspects, human-centered design and structural basis for architecture by the Analysis of collected data regarding the proposed site, Analysis and discussion of similar projects and preparing a technical report concerning the environmental analysis of the site, comparative study with similar projects. The final report leads to the final architectural program of the project of the **Digital architecture and design technology GRAD 2**

References


- Sheil, B., Skavara, M., Thomsen, M. R., & Ayres, P. (Eds.). (2024). ***Fabricate 2024: Creating Resourceful Futures***. UCL Press.
- Sheil, B., Thomsen, M. R., Tamke, M., & Hanna, S. (Eds.). (2020). ***Design transactions: rethinking information modelling for a new material age***. UCL Press.
- Oxman, R., & Oxman, R. (Eds.). (2014). ***Theories of the Digital in Architecture*** (Vol. 99). Abingdon: Routledge.
- Grobman, Y., & Neuman, E. (2013). Performalism: form and performance in digital architecture. Routledge.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final/Oral Exam |
|---|---|---|---|
| 50% | 0% | 0% | 50% |

| DAE414 | Digital architecture and design technology GRAD 2 | | 6 CH |
|---|---|---|---|
| Prerequisites | Architectural Sustainable Rehabilitation Design Studio - DAE411,<br>Digital architecture and design technology GRAD 1 - DAE413. | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 10 | - | |
| Required SWL | | Equivalent ECTS | |
| 275 | | 11 | |

Course Content

| |
|---|
| Comprehensive design project, professional ability of designing mega projects, multi-layered functions, impressive forms, awareness of the contemporary architectural trends, theories, social needs and practice "Architecture" professionally, serving the local community. |
| References |
| – Salama, A. M. (2021). Transformative pedagogy in architecture and urbanism. Routledge. |
| – Salama, A. M. (2016). Spatial design education: New directions for pedagogy in architecture and beyond. Routledge.<br>– Krupinska, J. (2014). What an architecture student should know. Routledge.<br>– Menges, A., & Ahlquist, S. (2011). Computational design thinking: computation design thinking. John Wiley & Sons. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final/Oral Exam |
| 50% | 0% | 0% | 50% |

| DAE221 | Construction (1): Conventional Construction Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 4 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| The course aims at understanding the building construction process and the construction of basic and essential components of any building. Students will learn about the main conventional construction systems, building's essential needs such as building protection against sun heat and dampness, bridging wall openings, retaining soil, and connecting different levels. Course topics will be: the load bearing walls, the RC skeleton, Arches, Lintels, Retaining walls, and also, design, construction, and finishing of linear and spiral staircases. |
| References |
| – Ching, F. D. (2020). ***Building construction illustrated***. John Wiley & Sons.<br>– Allen, E., & Iano, J. (2019). Fundamentals of building construction: materials and methods. John Wiley & Sons.<br>– Ambrose, J., & Tripeny, P. (2016). ***Simplified engineering for architects and builders***. John Wiley & Sons.<br>– Chudley, R., & Greeno, R. (2006). *Building construction handbook*. Routledge. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | - | 40% |

| DAE222 | Construction (2): Finishing Works and wood construction | | 3 CH |
|---|---|---|---|
| Prerequisites | Construction (1): Conventional Construction Systems- DAE221 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 4 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

The course aims at understanding the building finishing process and materials. Students will learn about the carpentry work of doors and windows, and the process and materials of finishing architectural internal spaces; floors, walls, and ceiling. Course topics will be: timber Doors & Windows, floor finishing: tiles, rolls, fabric, cast in situ, and boards, wall cladding, tiles, plastering, paints, boards, paper, ceiling finishing: tiles, boards, plastering, and paints.

**References**


- Allen, E., & Iano, J. (2019). Fundamentals of building construction: materials and methods. John Wiley & Sons.
- Hashmi, M. S. J. (2016). ***Comprehensive materials finishing***. Elsevier.
- Williams, R. S. (2010). Finishing of wood. ***Wood Handbook***, 16-39.
- Cattell, D. (2003). Specialist floor finishes: design and installation. Routledge.
- Savage, C. (1998). Trim carpentry techniques: installing doors, windows, base and crown. Taunton Press.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | - | 40% |

| DAE321 | Construction (3): Advanced Construction and finishing systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Construction (2): Finishing Works and wood construction - DAE222 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 4 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

The course aims at understanding the advanced building construction process and technologies . Students will learn about the wide span structure systems, precast and post tension systems, and Structural Glazing system. In addition, the student will learn about advanced finishing and cladding materials and techniques such as: raised floors, curtain walls, Stretched ceiling, GRC and GRP.

| References |
|---|
| – Ching, F. D. (2020). ***Building construction illustrated***. John Wiley & Sons.<br>– Allen, E., & Rand, P. (2016). Architectural detailing: function, constructibility, aesthetics. John Wiley & Sons.<br>– Naboni, R., & Paoletti, I. (2015). ***Advanced customization in architectural design and construction***. Cham: Springer International Publishing.<br>– Khoraskani, R. A. (2015**).** ***Advanced connection systems for architectural glazing*** (pp. 5-20). Springer International Publishing.<br>– El-Reedy, M. A. (2012). Reinforced concrete structural reliability. CRC Press.<br>– Cooper, R., Aouad, G., Lee, A., Wu, S., Fleming, A., & Kagioglou, M. (2008). ***Process management in design and construction***. John Wiley & Sons. |
| – Deplazes, A. (Ed.). (2005). ***Constructing architecture: materials, processes***, *structures*. Springer Science & Business Media. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | - | ٤0% |

| DAE322 | Working Design (1): Execution Drawings Coordination, Annotation and Coding | 3 CH |
|---|---|---|
| Prerequisites | Construction (3): Advanced Construction and finishing systems - DAE321 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 4 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| The course aims at informing students about execution drawings as needed to construct buildings , and spatial needs for basic technical systems, to coordinate between the technical systems, and organize related information. Also, it aims at training students on documenting data and information, preparing architectural execution drawings, and coding them according to the US CSI coding system. The aims are realized through a study of technical and drafting systems; preparation base drawings that guarantee appropriateness of spaces for structural, sanitary, electrical, air condition, and movement systems; organization data and annotations in plans, sections, and elevations. |
| References |

- Ching, F. D., & Winkel, S. R. (2021). Building codes illustrated: a guide to understanding the 2021 international building code. John Wiley & Sons.
- American Institute of Architects. (2017). ***The Architecture Student's Handbook of Professional Practice***. John Wiley & Sons.
- Styles, K., & Bichard, A. (2012). ***Working drawings handbook***. Routledge.
- Ballast, D. K. (2009). Architect's handbook of construction detailing. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 60%. | - | - | ٤0%. |

| DAE323 | Digital Knowledge Based Systems | 2 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | 2 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

This course has two subjects to focus on. The first one is the application of knowledge-based expert system methodology in CAE. Topics include knowledge-based programming methodologies, knowledge-based engineering techniques, expert system development environments and representative expert system applications in CAE. Each student develops a prototype expert system for an application of him/her choice. The second subject discusses issues related to practical applications of shape grammar: shapes, shape arithmetic, symmetry, spatial relations & shape computations.

References


- Bhambri, P., Rani, S., Balas, V. E., & Elngar, A. A. (Eds.). (2023). Integration of AI-Based Manufacturing and Industrial Engineering Systems with the Internet of Things. CRC Press.
- Yu, R., Gu, N., & Ostwald, M. J. (2021). Computational design: technology, cognition and environments. CRC Press.
- Liebowitz, J. (Ed.). (2019). ***The handbook of applied expert systems***. cRc Press.
- Sriram, R. D. (2012). Intelligent systems for engineering: a knowledge-based approach. Springer Science & Business Media.
- Menges, A., & Ahlquist, S. (2011). Computational design thinking: computation design thinking. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE324 | Smart Building Information Systems | | 2CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | - | 2 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course focuses on different work methodologies. Critical analysis of information and choice of argumentation in smart buildings. Work methodologies and pedagogical interest.

References


- Lévy, F., & Ouellette, J. W. (2019). Bim for design firms: Data Rich Architecture at Small and medium scales. John Wiley & Sons.
- Arayici, Y., Counsell, J., Mahdjoubi, L., Nagy, G., Ḥawwās, S. Z., & Dweidar, K. (Eds.). (2017). ***Heritage building information modelling***. Abingdon: Routledge.
- Kensek, K. (2014). ***Building information modeling***. Routledge.
- Eastman, C. M. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.
- Eastman, C. M. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.


– Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 50% | 10% | 40% | 0% |

| DAE325 | Advanced Building Integration Systems/BIM and Execution Documents | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | - | 2 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course introduces the state-of-the-art and major innovations in building technologies and structural, enclosure, telecommunications, mechanical, lighting, and interior systems. The course continues the mandate for Total Building Performance, clarifying the full range of building performance mandates required in today's architecture, including building integrity, thermal quality,

| |
|---|
| acoustic quality, visual quality, air quality, and spatial quality. Graduates of the department are expected to lead multidisciplinary design processes, enhance sustainable environmental performance, and ensure the long-term integrity of integrated systems. |
| Laboratory |
| – Outodesk Rivet 2023 or the latest version. |
| References |
| – Grondzik, W. T., & Kwok, A. G. (2019). ***Mechanical and electrical equipment for buildings***. John wiley & sons.<br>– Stansinoupolos, P., Smith, M., Hargroves, K., & Desha, C. (2013). ***Whole system design: An integrated approach to sustainable engineering***. Routledge.<br>– Syed, A. (2012). Advanced building technologies for sustainability (Vol. 3). John Wiley & Sons.<br>– Eastman, C. M. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers, and contractors. John Wiley & Sons.<br>– Kensek, K. (2014). ***Building information modeling***. Routledge. |
| – Krygiel, E., & Nies, B. (2008). Green BIM: **successful sustainable design with building information modeling**. John Wiley & Sons.<br>– Preiser, W. F., & Vischer, J. (Eds.). (2005). ***Assessing building performance***. Routledge. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE421 | Working Design (2): Detailing and BOQs | | 3 CH |
|---|---|---|---|
| Prerequisites | Working Design (1): Execution Drawings Coordination, Annotation and Coding - DAE322 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 4 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

The course aims at informing students about detailing architectural spaces. Student will start to investigate and design internal finishing, installations, accessories, and fixtures. Student will train to analyze, evaluate, and choose the optimum specifications of different items. In addition, student will integrate these specifications and manufacturer's details into the design.

Also, student will learn how to make "Component", "Sub-Component" and "Assembly Drawings" and quantity surveying to produce BOQs. Advanced supplementary systems and technical installations will be discussed such as systems of: Security, Firefighting, Fire Alarm, BMS, Automation, and other similar systems.

| References |
|---|
| – Kilmer, R., & Kilmer, W. O. (2021). ***Construction drawings and details for interiors***. John Wiley & Sons.<br>– Ching, F. D. (2020). ***Building construction illustrated***. John Wiley & Sons.<br>– Towey, D. (2017). Construction quantity surveying: a practical guide for the contractor's QS. John Wiley & Sons.<br>– Ballast, D. K. (2014). ***Architect's Handbook of Construction Detailing***. (2nd ed.). John Wiley & Sons.<br>– Cotgrave, A., & Riley, M. (2012). ***Total sustainability in the built environment***. Bloomsbury Publishing.<br>– Emmitt, S., Olie, J., & Schmid, P. (2009). *Principles of architectural detailing*. John Wiley & Sons. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 60%. | - | - | 40%. |

| DAE422 | Advanced Working Drawing/BIM Systems and Execution Documents | | 3 CH |
|---|---|---|---|
| Prerequisites | Working Design (2): Detailing and BOQs - DAE421<br>& Building information modelling BIM - DAE351 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| This text focuses on creating working drawings for tendering, site construction, and factory manufacturing. It discusses the coordination of spatial needs for technical systems like structure, HVAC, lights, and sanitation. The text also discusses the use of BIM applications like Revit for construction documents and the creation of specifications documents. It also covers job conditions, scope of work, detailed descriptions of items and materials, quality surveying, quantity calculation, and inspection of finished work. |
| Laboratory |
| – Outodesk Rivet 2023 or the latest version. |
| References |

- Adekunle, S., Aigbavboa, C. O., Ejohwomu, O., Thwala, W. D., & Mahamadu, A. M. (2023). *A **Building Information Modelling Maturity Model for Developing Countries***. Routledge.
- Kilmer, R., & Kilmer, W. O. (2021). ***Construction drawings and details for interiors***. John Wiley & Sons.
- Banihashemi, S., Golizadeh, H., & Rahim/herian, F. P. (2022). ***Data-driven BIM for energy efficient building design***. Routledge.
- Casini, M. (2021). Construction 4.0: Advanced Technology, Tools and Materials for the Digital
- Transformation of the Construction Industry. Woodhead Publishing
- Ching, F. D. (2020). ***Building construction illustrated***. John Wiley & Sons.
- Towey, D. (2017). Construction quantity surveying: a practical guide for the contractor's QS. John Wiley & Sons.
- Ballast, D. K. (2014). ***Architect's Handbook of Construction Detailing***. (2nd ed.). John Wiley & Sons.
- Eastman, C. M. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.
- Smith, D. K., & Tardif, M. (2009). Building information modeling: a strategic implementation guide for architects, engineers, constructors, and real estate asset managers. John Wiley & Sons.
- Krygiel, E., & Nies, B. (2008). Green BIM: successful sustainable design with building information modeling. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE231 | Sustainable Architecture | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

The course examines the environmental impact of building design and construction. The concept of sustainable architecture is discussed as a means of reducing this impact. Understanding the principles of Sustainable architecture that seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials and energy. Applications of the techniques of ecologically conscious approach in the field of architecture.

References

- Tabb, P. J., & Deviren, A. S. (2017). The greening of architecture: A critical history and survey of contemporary sustainable architecture and urban design. Routledge.
- Kibert, C. J. (2016). Sustainable construction: green building design and delivery. John Wiley & Sons.
- Iyengar, K. (2015). Sustainable architectural design: An overview. Routledge.
- Randolph, J., & Masters, G. M. (2008). ***Energy for sustainability: Technology, planning, policy***. Island Press.
- Kubba, S. (2012). Handbook of green building design and construction: LEED, BREEAM, and Green Globes. Butterworth-Heinemann.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE331 | Landscape Architecture | 3 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 3 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Overview of the urban context and its landscaping elements. The elements of the urban landscape: Open spaces, Built form, Urban form, Greenery, Street furniture, Movement patterns. The classical urban design contexts and their theories.

**References**


- Carmona, M. (2021). Public places urban spaces: The dimensions of urban design. Routledge.
- Sonkoly, G. (2017). ***Historical urban landscape***. New York: Palgrave Macmillan.
- Parker, S. (2015). Urban theory and the urban experience: Encountering the city. Routledge.
- Liversedge, J., & Holden, R. (2014). ***Landscape architecture: an introduction***. Hachette UK.
- Chen, G. (2011). Landscape architecture: planting design illustrated. ArchiteG, Inc.
- Deming, M. E., & Swaffield, S. (2011). ***Landscape architectural research: Inquiry, strategy, design***. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 0% | 40% |

| DAE332 | Introduction to Urban Planning, design, and housing | 3CH |
|---|---|---|
| Prerequisites | Landscape Architecture - DAE331 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |

| | | |
|---|---|---|
| 2 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Overview of the urban context elements. Introduction to urban design and planning theories and practice. The meaning and scope of urban design. The classical urban design contexts and their theories. The meaning of Urban morphology, and the vocabulary of urban form and space as the standards and best practice of urban design elements. Housing market and needs: demand and supply issues, housing provision system, its components, and relevant actors. Housing problems, housing typology in terms of types and levels

References


- Carmona, M. (2021). Public places urban spaces: The dimensions of urban design. Routledge.
- Kasprisin, R. (2019). Urban design: the composition of complexity. Routledge.
- Sonkoly, G. (2017). ***Historical urban landscape***. New York: Palgrave Macmillan.
- Parker, S. (2015). Urban theory and the urban experience: Encountering the city. Routledge.
- Liversedge, J., & Holden, R. (2014). ***Landscape architecture: an introduction***. Hachette UK.
- Chen, G. (2011). Landscape architecture: planting design illustrated. ArchiteG, Inc.
- Deming, M. E., & Swaffield, S. (2011). ***Landscape architectural research: Inquiry, strategy, design***. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 0% | 40% |

| DAE431 | Architecture, Culture & Heritage | 2 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

The course introduces students to the importance of culture and heritage in architectural design and development process. It develops students' analytical and descriptive skills to understand the meaning and significance of Human Heritage as a product of Culture and Civilization, with special reference to Egyptian Architectural Heritage. It also enhances the students design skills to deploy the layers of conceptions, beliefs, values, and architectural products in the different Egyptian historic periods while addressing contemporary Architectural and Urban Design problems.

References


- Mahgoub, Y., Cavalagli, N., Versaci, A., Bougdah, H., & Serra-Permanyer, M. (Eds.). (2021). ***Cities' identity through architecture and arts***. Springer International Publishing.
- Casares, J., & Amarillo, S. D. (Eds.). (2020). ***Islamic heritage architecture and art III*** (Vol. 197). WIT Press.
- Šćitaroci, M. O., Šćitaroci, B. B. O., & Mrđa, A. (Eds.). (2019). ***Cultural urban heritage: development, learning and landscape strategies***. Springer.
- Bold, J., Larkham, P., & Pickard, R. (Eds.). (2017). ***Authentic reconstruction: authenticity, architecture and the built heritage***. Bloomsbury Publishing.
- Rizzo, I., & Mignosa, A. (Eds.). (2013). ***Handbook on the economics of cultural heritage***. Edward Elgar Publishing.
- Gillman, D. (2010). ***The idea of cultural heritage***. Cambridge University Press.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| DAE432 | Housing | | 2CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course aims at the students to Understand the Housing market problems, housing typology and needs: demand and supply issues, housing provision system, its components, and relevant actors. Assessment of housing and services needs for a neighborhood. Fundamentals of land parceling, with application in real project. Movement network, roads hierarchy, and parking areas. Application of
theoretical studies in a project dealing with urban, social, and economic surveys for an existing area. Analysis and diagnosis of alternative solutions to housing projects.

References

- Grander, M., & Stephens, M. (Eds.). (2024). ***The Routledge Handbook of Housing and Welfare***. Routledge.
- Carmona, M. (2021). Public places urban spaces: The dimensions of urban design. Routledge.
- Fordham, R., Finlay, S., Gardener, J., Macmillan, A., Muldoon, C., Taylor, G., & Welch, G. (2019). ***Housing need and the need for housing***. Routledge.
- Leitner, H., Peck, J., & Sheppard, E. (Eds.). (2019**). *Urban studies inside/out: theory, method, practice***. Sage.
- Coiacetto, E., & Coiacetto, E. (2012). ***Understanding land development: A project-based approach***. CSIRO PUBLISHING.
- Walljasper, J. (2007). The great neighborhood book: A do-it-yourself guide to placemaking. New society publishers.
- Saunders, P. (2003). Social theory and the urban question. Routledge.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 0% | 40% |

| DAE433 | History and Theory of Planning | 2 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

**Course Content**

The course explores the history and development of cities from pre-historic times to modern times, focusing on the development of planning theories and comprehensive studies. It covers various civilizations, including ancient Egyptians, Mesopotamian civilizations, ancient Greeks, Romanians, Middle Ages, Islamic states, Renaissance, and Baroque eras. The course also includes field studies on urban residential sites and small towns, enhancing students' understanding of planning science and applying planning principles on small-scale contemporary plans.

**References**


- Brown, P. (2024). **The world of late antiquity**: AD 150-750. Thames & Hudson.
- Classen, A. (Ed.). (2023). Globalism in the Middle Ages and the Early Modern Age: Innovative Approaches and Perspectives (Vol. 27). Walter de Gruyter GmbH & Co KG.
- Rietbergen, P. (2020). ***Europe: a cultural history***. Routledge.
- Ching, F. D., Jarzombek, M. M., & Prakash, V. (2017). ***A global history of architecture***. John Wiley & Sons.

- Allmendinger, P. (2017). ***Planning theory***. Bloomsbury Publishing.
- Martin, T. R. (2013). Ancient Greece: from prehistoric to Hellenistic times. Yale University Press.
- Bhattacharya, B. (2006). ***Urban development in India: since pre-historic time***. Concept Publishing Company.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| DAE434 | Introduction to Regional Urban Planning | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course introduces regional planning concepts and frameworks, focusing on urban and regional development issues. It explores contemporary urban growth and human interventions, examining the past, present, and future of cities through four interrelated themes: environment, equity, economy, and culture. Students learn to develop land use plans and programs to create communities, accommodate population growth, and revitalize physical facilities in towns, cities, counties, and metropolitan areas.

References


- Grander, M., & Stephens, M. (Eds.). (2024). ***The Routledge Handbook of Housing and Welfare***. Routledge.
- . Hall, P., & Tewdwr-Jones, M. (2019). ***Urban and regional planning***. Routledge.
- Lichfield, N., Kettle, P., & Whitbread, M. (2016**). Evaluation in the Planning Process: The Urban and Regional Planning Series,** Volume 10 (Vol. 10). Elsevier.
- Bracken, I. (2014). Urban planning methods: Research and policy analysis. Routledge.
- Paris, C. (Ed.). (2013). Critical readings in planning theory: Urban and regional planning series. Elsevier.
- Thompson, S., & Maginn, P. J. (Eds.). (2012). Planning Australia: An overview of urban and regional planning.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| DAE141 | Human Behavior and the Built Environment | 1 CH |
|---|---|---|

| Prerequisites | - | |
|---|---|---|
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 1 | 0 | - |
| Required SWL | | Equivalent ECTS |
| 50 | | 2 |

Course Content

The course aims at exploring the way active human use of physical settings influences or is influenced by aspects of sustainability in the built environment. This includes categories of human experience such territoriality, way finding, cultural expression, visual and non-visual aesthetics, and task performance. The methods used in identifying and analyzing such kinds of social and cultural dimensions; ethnography, photo elicitation, agent-based modeling as a key for developing evidence based sustainable design.

References


- Engineer, A., Ida, A., Jung, W., & Sternberg, E. M. (2024). Measuring the Impact of the Built Environment on Health, Wellbeing, and Performance: Techniques, Methods, and Implications for Design Research. Taylor & Francis.
- Sussman, A., & Hollander, J. (2021). Cognitive architecture: Designing for how we respond to the built environment. Routledge.
- Molen, N. (2016). A method for employing qualitative data in the development of spatial agent-based models. Michigan State University.
- Langevin, J. (2014). Human Behavior & Low Energy Architecture: Linking Environmental Adaptation, Personal Comfort, & Energy Use in the Built Environment. Drexel University.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| DAE142 | History of Arts and Architecture (1): Ancient Civilizations | 2 CH |
|---|---|---|
| Prerequisites | - | |
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

| |
|---|
| This course aims at elaborating the relation between the architectural concept and the philosophy of design in different ages. It tackles the effects of physical, cultural, natural, and constructional possibilities on the different architectural elements, through a study of art and architecture for different ancient eras: Ancient Egyptian, West Asiatic, Babylonian, Assyrian, Persian, Greek, Roman, the early Christian and byzantine period. |
| References |
| • Von Reber, F., & Clarke, J. T. (2024). ***History of Ancient Art***. BoD–Books on Demand.<br>• Gray, G. T. (2021). An Introduction to the History of Architecture, Art & Design. Sunway University Press.<br>• Arnold, D. (2020). ***Art history: A very short introduction***. Oxford University Press.<br>• Freeman, C. (2014). Egypt, Greece, and Rome: civilizations of the ancient Mediterranean. Oxford University Press, USA.<br>• Sear, F. (2002). ***Roman architecture***. Routledge. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE241 | History of Arts and Architecture (2): Islamic Architecture and western architecture | 2 CH |
|---|---|---|
| Prerequisites | History of Arts and Architecture (1): Ancient Civilizations – DAE142 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| This course investigates the meaning, principles and development of the Islamic art and architecture in a chronological order in the Islamic world with special reference to Egypt clarifying the impact of the different political, economic, cultural, and environmental factors on the architectural space and elements through different periods and typologies The concepts and architectural characteristics of Architecture in Western Europe from Romanesque architecture till the nineteenth century Neoclassical architecture. |
| References |

- Ray, N. (2023). Thinking Through Twentieth-century Architecture. Routledge.
- . Kamalipour, H., Aelbrecht, P., & Peimani, N. (Eds.). (2023). ***The Routledge handbook of urban design research methods***. Routledge.
- Summerson, J., & Powers, A. (2023). ***The classical language of architecture***. Thames & Hudson.
- Hernandez, S. (Ed.). (2022). ***Islamic Heritage Architecture IV*** (Vol. 211). WIT Press.
- Hillenbrand, R. (2019). *Studies in the Islamic Decorative Arts*. Pindar Press.
- Ettinghausen, R., Grabar, O., & Jenkins, M. (2003). ***Islamic art and architecture*** *650-1250* (Vol. 59). Yale University Press.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE242 | Theories of Contemporary Architecture and design methods | 2 CH |
|---|---|---|
| Prerequisites | History of Arts and Architecture (2): Islamic Architecture and western architecture - DAE241 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

The theoretical foundations of architectural movements from the innovations of the Industrial Revolution to the rich pluralism of Contemporary Architecture. Correlation and interpretation of socio-cultural, political, economic, and industrial conditions, values, concepts, and canonical characteristics.

**References**


- Giamarelos, S. (2022). Resisting Postmodern Architecture: Critical Regionalism Before Globalisation. UCL Press.
- Szalapaj, P. (2014). Contemporary architecture and the digital design process. Routledge.
- Borden, I., Fraser, M., & Penner, B. (2014). Forty ways to think about architecture: architectural history and theory today. John Wiley & Sons.
- Abel, C. (2012). ***Architecture and identity***. Routledge.
- Kalay, Y. E. (2004). Architecture's new media: Principles, theories, and methods of computer-aided design. MIT press.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE151 | Visual Communication in Architecture | 3 CH |
|---|---|---|
| Prerequisites | - | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | 4 | 0 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

This course includes studying the fundamental skills of freehand drawing techniques, addressing the modeling and graphics component of computer-aided architectural design. Different exercises are to be applied in both 2D and 3D. Students will develop the ability to graphically communicate simple forms by transforming visual information into 2D images with shade and shadows and visualize 3D objects in perspective.

This course explains computer usage as a tool for architects to be used in 2D/3D drawings representation.

References


- Ching, F. D. (2023). ***Architectural graphics***. John Wiley & Sons.
- Byrkjeflot, H., Mjøset, L., Mordhorst, M., & Petersen, K. (2022). ***The making and circulation of Nordic models, ideas and images*** (p. 304). Taylor & Francis.
- Seidler, D. R. (2020). **Digital Drawing for Designers: A Visual Guide to AutoCAD** 2021. Bloomsbury Publishing USA.
- Liu, Y., Pears, N., Rosin, P. L., & Huber, P. (Eds.). (2020). ***3D imaging, analysis and applications***. Cham, Switzerland: Springer International Publishing.
- McMorrough, J. (2014). Drawing for architects: How to explore concepts, define elements, and create effective built design through illustration. Rockport Publishers.
- Yee, R. (2012). Architectural drawing: a visual compendium of types and methods. John Wiley & Sons.
- Klawonn, F. (2012). ***Introduction to computer graphics: using Java 2D and 3D***. Springer Science & Business Media.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 60% | 0% | 0% | 40% |

| DAE251 | Digital Architecture technology 1 and History of Digital Architecture and Design | 3 CH |
|---|---|---|
| Prerequisites | Visual Communication in Architecture - DAE151 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | 4 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Digital media and its application in architecture. Focus is on enabling skill acquisition in the use of AutoCAD, 3D Studio Max. Course introduces 2D drafting and 3D modeling using CAD applications - modeling, rendering and animation using 3D Studio Max and Exploring man-machine relations, Digitality as part of utopian thinking, digital revolution, The generalization of the "digital

architecture", The Theory of Digital Design, digital design methods in architecture, graphic representation of architectural forms and drawings such as classic CAD programs, or automation between 2D and 3D views characteristic of BIM platforms

Laboratory

- Outodesk AutoCAD 2024 or the latest version.

References

- Esquivel, G. (Ed.). (2024). Design Technology and Digital Production: An Architecture Anthology. Taylor & Francis.
- Ching, F. D. (2023). ***Architectural graphics***. John Wiley & Sons.
- Seidler, D. R. (2020). **Digital Drawing for Designers: A Visual Guide to AutoCAD** 2021. Bloomsbury Publishing USA.
- Liu, Y., Pears, N., Rosin, P. L., & Huber, P. (Eds.). (2020). ***3D imaging, analysis and applications***. Cham, Switzerland: Springer International Publishing.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE252 | Digital Architecture technology 2 and History of Digital Architecture and Design | 3 CH |
|---|---|---|
| Prerequisites | Digital Architecture technology 1 and History of Digital Architecture and Design - DAE251 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 1 | - | 4 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

This course covers the basics of 2D and 3D animation, from creating motion graphics to production. It covers text and object animations, video composition, audio, and effects. Students will learn to use tools like 3D max, Maya, Photoshop, Illustrator, Flash, and Adobe After Effects. The course also

| |
|---|
| covers the shift from representational to algorithmic logic, digital tools, and performance-oriented design. It also incorporates computer science concepts like computational design, AI, and process-oriented generative algorithms into architecture. |
| Laboratory |
| – Outodesk AutoCAD 2024, or the latest version.<br>– Autodesk 3DS MAX 2024, or the latest version.<br>– Adobe Photoshop cs6 2023, or the latest version. |
| Reference |
| – Chen, L., Penney, D., & Jiménez, D. (2022). AI for computer architecture: principles, practice, and prospects. Springer Nature.<br>– Hovestadt, L., Hirschberg, U., & Fritz, O. (Eds.). (2020). Atlas of digital architecture: Terminology, concepts, methods, tools, examples, phenomena. Birkhäuser.<br>– Nichols, R. (2020). Mastering Adobe Photoshop Elements 2020: Supercharge your image editing using the latest features and techniques in Photoshop Elements. Packt Publishing Ltd. |
| – Liu, Y., Pears, N., Rosin, P. L., & Huber, P. (Eds.). (2020). ***3D imaging, analysis and applications***. Cham, Switzerland: Springer International Publishing.<br>– Melendez, F. (2019). Drawing from the Model: Fundamentals of Digital Drawing, 3D Modeling, and Visual Programming in Architectural Design. John Wiley & Sons.<br>– Barker, C. (2016). Photoshop Tricks for Designers: How to Create Bada $$ Effects in Photoshop. Peachpit Press.<br>– Denz, N. (2014). Process-oriented analysis and validation of multi-agent-based simulations (Vol. 7). Logos Verlag Berlin GmbH.<br>– Vince, J., & Earnshaw, R. (Eds.). (2012). ***Advances in modelling, animation and rendering***. Springer Science & Business Media. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE253 | Programming for Design and Digital Fabrication | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 2 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |
| Course Content | | | |

| |
|---|
| Data modeling, analyzing statistical data, data interpretation, algorithmic thinking, implementing algorithms, basics of programming and scripting, form generation process, programming languages supported by 3d modelling, fabrication, 3D printing. |
| Laboratory |
| – Rhino ٨- Rhinoceros 3D. or the latest version<br>– Adobe Grasshopper٣,٠٣,٠١ , or the latest version. |
| References |
| – Sussman, A., & Hollander, J. (2021). Cognitive architecture: Designing for how we respond to the built environment. Routledge.<br>– Nandi, C. (2021). Programming Language Tools and Techniques for Computational Fabrication. University of Washington.<br>– Horvath, J., & Cameron, R. (2015). ***3D Printing with mattercontrol***. Apress.<br>– Coates, P. (2010). ***Programming. architecture***. Routledge.<br>– Levy, H., & Eckhouse, R. (2014). ***Computer programming and architecture: the VAX***. Digital Press.<br>– Coates, P. (2010). ***Programming. architecture***. Routledge. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE351 | Building Information Modeling (BIM) | | 3 CH |
|---|---|---|---|
| Prerequisites | Digital Architecture technology 2 and History of Digital Architecture and Design - DAE252 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| The course introduces the insight and tools to plan more efficiently, design, construct, and manage buildings and infrastructure and it helps architects to develop their designs and to create, coordinate, and manage tender drawings. Students will learn how to use one of BIM applications to develop the schematic design and to generate its tender documents. Application will be on moderate scale architecture projects such as administration building, clubhouse, small MPUs and similar projects. |
| Laboratory |
| – Outodesk Rivet 2023 or the latest version. |
| References |

- Asterios Agkathidis, Al-Assisted Architectural Design: Generative Form-Finding Methods By Using Al-2024
- Leite, F. L. (2019). BIM for design coordination: A virtual design and construction guide for designers, general contractors, and MEP subcontractors. John Wiley & Sons.
- De Wilde, P. (2018). ***Building performance analysis***. John Wiley & Sons.
- Sacks, R., Eastman, C., Lee, G., & Teicholz, P. (2018). BIM handbook: A guide to building information modeling for owners, designers, engineers, contractors, and facility managers. John Wiley & Sons.
- Borrmann, A., König, M., Koch, C., & Beetz, J. (2018). ***Building information modeling: Why? what? how?*** (pp. 1-24). Springer International Publishing.
- Hardin, B., & McCool, D. (2015). BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE352 | Architectural Computational Design | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course aims to equip architecture students with the knowledge and skills necessary to use computational tools and digital technologies to enhance and analyze architectural designs. It focuses on parametric modeling and computational algorithms, such as genetic algorithms and multi-objective search, to develop innovative and sustainable design solutions. The course addresses the structural and energy performance analysis of architectural elements, integrating digital fabrication techniques like 3D printing and CNC to transform digital models into executable designs. Additionally, it highlights the use of big data and algorithms to analyze trends and predict design needs, with a strong emphasis on energy and resource efficiency. The course includes practical projects that enable students to integrate these tools into the architectural design process, fostering creative thinking and interdisciplinary analysis to achieve optimal architectural performance.

References

Menges, A., & Ahlquist, S. (2011***). Computational design thinking: computation design thinking***. John Wiley & Sons.
Tedeschi, A., & Wirz, F. (2014). ***AAD_Algorithms-Aided Design: Parametric Strategies Using Grasshopper.***
Harmon, B. (2024). ***Computational Design for Landscape Architects***. Taylor & Francis.
Kyratsis, P., Manavis, A., & Davim, J. P. (Eds.). (2023). ***Computational design and digital manufacturing.*** Springer.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE353 | AI in Architecture Design | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | - | 3 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Introduction to AI, Data acquisition, Architecture Design and AI, AI Urbanism, AI for Building Design issues. Digital revolution and AI challenges

**Laboratory**

- AI-Aided Design for Architects
- Rhino ٨- Rhinoceros 3D. or the latest version
- Adobe Grasshopper٣،٠٣،٠١ , or the latest version

**References**

Agkathidis, A., Song, Y., & Ioanna, S. (2024). ***AI-Assisted Design: Utilising artificial intelligence as a generative form-finding tool in architectural design studio teaching***.
livrepository.liverpool.ac.uk
Komatina, D., Miletić, M., & Mosurović Ružičić, M. (2024). ***Embracing Artificial Intelligence (AI) in Architectural Education: A Step towards Sustainable Practice?.*** Buildings, 14(8).
Leach, N. (2021). ***Architecture in the age of artificial intelligence.*** torrossa.com

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE354 | Parametric Design Studio | | 3 CH |
|---|---|---|---|
| Prerequisites | Digital Architecture technology 2 - DAE252 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |

| | | |
|---|---|---|
| 2 | - | 2 |
| Required SWL | | Equivalent ECTS |
| 150 | | 6 |

Course Content

Parametric Modeling, algorithms, generative systems, form finding, performance-based evaluation, scripting, analysis tools, optimization methods, digital fabrication, parametric tools such as Rhino, Grasshopper.

Laboratory

- Rhino ٨- Rhinoceros 3D. or the latest version
- Adobe Grasshopper٣،٠٣،٠١ , or the latest version

References


- Jacobus, F., Carpenter, A., Loerts, R. S., Nunzio, A., & Bedeschi, F. (2023). ***Architectonics and Parametric Thinking: Computational Modeling for Beginning Design***. Routledge.
- Toker, U. (2022). Parametric Methods for Beginners: Architecture Applications. Routledge.
- Agkathidis, A. (2016). ***Generative design***. Hachette UK.
- Tang, M. (2014). Parametric building design using Autodesk Maya. Routledge.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 50% | 10% | 40% | 0% |

| | | |
|---|---|---|
| DAE451 | Digital Design & Fabrication | 3 CH |
| Prerequisites | Parametric Design Studio – DAE353 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | - | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

This course focuses on model development and introduces students to various modeling techniques and materials. It emphasizes the model's capacity to communicate design concepts at various scales and covers both physical and digital forms. The curriculum explores additive, subtractive, and casting modeling processes with various materials. Students also learn about digital manufacturing processes like milling, rapid prototyping, 3D printing, and laser cutting, where applicable. The course aims to cultivate material sensitivity and enhance students' understanding of software.

Laboratory

- Rhino ٨- Rhinoceros 3D. or the latest version
- Adobe Grasshopper٣،٠٣،٠١ , or the latest version

References

- Beorkrem, C. (2017). Material strategies in digital fabrication. Routledge.
- Johnson, J., & Vermillion, J. (2016). ***Digital design exercises for architecture students***. Routledge.
- Caneparo, L., & Cerrato, A. (2014). Digital fabrication in architecture, engineering and construction. Springer Netherlands.
- Dunn, N. (2014). Architectural Modelmaking Second Edition. Hachette UK.
- Stavric, M., Sidanin, P., & Tepavcevic, B. (2013). Architectural Scale Models in the Digital Age design, representation and manufacturing. Springer Wien NewYork.
- Mills, C. B. (2011). Designing with models: a studio guide to architectural process models. John Wiley & Sons.
- Corser, R. (2010). Fabricating architecture: selected readings in digital design and manufacturing. Princeton Architectural Press.
- Knoll, W., & Hechinger, M. (2007). ***Architectural models: construction techniques***. J. Ross Publishing.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 40% | 0% |

| DAE361 | Technical installation in buildings | | 2CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |
| Course Content | | | |
| Techniques used in technological systems in buildings (Sanitary. Water supply, alarm systems, firefighting systems, communication systems, air conditioning systems, electronic control systems), Basic concepts, materials, and technical installations with its influence on contemporary architecture and applications. | | | |
| References | | | |

- Ching, F. D., & Shapiro, I. M. (2020). *Green building illustrated*. John Wiley & Sons.
- Grondzik, W. T., & Kwok, A. G. (2019). ***Mechanical and electrical equipment for buildings***. John wiley & sons.
- Angle, J. S., Gala Jr, M. F., Harlow, D., & Lombardo, W. B. (2019). ***Firefighting strategies and tactics***. Jones & Bartlett Learning.
- Hall, F., & Greeno, R. (2017). ***Building services handbook***. Routledge.
- Sinopoli, J. M. (2009). Smart buildings systems for architects, owners and builders. Butterworth-Heinemann.
- Panchdhari, A. C. (2005). ***Water supply and sanitary installations***. New Age International.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE461 | Digital Media Studio | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

**Course Content**

Advanced projects in architectural visualization with an emphasis on the use of computer graphics animation and video production media. The workshop introduces advanced visualization software and teaches exploration of spatial expressions in motion graphics format. Students review and discuss selected literature and video materials on films.

**References**


Pallasmaa, J., & Zambelli, M. (2020). ***Inseminations: Seeds for architectural thought***. John Wiley & Sons.

Stone, R. B., & Wahlin, L. (2018). *The theory and practice of motion design: critical perspectives and professional practice*. Routledge.

Brodlie, K. W., Carpenter, L. A., Earnshaw, R. A., Gallop, J. R., Hubbold, R. J., Mumford, A. M., ... & Quarendon, P. (Eds.). (2012). ***Scientific visualization: techniques and applications***. Springer Science & Business Media.

Kerlow, I. V. (2009). ***The art of 3D computer animation and effects***. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 10% | 0% | 40% |

| DAE462 | Architectural & Urban Legislations and Sustainable | 2CH |
|---|---|---|

| Prerequisites | - | |
|---|---|---|
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

This course discusses the roles of architects, contractors, and owners in the building and construction process, focusing on professional practice codes, legislations, contracts, fees, bidding, and construction supervision. It also discusses contracting agreements, guarantees against construction, certificates for sustainable construction, and relevant legislation flaws. analyzing the types of certificates approved for sustainable construction, such as LEED or Green Pyramid, and studying the relevant legislation flaws. Case studies. Discussion of building codes and examples.

References


- Jackson, B. J. (2020). Construction management JumpStart: the best first step toward a career in construction management. John Wiley & Sons.
- Ashworth, A., & Perera, S. (2018). Contractual procedures in the construction industry. Routledge.
- Sacks, R., Eastman, C., Lee, G., & Teicholz, P. (2018). BIM handbook: A guide to building information modeling for owners, designers, engineers, contractors, and facility managers. John Wiley & Sons.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| DAE463 | Digital Marketing | 2 CH |
|---|---|---|
| Prerequisites | - | |
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 1 | 2 | - |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

Course Content

# Program 3: Communications and Computers Engineering Program

- ## Program Description

The Communication and Computer Engineering Program is where computer programming, networks, and communication engineering merges to prepare the Computer and Communication Engineer of the future.

The Communication and Computer technology program aims at providing future engineers with appropriate theoretical knowledge and technical skills to respond to professional market demands in the fields of Communication and Computer engineering technology.

- ## Career Prospects

Students who earn their CCE BSc degree gain a profound understanding of communications and Computers engineering built on a thorough background of physical science, mathematics and technology. Coursework prepares students for careers in government agencies, all local and international industries – from communication systems and computer programing and network security – or for future study in graduate schools.

- ## Relation to Sustainable Development Goals

| | | | | | |
|---|---|---|---|---|---|
| □ GOAL 1: No Poverty | □ GOAL 2: Zero Hunger | ☒GOAL 3: Good Health & Well-being | ☒GOAL 4: Quality Education | □ GOAL 5: Gender Equality | ☒GOAL 6: Clean Water & Sanitation |
| ☒GOAL 7: Affordable & Clean Energy | ☒GOAL8: Decent Work & Economic Growth | ☒GOAL 9: Industry, Innovation & Infrastructure | □ GOAL 10: Reduced Inequality | ☒GOAL 11: Sustainable Cities & Communities | ☒GOAL 12: Responsible Consumption & Production |
| ☒GOAL 13: Climate Action | ☒GOAL 14: Life Below Water | ☒GOAL 15: Life on Land | □ GOAL 16: Peace & Justice Strong Institutions | ☒GOAL 17: Partnerships to achieve the Goal | |

- ## Program Concentrations

The program qualifies graduates to work as Computers and communications engineers. The graduate can be specialized in one of the following two concentrations:

1. **Communications Engineering:** Graduates are more specialized in the design of communication engineering systems. Graduates demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks.
2. **Computers Engineering:** Graduates are more specialized in computer programing for software and hardware implementations. Graduates demonstrate additional abilities to model, analyze, design and build software engineering systems and networks.

- ## Program Competences

**According to the National Academic Reference Standards (NARS-2018), the competences for Graduates from NHADA University and all Engineering Programs, graduate must be able to (A-Level):**

1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
5. Practice research techniques and methods of investigation as an inherent part of learning.
6. Plan, supervise and monitor implementation of engineering projects.
7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

**In addition to the Competences for all Engineering Programs the Basic Electrical Engineering graduate must be able to (B-Level):**

2. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
3. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
4. Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
5. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
6. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

**In addition to the competences for all Engineering Programs (A-Level) and the competences for the Electrical Engineering Discipline (B-Level), the Communications and computers Engineering Program graduate must be able to (C-Level):**

1. Articulate the main concepts and limitations of performance of communication and computer engineering systems

| Concentration | Competence |
|---|---|
| Communication Engineering | C1a. Use the main concepts and limitations of performance of electrical communication systems and devices. |
| Computer Engineering | C1b. Relate the essential concepts and limitations of performance of computer engineering systems, networks, and devices. |

2. Establish the models, analyze them and compare between different designs of communication and computer engineering systems and utilize the software tools required to optimize their performance.

| Concentration | Competence |
|---|---|
| Communication Engineering | C2a. Model, correlate and design electrical communication engineering systems and utilize the software tools for performance optimization. |
| Computer Engineering | C2b. Categorize the types of computer engineering based models, develop the required analysis and codes for these models, then examine the systems in computer engineering and recognize the software tools required to optimize their performance. |

3. Develop the knowledge about measurement equipment, calibration and the ability to use these tools to characterize communication and computer engineering components and systems.

| Concentration | Competence |
|---|---|
| Communication Engineering | C3a. Compare and transfer the key points about measurement equipment, and grade the ability to use them to characterize components and systems in communication engineering. |
| Computer Engineering | C3b. Criticize and discover the measurement equipment, and verify the ability to use them to indicate the role of each element and component in the systems of computer engineering. |

4. Pivot the additional abilities related to the field of the concentration within communication and computer engineering as listed below:

| Concentration | Competence |
|---|---|
| Communication Engineering | C4a. Design and rewrite additional abilities to model, analyze, design, and implement communication engineering systems and networks. |
| Computer Engineering | C4b. Modify the existing algorithms, models, analysis topologies, designs, testing and validation procedures and the enhancement approaches implemented in computer engineering systems. |

- ## Graduate Attributes

The graduates from Communications and Computers program should be able to:

- Master a wide spectrum of communications and computers engineering knowledge and specialized skills, specifically in the realm of environmental aspects and sustainability and can apply acquired knowledge using theories and abstract thinking in real life situations.
- Apply analytic critical and systemic thinking to identify, diagnose and solve communications and computers engineering problems with a wide range of complexity and variation.
- Behave professionally and adhere to communication and computer engineering and sustainability ethics and standards.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Recognize his/her role in promoting the communication and computer engineering field and contribute in the development of the Communication and Computer profession and the community;
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills, and modern engineering tools necessary for communications and computers engineering practice. In addition to applying his/her own knowledge

and practical skills to create and develop communications and computers designs starting from the briefing phase till beyond the construction and operating phase.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner;
- Demonstrate leadership qualities, business and project administration and entrepreneurial skills.

## • Program Assessment Methods

Considering that the program Competencies illustrate a holistic status that would be achieved through a journey involves many different courses within different levels, and the final competence achievement can only be assessed at the end of its journey, each single competence is broken-down into measurable Learning Outcomes LOs that should be achieved in different courses. Thus, the program graduate competence may be considered as the final goal, while the courses LOs may be considered as the procedural aims/objectives.

Hence, different assessment methods are applied in program courses to assess these procedural aims/objectives. For further detail, refer to the courses' specifications and the assessment topologies can be listed as follows:

- ❖ Written Exams.
- ❖ Practical Exams.
- ❖ Oral Exams.
- ❖ Projects.
- ❖ Research.

## • Teaching and Learning Methods

The Program of Communications and Computer Engineering followed the following methods of teaching and learning to achieve the mission of the program:

1. Teaching and learning strategies in traditional education

1-1 Teaching strategies (where the faculty member is the focus)

- Lectures
- Field visit

1-2 Learning strategies (where the student is the focus)

1-2-1 Cooperative education

- Education based on group projects
- Education based on collective research

- Brainstorming

1-2-2 Interactive education strategies

- Self-study
- Reporting and research
- Problem solving
- Individual projects
- Education in experimental discovery

2- Distance teaching and learning strategies (e-learning)

- **Required Courses**
- **List of Communications and Computers Engineering Program Requirements Courses**

| Course Title | Weight | | | Contact Hours | | | | % |
|---|---|---|---|---|---|---|---|---|
| | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| University Requirements | 11 | 18 | 450 | 11 | 0 | 0 | 11 | 8% |
| Faculty of Engineering Requirements | 33 | 64 | 1600 | 24 | 17 | 10 | 51 | 23% |
| Major Requirements of Communications and Computers Engineering | 59 | 100 | 2500 | 44 | 27 | 24 | 95 | 41% |
| Minor Requirements of Communications and Computers | 41 | 68 | 1700 | 29 | 18 | 17 | 64 | 28% |
| Total | **144** | **250** | **6250** | **108** | **62** | **51** | **221** | **100%** |

- **Credit hour distribution according to NARS 2018 requirements**

| No. | Requirement | Achieved Percentage | Required Percentage (NARS2018) |
|---|---|---|---|
| 1 | Humanities and Social Sciences | 9% | 9-12% |
| 2 | Mathematics and Basic Science | 22.2% | 20-26% |
| 3 | Basic Engineering Science | 22% | 20-23% |
| 4 | Applied Engineering Sciences | 22% | 20-22% |
| 5 | Computer Science and its Applications | 10.4% | 9-11% |
| 6 | Projects and Engineering Applications | 8.2% | 8-10% |
| 7 | Specialized topics of the program | 6.2% | 6-8% |

## Major Requirements of Communications and Computers Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| BAS213 | Mathematics (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS211 |
| BAS311 | Mathematics (5) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS212 |
| CCE161 | Computer Programming | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |
| CCE211 | Electrical Circuits (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS122 |
| CCE214 | Electrical Circuits (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| CCE212 | Electromagnetic Fields | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS112, BAS122 |
| CCE251 | Logic Circuits Design | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| CCE213 | Electrical Measurements and Instrumentation | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS122 |
| CCE231 | Electronic Devices | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| CCE252 | Advanced Logic Circuits Design | 2 | 4 | 100 | 2 | 0 | 1 | 3 | CCE251 |
| CCE221 | Signal Analysis | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS211 |
| CCE215 | Modeling and System Analysis | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS211 |
| CCE321 | Electrical Communications | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE221 |
| CCE331 | Electronic Circuits | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE231 |
| CCE341 | Optoelectronics | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE231 |
| CCE351 | Computer Organization and Architecture | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE252 |
| CCE311 | Control Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE221,CCE 215 |
| CCE352 | Microprocessors and Applications | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161,CCE 351 |
| CCE332 | Digital Circuit design | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE331 |
| CCE353 | Computer Networks | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE321 |
| CCE322 | Digital Signal Processing | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE221 |
| Total | | 59 | 100 | 2500 | 44 | 27 | 24 | 95 | |

# Minor Requirements of Communications and Computers Engineering

- **Minor Requirements of Communications Engineering**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CCE361 | Data Structure and Algorithms | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE481 | Computer Vision | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| CCE451 | Computer and Network Security | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE353 |
| CCE323 | Digital Communication Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS113, CCE321 |
| CCE421 | Communication Networks | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE323 |
| CCE441 | Antenna and Wave Propagation | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE212 |
| CCE442 | Optical communication Systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE212 |
| CCE422 | Information and Coding Theory | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE323 |
| CCE443 | Microwave Devices and Circuits | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE212 |
| CCE423 | Mobile communications | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE421 |
| CCE491 | Communications and Computers Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | 101 CH. |
| CCE492 | Communications and Computers Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | CCE491 |
| | Communications Engineering Elective (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| | Communications Engineering Elective (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| | Communications Engineering Elective (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Total | | 41 | 68 | 1700 | 29 | 18 | 17 | 64 | |

- **Minor Requirements of Computers Engineering**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CCE361 | Data Structure and Algorithms | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE481 | Computer Vision | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| CCE451 | Computer and Network Security | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE353 |
| CCE362 | Database Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE161 |
| CCE461 | Big-Data Analytics | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE362 |
| CCE462 | Cloud Computing | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE353 |
| CCE463 | Operating Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE352 |
| CCE464 | Software Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE361 |
| CCE483 | Internet Of Things | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE482,CCE 362 |
| CCE465 | Data Mining | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE461 |
| CCE491 | Communications and Computers Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | ١٠ CH |
| CCE392 | Communications and Computers Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | CCE491 |
| | Computers Engineering Elective (1) | 3 | 5 | 125 | 2 | 0 | 2 | 4 | |
| | Computers Engineering Elective (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| | Computers Engineering Elective (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Total | | 41 | 68 | 1700 | 29 | 14 | 21 | 64 | |

## Elective Courses of Communications and Computers Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| **Pools of Communications Engineering Elective Courses** | | | | | | | | | |
| Communications Engineering Elective (1) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE431 | Integrated Circuits Design | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE331 |
| CCE424 | Telephony Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE321 |
| CCE425 | Acoustics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS121 |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Communications Engineering Elective (2) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE432 | VLSI Technology | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE331 |
| CCE426 | Satellite Communication | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE421 |
| CCE427 | Selected Topics in Communication Systems | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE421 |
| Communications Engineering Elective (3) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE444 | RF Integrated Circuits Design | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE331 |
| CCE445 | Photonics Micro-Systems | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE212, CCE442 |
| CCE446 | Radar Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE212, CCE441 |
| CCE447 | Bio electromagnetics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE212 |
| **Pools of Computers Engineering Elective Courses** | | | | | | | | | |
| Computers Engineering Elective (1) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE466 | Object-Oriented Programming | 3 | 5 | 125 | 2 | 0 | 2 | 4 | CCE161 |
| CCE484 | Computational Intelligence | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BAS113, CCE161 |
| CCE485 | Microcontrollers and Applications | 3 | 5 | 125 | 2 | 0 | 2 | 4 | CCE352 |
| Computers Engineering Elective (2) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE452 | Selected Topics in Computer networks and Security | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE353 |
| CCE453 | Introduction to Network Operations and Management | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE353 |
| CCE486 | Artificial Intelligence and its Applications | 3 | 5 | 125 | 2 | 1 | 1 | 4 | BAS113, CCE161 |
| Computers Engineering Elective (3) Select 3 Credit hrs. (one course) | | | | | | | | | |
| CCE467 | Selected Topics in Distributed and Mobile Computing | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE462 |
| CCE468 | Mobile and Web Application Development | 3 | 5 | 125 | 2 | 2 | 0 | 4 | CCE362 |
| CCE487 | Fundamentals of Deep Learning | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS113, CCE161 |

- **Proposed Study Plan**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 1 | | | | | | | | | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS121 | Vibration and Waves | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| | University Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| | University Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | 18 | 30 | 750 | 13 | 11 | 2 | 26 | |
| Semester 2 | | | | | | | | | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| BAS142 | Dynamics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| BAS113 | Probability and Statistics | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CCE161 | Computer Programming | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |
| - | Engineering Technology Elective | 2 | 3 | 75 | 2 | 0 | 2 | 4 | |
| - | Spatial Perception and Design Elective | 2 | 3 | 75 | 0 | 0 | 4 | 4 | |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 13 | 6 | 9 | 28 | |
| Semester 3 | | | | | | | | | |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| CCE211 | Electrical Circuits (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS122 |
| CCE212 | Electromagnetic Fields | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS112, BAS122 |
| CCE251 | Logic Circuits Design | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| CCE213 | Electrical Measurements and Instrumentation | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS122 |
| - | Structures and Properties of Materials Elective | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | University Elective (3) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | 18 | 30 | 750 | 14 | 7 | 7 | 28 | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 4 | | | | | | | | | |
| BAS213 | Mathematics (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS211 |
| CCE214 | Electrical Circuits (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| CCE231 | Electronic Devices | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| CCE252 | Advanced Logic Circuits Design | 2 | 4 | 100 | 2 | 0 | 1 | 3 | CCE251 |
| CCE221 | Signal Analysis | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS211 |
| CCE215 | Modeling and System Analysis | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS211 |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | 18 | 30 | 750 | 14 | 9 | 5 | 28 | |
| Semester 5 | | | | | | | | | |
| BAS311 | Mathematics (5) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS212 |
| CCE321 | Electrical Communications | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE221 |
| CCE331 | Electronic Circuits | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE231 |
| CCE341 | Optoelectronics | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE231 |
| CCE351 | Computer Organization and Architecture | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE252 |
| CCE311 | Control Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE221, CCE215 |
| | University Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | 18 | 30 | 750 | 14 | 7 | 7 | 28 | |

- **Communications Engineering Track**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 6 | | | | | | | | | |
| CCE352 | Microprocessors and Applications | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161, CCE351 |
| CCE332 | Digital Circuit design | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE331 |
| CCE353 | Computer Networks | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE321 |
| CCE361 | Data Structure and Algorithms | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE322 | Digital Signal Processing | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE221 |
| CCE323 | Digital Communication Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS113, CCE321 |
| - | Engineering Economy and Project Management Elective | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| Total | | 18 | 30 | 750 | 14 | 7 | 7 | 28 | |
| Semester 7 | | | | | | | | | |
| CCE491 | Communications and Computers Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | 101 CH |
| CCE481 | Computer Vision | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| CCE421 | Communication Networks | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE323 |
| CCE441 | Antenna and Wave Propagation | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE212 |
| CCE442 | Optical communication Systems | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE212 |
| - | Communications Engineering Elective (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Total | | 18 | 30 | 750 | 13 | 7 | 8 | 28 | |

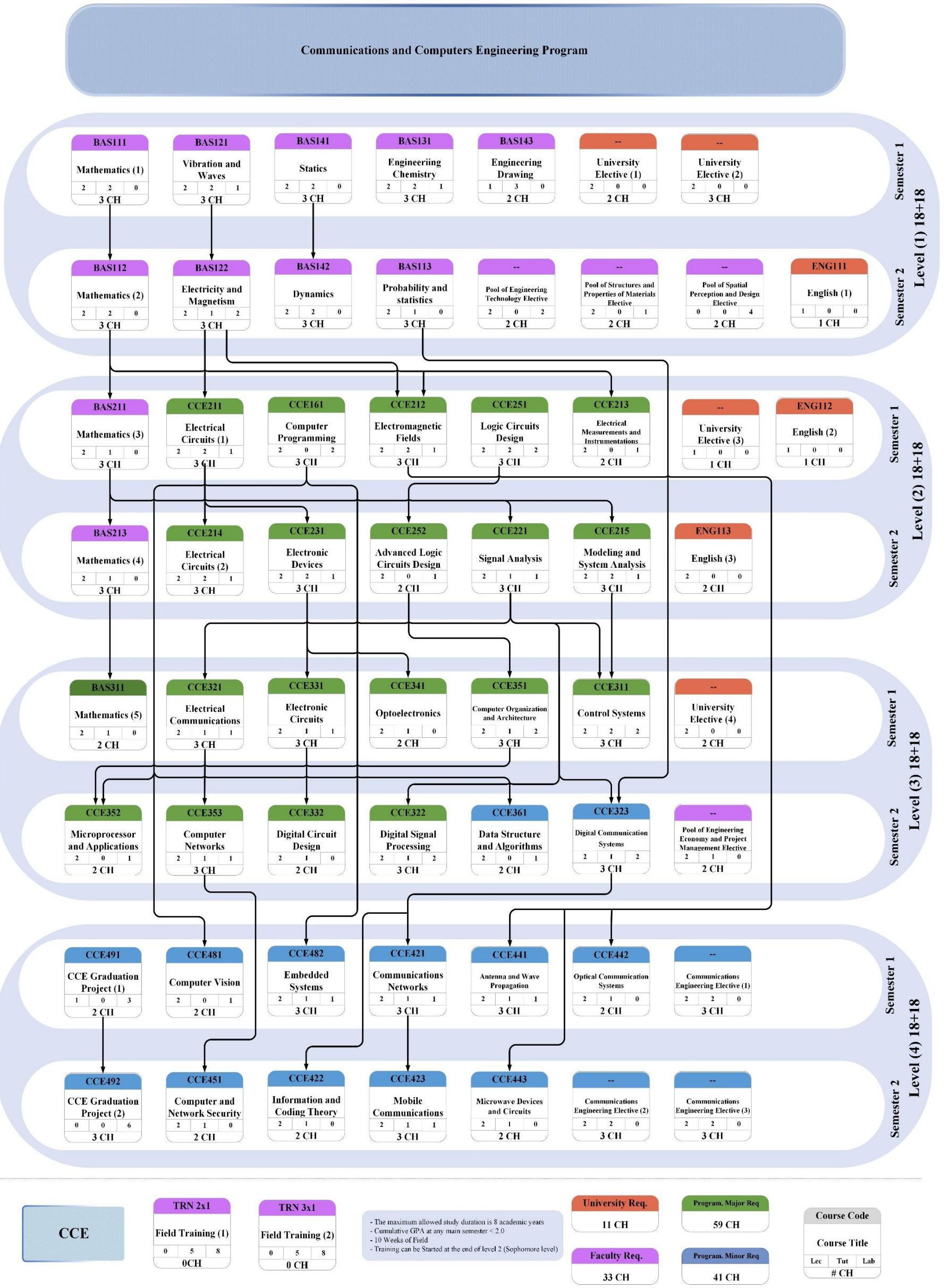
| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 8 | | | | | | | | | |
| CCE492 | Communications and Computers Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | CCE491 |
| CCE451 | Computer and Network Security | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE353 |
| CCE422 | Information and Coding Theory | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE323 |
| CCE443 | Microwave Devices and Circuits | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE212 |
| CCE423 | Mobile communications | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE421 |
| - | Communications Engineering Elective (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| - | Communications Engineering Elective (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Total | | 18 | 30 | 750 | 12 | 9 | 7 | 28 | |

- **Computers Engineering Track**

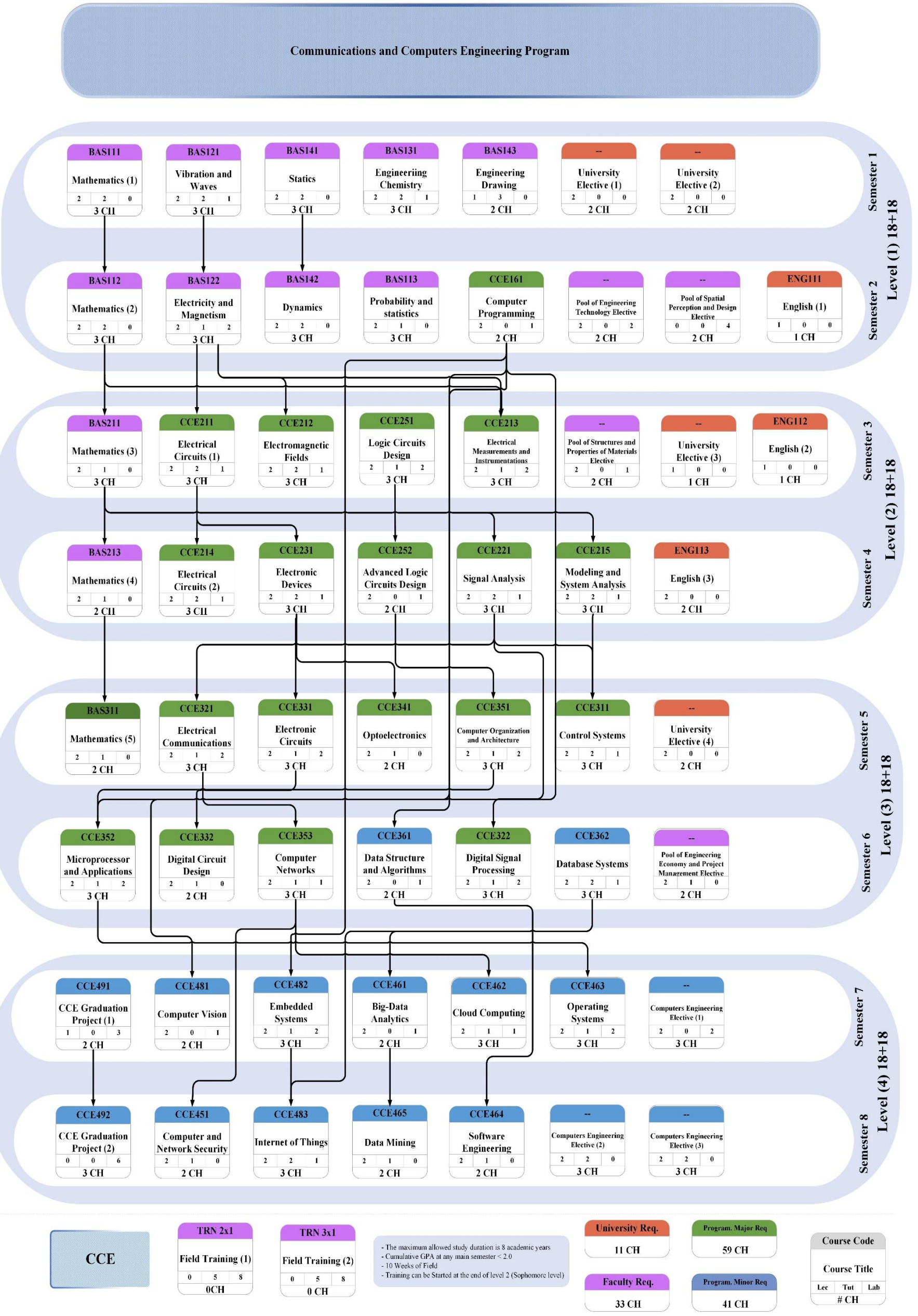
| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 6 | | | | | | | | | |
| CCE352 | Microprocessors and Applications | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161, CCE351 |
| CCE332 | Digital Circuit design | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE331 |
| CCE353 | Computer Networks | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE321 |
| CCE361 | Data Structure and Algorithms | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE322 | Digital Signal Processing | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE221 |
| CCE362 | Database Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE161 |
| - | Engineering Economy and Project Management Elective | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| Total | | 18 | 30 | 750 | 14 | 7 | 7 | 28 | |
| Semester 7 | | | | | | | | | |
| CCE491 | Communications and Computers Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | 101 CH |
| CCE481 | Computer Vision | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE161 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| CCE461 | Big-Data Analytics | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE362 |
| CCE462 | Cloud Computing | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE353 |
| CCE463 | Operating Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE352 |
| - | Computers Engineering Elective (1) | 3 | 5 | 125 | 2 | 0 | 2 | 4 | |
| Total | | 18 | 30 | 750 | 013 | 4 | 10 | 27 | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 8 | | | | | | | | | |
| CCE392 | Communications and Computers Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | CCE491 |
| CCE451 | Computer and Network Security | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE353 |
| CCE464 | Software Engineering | 2 | 3 | 75 | 2 | 1 | 0 | 3 | CCE361 |
| CCE483 | Internet Of Things | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE482, CCE362 |
| CCE465 | Data Mining | 2 | 4 | 100 | 2 | 1 | 0 | 3 | CCE461 |
| - | Computers Engineering Elective (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| - | Computers Engineering Elective (3) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Total | | 18 | 30 | 750 | 12 | 9 | 7 | 28 | |

- **Communications Engineering Track**



- **Computers Engineering Track**



# Communications and Computers Engineering Program Course Content

## Courses offered by Communications and Computers Engineering Program (CCE)

| CCE211 | Electrical circuits (1) | 3 CH |
|---|---|---|
| Prerequisites | Electricity and Magnetism – BAS122 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Current, Voltage, Power and energy, Constant and controlled current/voltage sources, Series and Parallel Circuit Analysis, DC circuits (Loop/mesh and Nodal methods), Circuit Theorems, Operational Amplifier, Capacitance and inductance, Response of First Order Circuits, Response of Second Order Circuits, alternating current, Analysis of AC circuits using Vectors, Computation of power.

**Laboratory**

- Electrical circuits Components
- Kirchhoff's Voltage Law (KVL)
- Theremins theorem
- Superposition theorem
- Measuring the impedance of R,C in AC
- RC Network as a low-pass Filter
- Project

**References**


- James M.Fiore, DC electric circuit analysis-A practical approach", Mohawk Valley community college, Libre Texts, 2020.
- Charles K. Alexander | Matthew n. o. Sadiku, Fundamentals of electric circuits, 5th edition, McGraw Hill, 2013.
- J. W. Nilsson and S. A. Riedel, Electric Circuits, Prentice - Hall, 8th. Ed., 2008.
- F. P. Yatsko and D. M. Hata, Circuits: Principles, Harcourt Brace College Publishers, 1992.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE212 | Electromagnetic Fields | | 3 CH |
|---|---|---|---|
| Prerequisites | Electricity and Magnetism – BAS122, Mathematics (2) – BAS112 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 5 | | 125 | |

**Course Content**

Vector analysis, Coulomb's law, Electric field intensity, Electric flux, Gauss's law, Divergence, Electric energy and potential, Electric conductors, Electrical resistance, Dielectric materials, Electrical capacitance, Poisson's equation, Laplace's equation. Steady magnetic fields, Ampere's law, Magnetic forces, Magnetic materials, Magnetic circuits, Inductance. Time varying magnetic fields, Maxwell's equations.

**Laboratory**

- Laboratory exercises about the basic concepts of electromagnetic.
- Problems Simulation using CAD software.

**References**

- W. Hayt and J. Buck, Engineering Electromagnetics, McGraw - Hill, 8th edition, 2012.
- Carson, D.R. and Lorrain, P. L., Introduction to Electromagnetic Fields and Waves, Literary Licensing, LLC, 2013.

**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE213 | Electrical Measurements and Instrumentation | | 3 CH |
|---|---|---|---|
| Prerequisites | Electricity and Magnetism – BAS122 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction about measurements, Errors in measurements, Statistical analysis of errors in measurements, Measurements of all electrical quantities (current, voltage, energy, and power) for dc and ac current, Measurement of resistances and capacitors, The multi-meter, The oscilloscope, Signal generators, Measurements of time period and frequency, Spectrum analyzers, Logic analyzers, Logic probe, Energy transducers (pressure, force, displacement, level, light, temperature, speed), A/D and D/A and applications, Data acquisition cards.

| Laboratory |
|---|
| • Accuracy and Precision in experimental data.<br>• Error in Measurement<br>• The voltmeter loading effect in circuits<br>• Oscilloscope operation and Basic oscilloscope measurements.<br>• Measuring frequency and phase shift with the oscilloscope.<br>• Basic function generator. |
| References |
| • Larry D. Jones and A. Foster Chin, Electronic Instruments and Measurements, Prentice - Hall International, 2nd. Ed., 1991.<br>• V. Baksh, U. A. Baksh, Electronic Instrumentation, Technical Publications, 2009.<br>• Klaas B. Klaassen, Electronic Measurement and Instrumentation, Cambridge Univ. Press, 1999.<br>• M. M. S. Anand, Electronic Instruments and Instrumentation technology, PHI Learning Pvt. Ltd, 2004. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Student Activities | Student Activities | Student Activities |
| 30% | 30% | 30% | 30% |

| CCE214 | Electrical circuits (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical circuits (1) - CCE211 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Network structures, Operational Amplifier, Response ofFirst Order Circuits, Response of Second Order Circuits, Three - phase Circuits, Mutual Inductance,Laplace and Fourier Transforms in Electric Circuits, Transfer Function, Two port Networks,Introduction to Frequency Selective Circuits, Fourier Series, Circuit Analysis using PSPICE simulation. |
| Laboratory |
| • Operational Amplifierdifferent applications.<br>• Two port Networks analysis<br>• Analysis using PSPICE simulation<br>• Project |
| References |
| • James M.Fiore, AC electric circuit analysis-A practical approach", Mohawk Valley community college, LibreTexts, 2020.<br>• Charles K. Alexander \| Matthew n. o. Sadiku, Fundamentals of electric circuits, 5th edition, |

McGraw Hill, 2013.
- J. W. Nilsson and S. A. Riedel, Electric Circuits, Prentice - Hall, 8th. Ed., 2008.
- F. P. Yatsko and D. M. Hata, Circuits: Principles, Harcourt Brace College Publishers, 1992.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE215 | Modeling and System Analysis | | 3 CH |
|---|---|---|---|
| Prerequisites | Mathematics (3) | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Study and analysis of continuous and discrete linear systems- State variables to represent continuous and discrete systems - Analysis of continuous and discrete linear systems using Laplace transforms - Analysis of discrete systems described by differential equations - Z-transforms and their applications in the analysis of discrete systems - Study of the signal flow curve and calculation of vector functions - Impulse response And using convolution integration to calculate the response to any input, State-space analysis, Finite state machines, Applications and case studies.

**Laboratory**

- Introduction to Matlab.
- Plotting response curves using Matlab.
- Transformation of mathematical models of dynamic systems using Matlab.
- Matlab representation of systems in block diagram form.
- Impulse response analysis of dynamic systems using Matlab.

**References**

- Signals & Systems, by Oppenheim, Willsky, Nawab (Prentice Hall), 2 edition (August 16, 1996)
- Digital Signal Processing: A Computer-based Approach, by Sanjit K. Mitra, 3-rd Edition, McGraw-Hill,2005
- S. Engell, G. Frehse, and E. Schnieder (Eds.): Modelling, Analysis, and Design of Hybrid Systems, © Springer-Verlag Berlin Heidelberg 2008. (available on ekb)
- René David and HassaneAlla: Discrete, Continuous, and Hybrid Petri Nets, Springer-Verlag Berlin Heidelberg 2010. (available on ekb)
- William S. Levine, The Control Systems Handbook: Control System Advanced Methods, CRC Press, Second Edition, 2018.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE311 | Control Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Signal Analysis, Modeling and System Analysis | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Block diagram representation of physical control systems. Introduction to feedback control systems. Characteristics of closed loop systems. Introduction to discrete event control systems. Obtainment of transfer functions along with illustrative examples. Block diagram reduction. Signal flow graphs. Performance of control systems. Time response of first and second order systems and response specifications. Identification of systems from time response. Static error analysis. Classical controllers: P, PI, PD, PID. Routh method for stability analysis. Root locus. Frequency response. State space representation in canonical forms. Introduction to digital control systems. Model of the sampling process. Z-transform.

Laboratory

References


- Ajit k. Mandal, Introduction to Control Engineering – Modeling, Analysis and Design, New Academic Science; 3rd edition. March 15, 2016.
- Roland S. Burns, Advanced Control Engineering, Elsevier Ltd, 2011.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE221 | Signal Analysis | | 3 CH |
|---|---|---|---|
| Prerequisites | Mathematics (4) | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Signals and systems: continuous - time and discrete - time, elementary signals, basic system properties. Linear Time Invariant Systems: continuous - time and discrete - time convolution, system properties. Fourier series representation of periodic signals: continuous - time and discrete - time. Continuous - time and discrete - time Fourier transforms and their properties. Frequency response of LTI systems. Sampling of continuous - time signals. Laplace transform and its properties.

Laboratory

- Basic signals and time - transformations.
- Linear time - invariant systems and convolution.
- Fourier series analysis and synthesis.
- Fourier transform and its properties.
- Magnitude and phase frequency responses of LTI systems.
- Sampling and aliasing.

References

- A. Oppenheim and A. Willsky, Signals and Systems, Prentice Hall, 2nd. Ed., 1997.
- John R. Buck, Computer Explorations in Signals and Systems Using MATLAB, Prentice Hall, 2nd. Ed., 2002.
- M. J. Roberts, Signals and Systems: Analysis Using Transform Methods and MATLAB, McGraw-Hill, 2nd. Ed., 2012.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE321 | Electrical Communications | 3 CH |
|---|---|---|
| Prerequisites | Signal Analysis | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 2 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Communication system elements, Overview of current communication systems. Communication channels properties. Basics of analog communication: amplitude, angle, frequency and analog pulse modulation; frequency division multiplexing. Basics of digital communication: sampling, quantization, pulse code modulation, Delta Modulation, Differential PCM, time division multiplexing, binary signal formats. Digital carrier modulation: ASK, PSK, FSK and QAM. Multiple - access techniques.

Laboratory

- Communication channels.
- Amplitude modulation.

- Frequency and phase modulation.
- Phase locked loop.
- Sampling and TDM.
- Digital carrier modulation.

References

- Simon Haykin and M. Moher, Communication Systems, John Wiley and Sons, Inc., 5th. Ed., 2009.
- Z. Ding and B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, 5th. Ed., 2019.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE322 | Digital Signal Processing | | 3 CH |
|---|---|---|---|
| Prerequisites | Signal Analysis | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Z - transform: ROC and properties. Transform analysis of LTI systems: system function and frequency response, linear - phase, minimum - phase and all - pass systems. Structures for discrete - time systems: basic IIR and FIR structures. Filter design techniques: filter specifications, IIR design, FIR design. Discrete Fourier Transform: sampling of the Fourier transform, properties of the DFT, circular convolution, linear convolution using DFT, FFT. Spectral analysis using DFT. Adaptive filters: LMS, RLS

Laboratory

- Introduction to Filter Design and Analysis Tool.
- Pole - Zero editing: effect on transfer function.
- Linear - phase, minimum - phase and all - pass systems.
- FIR and IIR filter design.
- DFT and FFT.
- Spectral analysis.
- Adaptive filter.

References

- Oppenheim and R. Schafer, Discrete - Time Signal Processing, Pearson, 3rd. Ed., 2010.
- John R. Buck, Computer Explorations in Signals and Systems Using MATLAB, Prentice Hall, 2nd. Ed., 2002.
- L. Tan and J. Jiang, Digital Signal Processing: Fundamentals and Applications, Academic Press, Elsevier, 3rd. Ed., 2019

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE323 | Digital Communication Systems | 3 CH |
|---|---|---|
| Prerequisites | Electrical Communications – CCE321, Probability and Statistics – BAS113 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Random processes: Gaussian process, narrow - band noise. Baseband pulse transmission: matched filter, inter - symbol interference. Signal space analysis: correlation receiver, probability of error. Performance of digital carrier modulation schemes. Spread - spectrum modulation. Multi - carrier modulation: OFDM. Fundamentals of information theory: source coding, channel capacity. Basic error - control coding.

**Laboratory**

- Random processes.
- Baseband pulse transmission.
- Matched filter and correlation receiver.
- Phase and timing recovery.
- OFDM.
- Error correction coding.

**References**


- Simon Haykin, Digital Communication Systems, John Wiley and Sons, Inc., 1st. Ed., 2013.
- Sklar, Digital Communications: Fundamentals and Applications, Prentice Hall, 2nd. Ed., 2001.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE421 | Communication Networks | 3 CH |
|---|---|---|
| Prerequisites | Digital Communication Systems – CCE323 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Introduction to telecommunication networks, Network topology, switching: Telegraph, Telephone, Telex, Data, Signaling, ISDN, Broad band, Private switching. Management network multiplexing: Analog, Digital, Wavelength division. Data transmission interface equipment: Modems, Digital data interface equipment. Codecs: Audio, Video. Copper lines: Open wire, Twisted pair cable, Coaxial cable. Optical fiber technology: Types of optical fibers, Cables, Wavelength Division Multiplexing in optical networks, Applications, Radio relay technology, Systems. Mobile radio: Service mode technology. Satellites: Services, Technology, Digital subscriber lines.

Laboratory

- Introduction to Networks lab
- Cabling & Packet Sniffing
- Network Devices & Packet Tracer
- Basic Device Configuration
- Basic Network Operation and Troubleshooting
- Address Subnetting
- VLSM & Route Summarization
- ATM NETWORKS
- ATM LAYERING
- ATM CELL SIMULATION
- Creating a simple wireless scenario.
- Creating random traffic-pattern for wireless scenario.
- Creating a simple wired and wireless scenario.
- Running MobileIP in a simple wired and wireless topology

References

- Computer Networks", Andrew S. Tanenbaum, 4th ed., Prentice Hall
- Data And Computer Communications", William Stallings, 8th ed., Prentice Hall

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE422 | Information and Coding Theory | 3 CH |
|---|---|---|
| Prerequisites | Digital Communication Systems – CCE323 | |

Number of weekly Contact Hours

| Lecture: 2 | Tutorial: 1 | Laboratory: 0 |
|---|---|---|
| 2 | 1 | 0 |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

Course Content

Uncertainty, information and uncertainty scale at Shannon -Source code: Characteristics of source codes: Codes, instantaneous code, Kraft's inequality, Huffman, and Fano codes- memoryless discrete channels- mutual information- Information channel modeling: model of binary symmetric channel. Shannon theorem for channel capacity. Error detection and correction: Linear block codes- Syndrome calculation- cyclic code - convolutional codes- Code tree and trellis diagram- Decoding: Viterbi algorithm.

Laboratory

References

- J. S. Chitode,"Information Theory and Coding: Information, Source Coding andChannel Coding", 2020.
- OrhanGazi,"Forward Error Correction via Channel Coding", 2019.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE423 | Mobile Communications | 3 CH |
|---|---|---|
| Prerequisites | Communication Networks - CCE421 | |

Number of weekly Contact Hours

| Lecture: | Tutorial: | Laboratory: |
|---|---|---|
| 2 | 2 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Introduction to mobile cellular systems. Radio Resource management - Small and large-scale fading. The GSM system: GSM Network Architecture, GSM Air Interface, GSM Network Protocols. CDMA system: CDMA modulation and demodulation, CDMA air links, types of codes in CDMA, power control in CDMA. UMTS Evolution & Air interface, UMTS Network, UMTS Protocol Stack &Physical layer processing. LTE Network Structure, LTE Air interface, LTE Protocol stack & Physical Layer, LTE Planning.

Laboratory

Derive Test Using TEMS Investigation, Planning using ATOLL.

- Single Site Verification test, Cluster Test, Main Road Test, Benchmarking Test, SWAP test.
- 2G Problems: Cross sector, Cross feeder, HO Failures, Missing Neighbors, dropped calls, blocked calls, Overshooting, Hardware problem using TEMS software.
- 3G Problems: Cross sector, Cross feeder, Missing Neighbors, Pilot Pollution using TMES software.
- Introduction to 4G Planning using ATOLL software.

References

- RajibTaid,"Mobile Communications Systems Development: A Practical Introduction to System Understanding, Implementation and Deployment", 2021.
- Simon, M., "Digital communication over fading channels: a unified approach to performance analysis", 2000.
- Gordon L. Stüber,"Principles of Mobile Communication", 2017.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE424 | Telephony Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Communications – CCE321 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction to telephone networks - Pulse code editing - Digital synchronous sequence - AXE digital switch - ISDN - Asynchronous transfer mode - Broadband ISDN. PCM and TDM applications - Electronic switching systems. Signaling system protocol #7. Data communication over PSTN: digital subscriber line technology. ISDN service. Introduction to VoIP Telephony. Traffic analysis: Traffic intensity, grade of service, traffic distributions, applications of the Erlang - B formula in sizing the switch components.

**Laboratory**

- Structure of public switched telephone network
- PCM applications T and E carrier systems.
- TDM applications T and E carrier systems.
- Examples to apply Signaling system protocol #7
- Apply Data communication over PSTN: digital subscriber line technology.
- ISDN service
- VoIP Telephony

**References**


- P. Gnanasivam, Traffic System Design Handbook, New Age International Publishers, 1st. Ed., 2005.
- James R. Boucher, Traffic System Design Handbook, Telecommunications Handbook Series, IEEE Press, New York, 1993.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE425 | Acoustics | | 3 CH |
|---|---|---|---|
| Prerequisites | Vibration and Waves – BAS121 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to acoustics, One dimensional plane, spherical and cylindrical sound waves, Transmission, reflection and absorption of incident plane sound waves, Vibrating strings, Vibrating bars, Membranes and plates, Pipes waveguides and resonators, Fundamentals of room acoustics, Acoustic ducts and filters, Sound absorption and sound absorbers, Sound measuring Instruments, Physiology of hearing, Architectural acoustics, Walls enclosures and barriers, Underwater acoustics, Microphones, Radiation patterns for microphones, Loudspeakers.

Laboratory

References

- Michael Moser, Engineering acoustics: an introduction to noise control, Springer, 2004.
- Floyd Toole, Sound reproduction, Loudspeakers, and rooms, Focal Press, 2008.
- Daniel R. Raichel, The science and application of acoustics, Springer, 2000.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE426 | Satellite Communication | | 3 CH |
|---|---|---|---|
| Prerequisites | Communication Networks - CCE421 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| ٢ | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

An overview of satellite communication systems. Orbital concepts: Orbital parameters, geostationary orbits, low earth and medium earth orbits. System components: The space Link, space and earth segments. Earth stations technology. Space link (uplink and downlink) analysis. Frequency division multiple - access, time division multiple - access, and code division multiple - access. Packet switching in satellite systems. Examples of satellite communication systems.

Laboratory

| References | | | |
|---|---|---|---|
| • Dennis Roddy, Satellite Communications, Barnes and Noble, 4th. Ed., 2006.<br>• Maral and Bousquet, Satellite Communications Systems: Systems, Techniques and Technology, John Wiley, Inc, 5rd. Ed., 2020. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE427 | Selected Topics in Communication Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| Selected topics in recent directions and advances in communication systemswill be presented in this course. Course material will reflect the needs of the graduating students. | | | |
| Laboratory | | | |
| | | | |
| References | | | |
| • Periodicals and Journals in Communications | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE231 | Electronic Devices | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Circuits (1) - CCE211 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| The course presents PN junction diodes, special diodes, diode circuits applications, rectifiers, and peak detectors - Bipolar junction transistors (BJT), dc models, modes of operation, bias and stabilization, graphical analysis, small-signal ac models - Junction field-effect transistors (JFETs). Metal oxide semiconductor field-effect transistors (MOSFETs), dc models, modes of | | | |

operation, bias and stabilization, small signal ac models, and amplifier configurations. Logic circuits: BJT logic families, construction, properties, speed, and applications.

Laboratory

- Circuit Connection Revision (using the instrument in measuring with connecting resistive elements)
- PN junction characteristics, and Diode circuits
- Applied Diodes Applications, and Zener Applications
- BJT characteristics and DC analysis
- BJT AC analysis
- JFET characteristics, JFET DC - AC analysis
- MOS characteristics, MOS DC - AC analysis

References

- Floyd, Thomas L., and David Buchla. Electronics Fundamentals: Circuits, Devices & Applications, 9th Edition. Prentice Hall Press, 2021.
- Razavi, Behzad. Fundamentals of microelectronics, 3rd Edition. John Wiley & Sons, 2021.
- Sedra, Adel S., and Kenneth Carless Smith. Microelectronic circuits: theory and applications, 8th Edition. Oxford University Press, 2019.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE331 | Electronic Circuits | 3 CH |
|---|---|---|
| Prerequisites | Electronic Devices - CCE231 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 2 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

The course presents small geometry effects in MOSFETs. BJT and MOS analog multipliers - Oscillators and waveform shaping - linear oscillators, nonlinear oscillators and multivibrators, MOS - C continuous time filters, switched - C filters - current conveyors and current feedback amplifiers - Voltage references - Data converters. Phase locked loops.

Laboratory

- Electronic devices Revision.
- Current conveyor, and CFOA.
- Passive (low and high pass filter) Filter circuits.
- Active (low and high pass filter) Filter circuits.
- MOS-C Filter, Switched Capacitor response.
- Oscillator circuits (applied BJT oscillator analysis, and applied MOS oscillator analysis).
- Wave Function Generator analysis (multivibrators analysis).

- Phase-Locked Loop analysis.

References


- Floyd, Thomas L., and David Buchla. Electronics Fundamentals: Circuits, Devices & Applications, 9th Edition. Prentice Hall Press, 2021.
- Razavi, Behzad. Fundamentals of microelectronics, 3rd Edition. John Wiley & Sons, 2021.
- Sedra, Adel S., and Kenneth Carless Smith. Microelectronic circuits: theory and applications, 8th Edition. Oxford University Press, 2019.
- Wade, Jessica, Joseph Razzell Hollis, and Sebastian Wood. Printed Electronics. IOP Publishing, 2018.
- Boylestad R. L., &Nashelsky L, Electronic Devices and Circuit Theory,11thEdition, Pearson Prentice Hall, 2008.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE332 | Digital Circuit design | 2 CH |
|---|---|---|
| Prerequisites | Electronic Circuits – CCE331 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 0 |

| Required SWL | Equivalent ECTS |
|---|---|
| 100 | 4 |

Course Content

The course presents CMOS Inverter: Noise margin, Propagation delay, Power dissipation, CMOS combinational circuits: Static design, pass transistors and transmission gates, Dynamic design, CMOS sequential circuits: Latches, Flip- flops, Counters, Monostable Ring oscillator, Random Access Memory RAM, Read Only Memory ROM, Emitter Coupled Logic ECL, Bi CMOS circuits.

Laboratory

References


- Li, Y. Computer Principles and Design in Verilog HDL. Chichester, UK: John Wiley & Sons, Ltd. 2015.
- Floyd, Thomas L., and David Buchla. Electronics Fundamentals: Circuits, Devices & Applications, 9th Edition. Prentice Hall Press, 2021.
- Razavi, Behzad. Fundamentals of microelectronics, 3rd Edition. John Wiley & Sons, 2021.
- Sedra, Adel S., and Kenneth Carless Smith. Microelectronic circuits: theory and applications, 8th Edition. Oxford University Press, 2019.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE431 | Integrated Circuits Design | | 3 CH |
|---|---|---|---|
| Prerequisites | Electronic Circuits – CCE331 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Integrated circuits trends and implementation methodologies - MOS inverters, inverters switching characteristics, MOS logic gates circuits, Digital circuit synthesis, clocking and timing, interconnects issues, power dissipation, combinational and sequential MOS logic circuits. Memories and array circuits, low power design, packaging, power and I/O issues. Testing and design for testability methodologies and tools. Full - custom IC design project. Introduction to VHDL and FPGAs language.

**Laboratory**

- Circuit simulation by Hspice
- Circuit Layout & Verification (Process & layout)
- Circuit Layout & Verification (Layout environment & tool)
- Circuit Layout & Verification (Verification environment & tool)
- One-Bit Mirror Adder Design
- Bit Accumulator Design
- MOSFET simulation (Hspice overview)
- MOSFET simulation (MOSFET circuit simulation)
    - VLSI circuit simulation (Combinational logic circuits)
- VLSI circuit simulation (Sequential logic circuits)

**References**

- Karim Abbas, Handbook of Digital CMOS Technology, Circuits, and Systems, Springer, Jan 14, 2020
- Udit Kumar , Aditya Gupta, et al, The VLSI Handbook: Design Principles, Industry and Career Perspectives, Jul 7, 2021
- N. H. E. Weste and D. Harris, CMOS VLSI Design: A Circuits and Systems Perspective, Addison - Wesley, 3rd. Ed., 2004.
- J.M. Rabaey, A. Chandrakasan, B. Nikolic, Digital Integrated Circuits, Prentice hall, 3rd Ed., 2007.
- S. Kang, Y. Leblebici, CMOS Digital Integrated Circuits: Analysis and Design, McGraw Hill, 3rd. Ed.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE432 | VLSI Technology | | 3 CH |
|---|---|---|---|
| Prerequisites | Electronic Circuits – CCE331 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to VLSI technology, future trends and technology limitations. Basic technology modules include crystal growth and wafer preparation; mask generation techniques; lithography; diffusion process; ion implantation; oxidation; etching techniques - wet etching and plasma etching; thin film deposition - epitaxial growth, chemical vapor deposition techniques, metallization; clean room technology; Advanced process integration for CMOS, Bi-CMOS, and Bipolar fabrication; Failure analysis techniques. Advanced packaging techniques.

References


- Taur, Yuan, and Tak H. Ning. Fundamentals of modern VLSI devices. Cambridge University Press, 2021.
- Plummer, James D. Silicon VLSI technology: fundamentals, practice, and modeling. Pearson Education India, 2009.
- Wolf, Wayne. Modern VLSI Design: IP-Based Design (paperback). Pearson Education, 2008.
- Widmann, Dietrich, Hermann Mader, and Hans Friedrich. Technology of integrated circuits. Vol. 2. Springer Science & Business Media, 2000.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE341 | Optoelectronics | | 2 CH |
|---|---|---|---|
| Prerequisites | Electronic Devices - CCE231 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

| |
|---|
| Light-matter interaction, 3-level and 4-level lasers, Gain coefficient, Gain saturation, Fabry-Perot resonators, Photons in semiconductors, Heterojunctions, Double-heterostructure semiconductor lasers, Single- and multiple-quantum well lasers, DFB and DBR lasers, FP and travelling wave semiconductor optical amplifiers, Erbium dopedfiber amplifiers, Light emitting diodes, Laser and LED dynamics, PIN and APD photodetectors. |
| References |
| • B. Saleh, M. Teich, Fundamentals of Photonics, 3rd Edition, Wiley, 2019.<br>• A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, 6th Edition, 2006. |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| | | |
|---|---|---|
| CCE441 | Antenna and Wave Propagation | 3 CH |
| Prerequisites | Electromagnetic Fields – CCE212 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| ٢ | 2 | ١ |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| Wave propagation: ground, direct and sky waves, Antenna types, Antenna parameters, Wire antennas, Loop antennas, Rectangular and circular apertures antennas, Reflector antennas, Microstrip antennas, Broadband antennas, Antenna arrays. |
| Laboratory |
| • Exploring Spectrum<br>• S- Parameter Measurement<br>• Antenna Diversity<br>• Dipole Antennas<br>• 8 volt Antenna Measurement System Manual<br>• Aperture Antennas<br>  • Folded Dipoles and Yagis<br>  • Microstrip antenna. |
| References |
| • Antenna Theory, Balanis, third edition.<br>• Antenna Engineering Handbook - 3ed – Johnson. |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE442 | Optical communication Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Communication Networks - CCE421, Electronic Devices - CCE231 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Physics of optical communication components and applications to communication systems. Ray representation in optical fibers. Topics include fiber attenuation and dispersion. Optical properties of semiconductors Emitters: laser diodes and light emitting diodes. Photo detectors: PIN and avalanche photo diode (APD).

References


- John M. Senior, "Optical Fiber Communications, Principles and Practice" Third Edition, Prentice Hall, 2009.
- Kumar, S. and Deen, M J.: Fiber Optic Communication Systems, Wiley 2014. Note: available as an e-book.
- Agrawal, G.: Fiber-Optic Communication Systems, 4th Ed., Wiley 2010


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE443 | Microwave Devices and Circuits | | 3 CH |
|---|---|---|---|
| Prerequisites | Electromagnetic Fields – CCE212 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Electromagnetic fields in media and boundary conditions,Wave equation and basic plane wave solutions,Transmission line theory, Smith chart,Waveguides, Microwave network analysis, Matching networks, Filter design, Amplifier design. Microwave active devices: Klystrons, Travelling Wave tubes, Magnetrons, Tunnel diodes, Transferring electron devices IMPATT, TRAPATT, BARITT.

Laboratory

| References | | | |
|---|---|---|---|
| • David Pozar, Microwave Engineering, 4th edition, John Wiley & Sons, 2012.<br>• Samuel Y. Liao, Microwave Devices and Circuits, Publisher: Pearson India, 2000 | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE444 | RF Integrated Circuits Design | | 3 CH |
|---|---|---|---|
| Prerequisites | Electronic Circuits – CCE331 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |
| Course Content | | | |
| Introduction to communication circuits design - two-port circuits - review of resonance circuits - introduction to transmission line theory - frequency response of the transmission lines - S-parameters - design of periodic structure filter networks - Smith chart - power gain and stability of two-port networks - matching networks design - effect of noise on the feedback - noise in communication systems - electrical noise - calculation of noise of the two-port networks - design of low noise amplifiers - design of power amplifiers - modulation and transmission circuits - transmitters and mixers circuits - oscillators analysis in case of stability - negative resistance oscillators - differential oscillators - voltage controlled oscillators. | | | |
| Laboratory | | | |
| | | | |
| References | | | |
| • Thomas H. Lee, The Design of CMOS Radio-Frequency Integrated Circuits, 2nd edition, 1998.<br>• BehzadRazavi, RF Microelectronics, 2nd Edition, Pearson<br>• Tony Chan Carusone, David Johns, Kenneth Martin, analog Integrated Circuits, 5th Edition, Wiley. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE445 | Photonics Micro-Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Electromagnetic Fields – CCE212,<br>Optical Communication Systems – CCE442 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Symmetric and asymmetric single mode dielectric waveguide, 2D waveguide and the effective index method, propagation in Multimode guide, the Multimode interference MMI structures, Integrated optics IO splitters and directional couplers, IO filters and multiplexers, MEMS technology, Micro-mirrors and micro-lenses, Optical MEMS switches, Fibre lens, Variable optical attenuators, Multilayer filter design, Tuneable MEMS filters.

**Laboratory**

**References**


- Solgaard Photonic microsystems: Micro and nanotechnology applied to optical devices and systems. Springer Science & Business Media; 2009.
- Garmire E, Hammer JM, Kogelnik H, Zernike F. Integrated optics. Springer Science & Business Media; 2013.
- Reed GT, Knights AP. Silicon photonics: an introduction. John Wiley & Sons; 2004.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE446 | RADAR Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Electromagnetic Fields – CCE212, Antenna and Wave Propagation – CCE441 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Fundamental components of radar systems and its applications. Radar range equation. Radar Parameters. Radar cross - section predictions and fluctuations. Noise and clutter. Probability of detection and false alarm. Pulsed and SFCW radar systems. FMCW radar systems. MTI Radars. Doppler radar. Radar antennas. Phased Arrays. Basic radar measurements.

| Laboratory |
|---|
| • Explaining components of radar systems.<br>• Radar range equation: Low PRF Radar Equation (using MATLAB).<br>• Low PRF Radar Equation (using MATLAB).<br>• Surveillance Radar Equation (using MATLAB).<br>• Radar Equation with Jamming (using MATLAB):<br>1. Self-Screening Jammers (SSJ).<br>2. Burn-Through Range.<br>3. Stand-Off Jammers (SOJ)<br>• Radar Cross Section (RCS) (using MATLAB):<br>1. RCS Dependency on Aspect Angle and Frequency.<br>2. RCS Dependency on Polarization.<br>3. RCS of Simple Objects.<br>4. RCS Prediction methods.<br>• Pulsed and Continuous Wave (CW) Radars, Range, Range Resolution, Doppler Frequency.<br>• Radar Losses, Transmit and Receive Losses, Antenna Pattern Loss and Scan Loss, Processing Loss.<br>• FM radar systems, MTI Radars. |
| References |
| • M. Skolnik, Introduction to Radar Systems, McGraw - Hill, 3rd. Ed., 2001.<br>• BassemMahafza, Radar Signal Analysis and Processing Using Matlab, Chapman and Hall/CRC, 2008. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE447 | Bioelectromagnetics | | 3 CH |
|---|---|---|---|
| Prerequisites | Electromagnetic Fields – CCE212 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Fundamentals of electromagnetics - Penetration of RF/microwaves into biological tissues -Skin effect - The near field of an antenna - RF/Microwave interaction mechanisms in biological materials - Effects of radio frequency fields on the nervous system, the brain and spinal cord, the blood-brain barrier, and cells and membranes - Thermal therapy - Dielectric and inductive heating - EM-Wave protecting absorbers - Ferrite absorbers - RF/Microwave Delivery Systems for Therapeutic Applications. |

| Laboratory |
|---|
| |

| References |
|---|
| • Cynthia Furse, Douglas A. Christensen, Carl H. Durney, James Nagel (2019). Basic introduction to bioelectromagnetics. (3rded.), CRC Press.<br>• Vorst, Rosen, A., &Kotsuka, Y. (2006). RF/microwave interaction with biological tissues. John Wiley & Sons. https://doi.org/10.1002/0471752053 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE251 | Logic Circuits Design | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Number systems, conversion between different number systems. Binary operations. Boolean Algebra laws, De Morgan Laws. Logic operations, logic gates. Methods of representation of logic functions truth table, S.O.P and P.O.S. K-map realization. Minimization of multiple-output Logic Functions. Half adders. full adders/ Subtractor. Decoders and Encoders. Data selectors Multiplexer and DE multiplexers.Comparators. Project. |
| Laboratory |
| • Number System<br>• Logic gates<br>• Half Adder / Full Adder<br>• Simplification of Boolean Function using K-Map TechniquesDecoder/ Encoder<br>• MUX /De MUX<br>• Project |
| References |
| • M.V. Subramanyam, "Switching theory and logic design", Laxmi Pub., 2005.<br>• Mano, M.M &Kime,C.R, ”Logic and Computer Design Fundamentals 2nd ed., Englewood cliffs, NJ:Prentice hall,2000.<br>• Nelson, V.P, Nagel, H.T., Carroll, B.D.and Irwin, J.D.”Digital Logic Circuit Analysis and Design”, NJ: Prentice Hall,1995.<br>• Warkely, J.F, “Digital Design: Principles and Practices”2nd ed. Engel wood cliffs, NJ: Prentice Hall , 2000.<br>• Mano , M.M.” Digital Design” 2nd . |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE252 | Advanced Logic Circuits Design | | 2CH |
|---|---|---|---|
| Prerequisites | Logic Circuits Design – CCE251 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Basic latches and flip flop. Counters and shift registers. Basic PLD architects. Finite state machine design. Logic minimization and optimization using EDA tools. FPGA design. VHDL basics. Project.

**Laboratory**

- Satisfy the transition and truth table for all types of Flip Flops
- SynchronousCounter Principles design
- Shift Register Circuit Analysis and Design
- Apply logic design technique for PLD.
- Basic of VHDL hard ware language.
- Project

**References**


- M.V.Subramanyam, "Switching theory and logic design", Laxmi Pub., 2005.
- Mano, M.M&Kime,C.R, ”Logic and Computer Design Fundamentals 2nd ed., Englewood cliffs, NJ:Prentice hall,2000.
- Nelson,V.P,Nagel,H.T.,Carroll,B.D.and Irwin,J.D., ”Digital Logic Circuit Analysis and Design”,NJ: Prentice Hall,1995.
- Warkely,J.F , “Digital Design: Principles and Practices”2nd ed. Engel wood cliffs, NJ: Prentice Hall ,2000.
- Volnei A. Pedroni, "Circuit design with VHDL", 2004 MassahusettsInstitue of technology.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE351 | Computer Organization and Architecture | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Logic Circuits Design – CCE252 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |

| 125 | 5 |
|---|---|

**Course Content**

The course presents Von Newman and Harvard Architectures, Computer arithmetic, Design of ALU and pipelined processor, Control unit, Instruction repertoires (RISC, CISC), RAM access, Interrupt circuits, Bus synchronization, I/O devices, Channels, Memory architectures, Connection of computer peripherals, large computer systems (parallel processing, array processors, interconnect networks, multiprocessors).

**Laboratory**

- Introduction to programming concept, and assembly language.
- Demonstrates the use of the LODS and STOS instruction to convert an upper-case string to its lower-case value.
- Explaining SMPCACHE simulator.
- Influence of cache coherence protocols.
- Influence of mapping, and word wide.
- Influence of numbers of words by block (block size).
- Influence of numbers of cache sets (for set-associative caches).
- Influence of replacement policies.
- Influence of cache size (blocks in cache).
- Influence of schemes for bus arbitration.
- Influence of number of processors

**References**


- William Stallings, Computer Organization and Architecture, 10th edition Prentice Hall, 2016.
- D.A. Patterson, J.L. Hennessy. Computer Organization and Design, The Hardware-Software Interface, Fifth Edition
- Hamachi, carl, Computer organization and embedded systems. 2012.
- V. Rajaraman and T. Radhakrishnan, Computer Organization & Architecture, PHI Learning Private Limited, New Delhi, 2007.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE352 | Microprocessors and Applications | | 3 CH |
|---|---|---|---|
| Prerequisites | Computer Programming – CCE161, Computer Organization and Architecture – CCE351 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

This course is an introduction to microprocessor and microcontroller hardware and software. Assembly language instructions and programming, troubleshooting, and input/output techniques are studied. Computer-based program editing, and assembly techniques are used. Students practice with laboratory applications.

Laboratory

- Introduction to Microprocessor and Basic Setup
- Basic Programming in Assembly Language
- Register Transfer and Micro Operations
- Using the ALU and Basic Input/Output Operations
- Digital Components and BUS Systems
- Timer and Interrupt Programming
- Serial Communication Interfaces
- ADC and DAC Implementations
- Implementing PWM for Motor Control
- Embedded Project Development and Debugging

References

- SearchCreators. (2023). Microcontroller and Embedded System - 21CS43: 2018-2023 Yearly Question Papers. Retrieved from http://searchcreators.org/mc_es_question_papers/.
- Hossain, M. S., & Ali, A. M. (2020). Real-time power theft monitoring and detection system with Arduino ATMega328P microcontrollers. Energy Reports, 6, 291-296. https://doi.org/10.1016/j.egyr.2020.11.002
- EduVark. (2023). Microcontroller VTU Question Papers. Retrieved from https://eduvark.com/microcontroller-vtu-question-papers-220763.html

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE353 | Computer Networks | 3 CH |
|---|---|---|
| Prerequisites | Electrical Communications – CCE321 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Network layers (Physical layer - Data link layer - MAC Sublayer - Network layer - Transport layer - Application layer - Network security) , TCP / IP Network protocol, Routing protocols, (protocol principles- protocol verification- HDLC, and PPP), Network Design, Network Management, Congestion, Examples of LAN's and WAN's, High Speed Networks, Other Network Protocols.

| Laboratory |
|---|
| • Networks Cabling (Theoretical)<br>• Networks Cabling (Practical)<br>• IP Addressing<br>• Introduction to Packet Tracer 5.3 and Simple 5 PC's network<br>• Building a LAN with HUPs and Switches<br>• Router Configuration Using Packet Tracer 1<br>• Router Configuration Using Packet Tracer<br>• Static Route Configuration on Router-Part<br>• Static Route Configuration on Router-Part 2<br>• Standard access control list (ACL) configuration in packet tracer<br>• Extended access control list (ACL) configuration in packet tracer<br>• Wireless connection using packet tracer |
| References |
| • James F Kurose and Keith W Ross, Computer Networking:A Top-Down Approach, Seventh edition, 2016<br>• Andrew S. Tanenbaum and David Wethecall, Computer Networks, Pearson, 5th. Ed, 2010 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE451 | Computer and Network Security | | 2 CH |
|---|---|---|---|
| Prerequisites | Computer networks – CCE353 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Overview of computer and network security and methods of defense, Attacks and threats, Secure encryption systems (symmetric and public key encryption schemes, AES (advanced encryption standard), RSA standard, Security protocols (key distribution, authentication, and digital signature schemes, Software security (protection from viruses and similar programs, design of secure operating systems, database security), Network security (IP security and the IPSec protocol, firewalls, web security, electronic mail security, network management security aspects). security issues in wireless technologies and mobile computing |
| Laboratory |
| |
| References |
| • Cryptography and Network Security (4th Edition), Joseph MiggaKizza, Computer Network Security, Feb 18, 2003. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE452 | Selected Topics in Computer networks and Security | | 3 CH |
|---|---|---|---|
| Prerequisites | Computer Networks – CCE353 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Selected topics in recent developments in Computer networks and Security will be presented in this course. Course material will reflect the needs of the graduating students. |
| Laboratory |
| |
| References |
| Textbooks, periodicals and journals related to the selected topics. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE453 | Introduction to Network Operations and Management | | 3 CH |
|---|---|---|---|
| Prerequisites | Embedded System – CCE482, Database Systems – CCE462 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Network management: Goals, Organization, Functions. Basic foundations: Standards, Models, Languages. Simple Network Management Protocol (SNMP). Network management applications. Software Defined Networking (SDN). Different types of networks according to size and function, Campus networks, Data center networks. Load balancing and distribution. Traffic engineering and management. |
| References |

- Alexander Clemm, Network Management Fundamentals, Cisco Press, 2007.
- Mani Subramanian, Network Management: Principles and Practices, Pearson, 2010.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE161 | Computer Programming | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Review on the main concept of the computer programming, introduction to arrays and its operations, addresses and pointers and its operations, memory management : New and Delete, pointers to objects, structures, Built- in functions in the programming language used, user-define functions, calling the functions, passing arguments to functions, the returning values from functions, overloaded functions, classes, introduction to object-oriented programming. Fundamentals of MATLAB.

**Laboratory**

- The students should prepare a complete program design.
- Write an example python programs for array.
- Write an example python programs for pointers.
- Write an example python programs for functions.
- Program for calling the functions.
- Program for passing arguments to functions.

**References**


- Choi, B. (2021). Learn Python Basics on Windows. In: Introduction to Python Network Automation. Apress, Berkeley, CA.
- "Cheng, C., & Jackson, M. (2016). Python. Somerville, Mass.: Candlewick Press.
- Moses, B. (2017). Python. Cardiff: Candy Jar Books.
- Al Sweigart, (2015). Automate the Boring Stuff with Python. USA
- Fitzpatrick and Ledeczi, Computer Programming with MATLAB,


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE361 | Data Structure and Algorithms | | 2 CH |
|---|---|---|---|
| Prerequisites | Computer Programming – CCE161 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Data types and representation, Analyze the efficiency of algorithms using Big O notation.,Problem-solving techniques, data structures representation in storage and memory allocation, linear lists, stacks, queues, de-queues, memory allocation, trees, graphs, searching and sorting algorithms and their analysis, hashing, programming project.Choose the appropriate data structure for a given problem.Implement algorithms using your chosen programming language. Apply data structures and algorithms to solve real-world problems.

Laboratory

- Build Arrays using C++/Python language.
- Build linked lists using C++/Python language.
- Build stacks using C++/Python language.
- Build queues using C++/Python language.
- Build searching and sorting algorithms and their analysis to Arrays.
- Build trees using C++/Python language.
- Apply searching and sorting algorithms and their analysis to trees.
- Build graphs using C++/Python language.

References

- SartajSahni, Data Structures and Algorithms, and applications in C++, McGraw-Hill, 1st. Ed., 1988.
- A Textbook of Data Structures and Algorithms, Volume 1,by G. A. VijayalakshmiPai,released January 2023,Publisher(s): Wiley-ISTE,ISBN: 9781786308696
  - A Textbook of Data Structures and Algorithms, Volume 3,by G. A. VijayalakshmiPai, released January 2023,Publisher(s): Wiley-ISTE,ISBN: 9781786308924

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE362 | Database Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Computer Programming – CCE161 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |

| 125 | 5 |
|---|---|

Course Content

File-systems Vs database systems. Concepts of Database Systems and Architecture.Different types of databases. The Database Management System (DBMS). Database models. Relational database concepts. Entity- relationship models and diagrams. Conceptual Database Design, Logical Database Design for Relation Model, Physical Database Design for Relational Database, Functional dependencies, Structured Query Language (SQL), Database Application Using Postgres/MySQL, Database Administration, Distributed Databases.

Laboratory

- Setting up database management system (MySql)
- Creating database
- Creating tables
- Use advanced DDL commands
- Database update (Drop and Alter Table)
- Using simple SQL statements
- Order by , join SQL statements
- Set operations
- Nesting of queries
- Aggregate functions in SQL

References

- Database System Concepts,SeventhEdition,AviSilberschatz,Henry F. Korth,S. Sudarshan(2019),Publisher:McGraw-Hill,ISBN 9780078022159
- Database Design and Implementation: Second Edition by Edward Sciore (Author),Publisher : Springer; February , 2020),ISBN : 3030338355

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE461 | Big-Data Analytics | 2 CH |
|---|---|---|
| Prerequisites | Database Systems – CCE462 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 0 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

Course Content

Definition and taxonomy of big data. Challenges, trends, and applications. Big data technologies and tools.The Hadoop ecosystem. The Map-reduce paradigm. Big Data Storage and Analytics. Big data analytics machine learning algorithms. Graph analytics. Big data visualization.

Laboratory

- Technologies for Handling Big Data: Installation and configuration of Hadoop.
- Learning about Hadoop and its ecosystem which includes HDFS, and MapReduce.
- over the entire framework of MapReduce and uses of MapReduce.
- Understanding Big Data Technology Foundations: This module covers the big data stack
- Using Hadoop to store data: This includes an entire module of HDFS, HBase and their respective ways to store and manage data along with their commands.
  - Learn NoSQL Data Management : This module covers all about NoSQL including document databases, relationships, graph databases, schema less databases, CAP Theorem etc.

References


- BalamuruganBalusamy, NandhiniAbirami, SeifedineKadry, Big Data: Concepts, Technology, and Architecture Wiley, 2021.
- B. Baesens, Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Wiley, 2014.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE462 | Cloud Computing | 3 CH |
|---|---|---|
| Prerequisites | Computer Networks – CCE353 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Cloud computing concepts, Cloud computing characteristics, Cloud computing models, techniques, and architectures. Infrastructure as a Service (IaaS): resource virtualization, server, storage, network. Platform as a Service (PaaS): Cloud platform and management. Software as a Service (SaaS): web services, web OS, Case studies. Cloud-based software systems. Cloud issues: provider lock-in, security. Key cloud service providers and platforms. Creating own cloud services. Cloud deployment and service models, cloud infrastructure, migration to cloud computing environments.

Laboratory

- Installation and configuration of Hadoop/Euceliptus etc.
- Service deployment and Usage over cloud.
- Management of cloud resource
- Using existing cloud characteristics and Service models
- Cloud Security Management.
  - Performance evaluation of services over cloud

| References |
|---|
| • Douglas Comer, The Cloud Computing Book The Future of Computing Explained, CRC Press, 2021<br>• Thomas Erl, Eric Monroy, Cloud Computing: Concepts, Technology, Security, and Architecture, Pearson; 2nd edition, 2023 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE463 | Operating Systems | 3 CH |
|---|---|---|
| Prerequisites | Microprocessors and Applications – CCE352 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| Types of operating systems, functions of operating systems, process states, memory management, virtual memory, processor management, process scheduling, multiprocessor systems, device management, deadlock prevention, file systems, system resilience, network and distributed operating systems, real time systems, programming project. |
| Laboratory |
| • Basics of OS, Linux, processes.<br>• Building multi-threaded and multi-process applications.<br>• Building a custom shell, process lifecycle management.<br>• Synchronization.<br>• New scheduler in xv6 (or Linux)<br>• Copy-on-write fork in xv6 (or Linux)<br>• Understanding features of modern file systems.<br>• Building a new user space file system |
| References |
| • A. Dhotre, Operating Systems, Technical Publications Pune, India, 2008.<br>• ABRAHAM SILBERSCHATZ, OPERATING SYSTEM CONCEPTS, 9th Edition, Wiley, USA, 2013.<br>• William Stallings , Operating Systems : Internal and Design Principles, 7th Edition, Pearson-2012 |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10 % | 40% |

| CCE464 | Software Engineering | 2 CH |
|---|---|---|
| Prerequisites | Data Structure and Algorithms – CCE361 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

The principles of software engineering, SDLC SW Life Cycle model. Selection of life cycle model Agile and plan-driven process .Software production processes:Software Design, Software Implementation, Software Testing and Debugging, Software Deployment and Maintenance, object-oriented design, Unified Modelling Language (UML), software design, software systems verification and validation, the basics of software management and quality assurance-documentation and reports, project design.

**Laboratory**

**References**

- Ian Sommerville, K.K. Aggarwal and Yogesh Singh, Software Engineering, 10th Edition ,Publisher : Pearson (March 24, 2015),ISBN : 0133943038
- Clean Architecture: A Craftsman's Guide to Software Structure and Design,1st Edition,by Robert Martin ,Publisher : Pearson; 1st edition (September 10, 2017),ISBN : 0134494164
- Systems Analysis and Design: An Object-Oriented Approach with UML ,by Alan Dennis (Author), Barbara Wixom , David Tegarden ,Publisher : John Wiley & Sons Inc; 6th edition (14 April 2021),ISBN : 111955991X

**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE465 | Data Mining | 2 CH |
|---|---|---|
| Prerequisites | Big-Data Analytics – CCE461 | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

Introduction to data mining process. Data preprocessing: cleaning, integration, reduction, transformation, discretization. Data warehousing.Classification: k-nearest neighbors, multiple linear regression, logistic regression, decision tree,bayes classification, rule-based classification,

support vector machine, anomaly detection. Cluster analysis. Web mining: text and web-page preprocessing, inverted index, web meta-search,social network analysis, web crawling. Data mining tools. Applications of data mining to various application domains.

Laboratory

- Build Data Warehouse and Explore WEKA
- Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
- Demonstrate performing classification on data sets.
- Demonstrate performing clustering on data sets.
- Demonstrate performing Regression on data
- Demonstrate web-mining.

References

- CharuAggrawal, Data Mining: The Textbook, Springer, 2015
- Jared Dean, Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners, Wiley 1st Edition, 2014
- , Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2013

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE466 | Object-Oriented Programming | 3 CH |
|---|---|---|
| Prerequisites | Computer programming – CCE161 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 0 | 2 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Object-oriented programming principles and techniques using C++. Classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes, and low-level language features. Mapping of UML design to C++ implementation and object-oriented considerations for software design and reuse. Relation of C++ to GUI, databases, and real-time programming.

Laboratory

- Using C++, write programs for classes then execute these programs to see the output.
- Using C++, write examples for overloading, data abstraction, information hiding.
- Encapsulation, inheritance, polymorphism.
- File processing, templates, exceptions, container classes.
- Mapping of UML design to C++ implementation and object-oriented considerations for software design.

- Apply C++ to GUI, databases, and real-time programming.

Reference

- Robert Lafore, Object-Oriented Programming in C++, Fourth Edition, 2002.
- Brett D. McLaughlin, Gary Pollice, and Dave West, Head First Object-Oriented Analysis and Design, O'Reilly Medi, 1st Edition, 2006.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE467 | Selected Topics in Distributed and Mobile Computing | 3 CH |
|---|---|---|
| Prerequisites | Cloud Computing – CCE462 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 2 | 0 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Selected topics in recent developments in Distributed and Mobile Computing will be presented in this course. Course material will reflect the needs of the graduating students.

Laboratory

References

- Paola Flocchini, Giuseppe Prencipe, Nicola Santoro, Distributed Computing by Mobile Entities Current Research in Moving and Computing, Springer, 2019.
- Unmesh Joshi, Patterns of Distributed Systems, Addison-Wesley Professional; 1st edition, 2023

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE468 | Mobile and Web Application Development | 3 CH |
|---|---|---|
| Prerequisites | Database Systems – CCE462 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 2 | 0 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

HTML – CSS – JavaScript – PHP – MySQL – Web Design –Web Development – Introduction to Mobile Development for Android – Introduction to Mobile Development for iOS.

Laboratory

References


- Jon Duckett, Web Design with HTML, CSS, JavaScript and jQuery Set, Wiley, 2014.
- Shaun Lewis and Mike Dunn, Native Mobile Development: A Cross-Reference for iOS and Android,1st edition, O'Reilly Media, 2019.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| CCE481 | Computer Vision | 2 CH |
|---|---|---|
| Prerequisites | Computer Programming – CCE161 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 0 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

Course Content

Basics of image processing techniques and algorithms: image preprocessing, filters, image enhancement, edge detection, image segmentation. Applications: Object Recognition, Face Detection, Autonomous Vehicles, Convolutional Neural Networks (CNNs), Video Surveillance, Augmented Reality, Medical Image Analysis, Drone Imagery, Industrial Automation, Gesture Recognition.

Laboratory

- Introduction to Python and OpenCV
- Image Preprocessing Techniques
- Implementing Filters for Image Enhancement
- Edge Detection Algorithms
- Image Segmentation Techniques
- Autonomous Vehicle Navigation Systems
- Object Detection with Pre-trained Models
- Real-time Video Processing
- Face Recognition using Deep Learning
- Implementing Convolutional Neural Networks from Scratch
- Advanced Applications Using CNN
- Medical Image Analysis Techniques

References

- Vedaldi, A., &Soatto, S. (2021). *Computer Vision: Foundations and Applications*. Cambridge University Press.
- Culjak, I., Tralic, D., &Grgic, S. (2020). *Introduction to Deep Learning for Computer Vision: Building Neural Networks from Scratch*. Academic Press.
- Zhou, S. K., Rueckert, D., &Fichtinger, G. (2020). *Handbook of Medical Image Computing and Computer Assisted Intervention*. Elsevier.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE482 | Embedded Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Computer Programming – CCE161 | | |
| Number of weekly Contact Hours | | | |
| Lecture 2 | Tutorial 1 | Laboratory 1 | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction to embedded systems. FPGA Structure: architecture, configurable logic blocks, routing, lookup tables, memory and I/O blocks. FPGA design flow.Systematic coverage of the PIC18 family of Microcontrollers. Assembly language and C language programming and interfacing techniques. Separate chapters on programming and interfacing the PIC with peripherals - Includes information on how to interface the PIC with LCD, keyboard, ADC, DAC, Sensors, Serial Ports, Timers, DC and Stepper Motors.

**Laboratory**

- Write a program to toggle all the led to port and with some time delay using ARM7.
- Write a program to interface LCD with ARM7
- Write a program to interface 4*4 matrix keypad with ARM7
- Write a program for interfacing LED and PWM and to verify the output in the ARM7
- Write a program to interface Stepper motor with ARM7
- Write a program for interfacing of DC motor with ARM7
- Write a program to study and characteristics of the programmable gain amplifier (PGA)
- Write a Program realization of low pass, high pass and band pass filters and their characteristics
- Write a program to interface ADC and DAC with PSOC
- Digital function implementation using digital blocks
- Counter for blinking LED
- PWM
- Digital buffer and digital inverter

**References**

- Tim Wilmshurs, Designing Embedded Systems with PIC Microcontrollers, 2009.
- Muhammad Ali Mazidi, Rolin D. McKinlay, Danny Causey, PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18, Pearson Prentice Hall, 2008.
- Wayne Wolf, FPGA - Based System Design, Prentice Hall, 2004.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE483 | Internet of Things | 3 CH |
|---|---|---|
| Prerequisites | Embedded System – CCE482 –, Database Systems – CCE362 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 2 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Introduction to IoT. Components of an IoT Architecture, hardware platforms, low power devices, sensors, relevant wireless technologies (Wi-Fi, Bluetooth, BLE, Zigbee, Z-Wave) and networking protocols (M2M - Machine to Machine-, LoRa, IPv6, 6LowPAN), security and privacy concepts, IoT device programming and debugging, cloud integration, IoT-based applications, remote health monitoring and emergency notification systems, and transportation systems, Mobile and ubiquitous services: home services, travel and business services, consumer services.

Laboratory

- Setup of a Wireless Sensor
- Setup of simple embedded systems
- Integrating and Interconnecting Smart Objects
- Building the Web of Things
- Security measures
- IoT device programming and debugging.
- IoT-based application.

References


- Fundamentals of Wireless Sensor Networks - Theory and Practice, Wiley, 2010.
- Interconnecting Smart Objects with IP – The Next Internet, J.-P. Vasseur and A.Dunkels, Morgan Kaufmann, 2010.
- Building the Web of Things, Dominique Guinard, and VladTrifa, 2016.
- Wireless Positioning Technologies and Applications, Second Edition, Alan Bensky, Artech House, 2016.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE484 | Computational Intelligence | | |
|---|---|---|---|
| Prerequisites | Probability and Statistics – BAS113, Computer Programming – CCE161 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Definitions, learning theory, soft-computing paradigm. Fuzzy systems: Fuzzy logic, approximate reasoning, fuzzy control. Neural networks:machine learning using neural networks, supervised and unsupervised learning, competitive learning, reinforcement learning, neuro-dynamic programming, neuro-fuzzy systems. Evolutionary computation: genetic algorithms, genetic programming, genetic optimization, machine learning using genetic algorithms. Particle swarm optimization. Bayes networks. Artificial immune systems.Rough theory. Granular computing. Chaos theory. Applications: intelligent control systems, object recognition, applications in mobile robots, face recognition, pattern recognition.

Laboratory

- Fuzzy system software setup
- Fuzzy system applications
- Neural network software setup
- Neural networks applications
- Object recognition tools
- Face recognition tools
- Machine learning tools

References

- Engelbrecht A. (2007). Computational Intelligence: An Introduction (2nd ed.), John Willey and Sons.
- Raman Kumar, Recent Advances in Computational Intelligence, Springer, 2009.
- Yue Wu, Xinglong Zhang, PengfeiJia, Recent Advances in Machine Learning and Computational Intelligence, MDPI, 2023.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE485 | Microcontrollers and Applications | 3 CH |
|---|---|---|
| Prerequisites | Microprocessors and Applications – CCE352 | |
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |

| | | |
|---|---|---|
| 2 | 0 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Difference between microprocessors and microcontrollers, General architecture of microcontrollers, Architecture of one of the available microcontrollers, its assembly, Programming with either C or Basic, Input and output of data, Timers, Counters, and Interrupts, Software and hardware applications. Dealing with A/D and D/A, A complete project to control a simple process like controlling temperature or the speed of a motor.

Laboratory

- Experimenting with the assembly language of the used microcontrollers, or the high level language used with the simulator.
- 0Experimenting with the assembly language of the used microcontrollers, or the high level language used with the simulator.
- Experimenting with the assembly language of the used microcontrollers, or the high level language used with the simulator.
- Experimenting with the assembly language of the used microcontrollers, or the high level language used with the simulator.
- Experiment on dealing with interrupts.
- Experiment on dealing with Timers, and Counters.
- Doing a complete course project to use the microcontroller in controlling a physical variable like temperature or pressure, and display that variable. The A/D, and D/A must be used in this project.

References

- Danny Cansey, Muhammed Ali Mazidi, PIC Microcontrollers and Embedded Systems Using Assembly and C, Pearson Prentice Hall, 2007.
- Lucio Di Jasio, Tim Wilmshurst, Dogan Ibrahim, PIC Microcontrollers, Know it all, Elsevier Inc, 2008.
- Giladi, Ran. Network processors: architecture, programming, and implementation. Morgan Kaufmann, 2008.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE486 | Artificial Intelligence and its Applications | 3 CH |
|---|---|---|
| Prerequisites | Probability and Statistics – BAS113, Computer Programming – CCE161 | |

Number of weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 1 |
| Required SWL | | Equivalent ECTS |

| | |
|---|---|
| 125 | 5 |

Course Content

Search: Graph search, Constraint satisfaction, Games; Machine learning: Decision trees, Neural Networks; Knowledge representation and inference: Propositional and first order logic, Rule - based systems, Fuzzy logic systems.ABC: Artificial Intelligence, Big Data and Cloud Computing.Artificial Intelligence vs. Machine Learning vs. Deep Learning.Smart City with AI. Applications of AI in Healthcare Industry.

Laboratory

- Experiments using Matlab: Neural Networks and Fuzzy logic toolboxes. Apply one of the AI techniques on a real problem or a game and introduce this work written on paper and /or stored on a floppy or compact disk. A maximum of three students are allowed to join in one project. Projects shouldn't be repeated, if it happens, the time of submission is taken into consideration. Three parameters are considered in the evaluation of a project:
- The originality of the project's idea.
- The understanding of the used techniques.
- The level of implementation of the project.

References


- Stuart and Peter Norving, Artificial Intelligence: a modern approach Russel, Prentice Hall, 2nd. Ed., 2003.
- BrahimLejdel, EliseoClementini, LouaiAlarabi, Artificial Intelligence and Its Applications, 2021
- S. KanimozhiSuguna, Artificial Intelligence (AI): Recent Trends and Applications, CRC Press, 2021.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE487 | Fundamentals of Deep Learning | | 3 CH |
|---|---|---|---|
| Prerequisites | Probability and Statistics – BAS113, Computer Programming – CCE161 | | |
| Number of weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to deep learning and its underlying theory. Architectures commonly associated with deep learning: Basic Neural Networks (NN), Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN). Methods to train and optimize the architectures. Methods to perform effective inference. Range of applications.

| Laboratory | | | |
|---|---|---|---|
| | | | |
| References | | | |
| • Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning. MIT Press, 2016. online version<br>• SandroSkansi, Introduction to Deep Learning. Springer, 2018. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| CCE491 | Communications and Computers Graduation Project (1) | 2 CH |
|---|---|---|
| Prerequisites | After completing 101 CH | |
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 1 | 0 | 3 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |
| Course Content | | |
| This capstone project lets students apply prior learning to solve an industry or community problem. It considers real-world constraints like cost, environment, ethics, and safety. Students explore solutions, assess feasibility, and create a high-level design.Then, students will perform research work to explore different approaches and reach an initial high-level design or system architecture and specifications. A final report details findings and plans the detailed design phase for Project 2 | | |
| Assessment Criteria | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final/Oral Exam |
| 50% | 0% | 0% | 50% |

| CCE492 | Communications and Computers Graduation Project (2) | 3 CH |
|---|---|---|
| Prerequisites | Communications and Computers Graduation Project (1) | |
| Number of weekly Contact Hours | | |
| Lecture | Tutorial | Laboratory |
| 0 | 0 | 6 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |
| Course Content | | |
| Project 2 builds on Project 1's design. Students refine the plan, verify it, and create a working prototype. This phase ends with complete design documents, drawings, and a materials list. . At | | |

| | | | |
|---|---|---|---|
| the end of Project 2, students are asked to submit a dissertation or project report and go through an oral examination after delivering a presentation of their work. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final/Oral Exam |
| 50% | 0% | 0% | 50% |

## Courses offered by Basic Sciences in Communications and Computers Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | BAS211 | Mathematics (3) |
| 2 | BAS213 | Mathematics (4) |
| 3 | BAS311 | Mathematics (5) |

## Graduate's Attributes Vs Program's Competencies Matrix

| | | Program Graduate's Attributes (GA) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GA1 | GA2 | GA3 | GA4 | GA5 | GA6 | GA7 | GA8 | GA9 | GA10 |
| Program's Competencies | A1 | ■ | | | ■ | | | | | | |
| | A2 | | ■ | | | | | ■ | | | |
| | A3 | ■ | ■ | | | | ■ | ■ | | | |
| | A4 | ■ | ■ | ■ | | | | ■ | | | |
| | A5 | | ■ | | | | | ■ | | | |
| | A6 | ■ | | ■ | ■ | | | ■ | | | ■ |
| | A7 | | | ■ | ■ | ■ | | | ■ | ■ | ■ |
| | A8 | | | | | | | | | ■ | |
| | A9 | | ■ | | | | | ■ | ■ | | ■ |
| | A10 | | | | ■ | ■ | | | ■ | | |
| | B1 | ■ | ■ | | | ■ | | ■ | | ■ | |
| | B2 | ■ | ■ | | | ■ | ■ | ■ | | ■ | ■ |
| | B3 | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | |
| | B4 | ■ | ■ | | ■ | | | | | ■ | ■ |
| | B5 | | | | ■ | ■ | | ■ | | ■ | ■ |
| | C1a | ■ | | | | | | ■ | | ■ | |
| | C1b | ■ | ■ | | | | | ■ | | | |
| | C2a | ■ | ■ | ■ | | | | | | | |
| | C2b | ■ | ■ | | | ■ | ■ | ■ | | | ■ |
| | C3a | ■ | ■ | | | | | ■ | | ■ | |
| | C3b | ■ | ■ | | | | | ■ | | ■ | |
| | C4a | ■ | ■ | | | ■ | | ■ | | ■ | |
| | C4b | ■ | ■ | | | ■ | | ■ | ■ | ■ | |

## Learning Outcomes of Communications and Computers Engineering Graduate

### 1. Knowledge and Understanding

By the end of the B.Sc. program, the graduate of Communications and Computers Engineering Program should be able to:

| Code | Learning Outcome |
|---|---|
| **1.1** | Explain advanced topics in electronics and communications engineering. |
| **1.2** | Describe the fundamentals and concepts of emerging topics in electronics and communications and related fields. |
| **1.3** | Recognize the social and environmental impacts of different technologies in electronics and communications. |
| **1.4** | Describe scientific developments and technologies in the field. |
| **1.5** | Acquire the fundamentals and ethics of scientific research. |

### 2. Intellectual Skills

By the end of the B.Sc. program, the graduate of Communications and Computers Engineering Program should be able to:

| Code | Learning Outcome |
|---|---|
| **2.1** | Analyze and evaluate information in the field and apply it to solve problems. |
| **2.2** | Identify and investigate specialized problems and propose multiple solutions, especially in the absence of complete data. |
| **2.3** | Integrate diverse knowledge to solve professional problems. |
| **2.4** | Formulate research questions and write a scientific study around a research problem. |
| **2.5** | Plan for the development of electronics and communications systems and components. |

### 3. Professional Skills

By the end of the B.Sc. program, the graduate of Communications and Computers Engineering Program should be able to:

| Code | Learning Outcome |
|---|---|
| **3.1** | Design and simulate electronics and communications systems using specialized software tools. |
| **3.2** | Write and evaluate technical reports. |
| **3.3** | Design electronic circuits and make measurements and required tests to evaluate its performance. |
| **3.4** | Read the data sheets and evaluate the specifications of components and devices. |

### 4. General and Transferable Skills

By the end of the B.Sc. program, the graduate of Communications and Computers Engineering Program should be able to:

| Code | Learning Outcome |
|---|---|
| **4.1** | Communicate effectively with others and share ideas. |
| **4.2** | Use information technology to support professional practice. |
| **4.3** | Acquire self-assessment skills and determine personal learning needs. |
| **4.4** | Work in a team and lead teams in diverse professional contexts. |
| **4.5** | Manage time efficiently. |
| **4.6** | Acquire lifelong self-learning skills. |

# Learning Outcomes of Communications and Computers Engineering Program Vs Graduate Attributes Matrix

| | | | Program Graduate's Attributes (GA) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GA1 | GA2 | GA3 | GA4 | GA5 | GA6 | GA7 | GA8 | GA9 | GA10 |
| Learning Outcomes (LOs) | Knowledge and Understanding | 1.1 | ■ | | | | ■ | | | | | ■ |
| | | 1.2 | ■ | | | | | | ■ | | | |
| | | 1.3 | | | | | ■ | ■ | | | | |
| | | 1.4 | ■ | | | ■ | ■ | | ■ | | | |
| | | 1.5 | | | ■ | ■ | | | | ■ | ■ | ■ |
| | Intellectual Skills | 2.1 | | ■ | | | | | | | | |
| | | 2.2 | | ■ | | | | | ■ | | | |
| | | 2.3 | | ■ | | | | ■ | | | | |
| | | 2.4 | | ■ | | | | | | ■ | ■ | |
| | | 2.5 | | ■ | | | ■ | | ■ | | | |
| | Professional Skills | 3.1 | | | | | | ■ | ■ | | | |
| | | 3.2 | | | | | ■ | | | | ■ | |
| | | 3.3 | ■ | ■ | | | ■ | | ■ | | | |
| | | 3.4 | | | | | | | | | | |
| | General and Transferable Skills | 4.1 | | | ■ | ■ | ■ | | | | ■ | ■ |
| | | 4.2 | | | | | | ■ | ■ | | | |
| | | 4.3 | | | ■ | | | | | ■ | | ■ |
| | | 4.4 | | | ■ | ■ | ■ | | | | ■ | ■ |
| | | 4.5 | | | | | | | | | | ■ |
| | | 4.6 | | ■ | | | | ■ | | ■ | | |

## Courses VS Teaching and Learning Methods of Communications and Computers Engineering Program

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (2) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (3) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| - | University Elective (4) | ■ | | ■ | ■ | ■ | | | | ■ | | |
| BAS111 | Mathematics (1) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS112 | Mathematics (2) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS113 | Probability and Statistics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS121 | Vibration and Waves | ■ | ■ | | | | ■ | | ■ | | ■ | |
| BAS122 | Electricity and Magnetism | ■ | ■ | | | | ■ | | ■ | | ■ | |
| BAS131 | Engineering Chemistry | ■ | ■ | | | | ■ | | ■ | | ■ | |
| BAS141 | Statics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS142 | Dynamics | ■ | ■ | | | | ■ | | | | ■ | |
| BAS143 | Engineering Drawing (1) | ■ | ■ | ■ | | | | | ■ | | | |
| TRN2x1 | Field training (1) | | | ■ | ■ | ■ | | ■ | | | | ■ |
| TRN3x1 | Field Training (2) | | | ■ | ■ | ■ | | ■ | | | | ■ |
| - | Engineering Economy and Project Management Elective | ■ | ■ | | ■ | ■ | | | ■ | ■ | ■ | ■ |
| - | Structures and Properties of Materials Elective Courses | ■ | ■ | | ■ | ■ | | | ■ | ■ | ■ | |
| - | Engineering Technology Elective Courses | ■ | ■ | | ■ | ■ | | | ■ | ■ | ■ | ■ |
| - | Spatial Perception and Design Elective Courses | ■ | ■ | | ■ | ■ | | | ■ | ■ | ■ | |
| BAS211 | Mathematics (3) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS213 | Mathematics (4) | ■ | ■ | | | | ■ | | | | ■ | |
| BAS311 | Mathematics (5) | ■ | ■ | | | | ■ | | | | ■ | |
| CCE161 | Computer Programming | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE211 | Electrical Circuits (1) | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE214 | Electrical Circuits (2) | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE212 | Electromagnetic Fields | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE251 | Logic Circuits Design | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE213 | Electrical Measurements and Instrumentation | ■ | ■ | | | ■ | ■ | | ■ | | ■ | |
| CCE231 | Electronic Devices | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE252 | Advanced Logic Circuits Design | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE221 | Signal Analysis | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE215 | Modeling and System Analysis | ■ | ■ | | | ■ | ■ | | ■ | | ■ | |
| CCE321 | Electrical Communications | ■ | ■ | | | ■ | ■ | | ■ | | ■ | |

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CCE331 | Electronic Circuits | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE341 | Optoelectronics | ■ | ■ | | | ■ | ■ | | | | ■ | |
| CCE351 | Computer Organization and Architecture | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE311 | Control Systems | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE352 | Microprocessors and Applications | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE332 | Digital Circuit design | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE353 | Computer Networks | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE322 | Digital Signal Processing | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| Communications Engineering Minor Requirements | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE481 | Computer Vision | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE482 | Embedded Systems | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE451 | Computer and Network Security | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE323 | Digital Communication Systems | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE421 | Communication Networks | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE441 | Antenna and Wave Propagation | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE442 | Optical communication Systems | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE422 | Information and Coding Theory | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE443 | Microwave Devices and Circuits | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE423 | Mobile communications | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE491 | Communications and Computers Graduation Project (1) | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| CCE492 | Communications and Computers Graduation Project (2) | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Communications Engineering Elective (1) | | | | | | | | | | | | |
| CCE431 | Integrated Circuits Design | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CCE424 | Telephony Systems | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CCE425 | Acoustics | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| Communications Engineering Elective (2) | | | | | | | | | | | | |
| CCE432 | VLSI Technology | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE426 | Satellite Communication | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE427 | Selected Topics in Communication Systems | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| Communications Engineering Elective (3) | | | | | | | | | | | | |
| CCE444 | RF Integrated Circuits Design | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE445 | Photonics Micro-Systems | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE446 | Radar Systems | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CCE447 | Bioelectromagnetics | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| Computers Engineering Minor Requirements | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | ■ | ■ | | | ■ | | ■ | ■ | | ■ | |
| CCE481 | Computer Vision | ■ | ■ | | | ■ | | ■ | ■ | | ■ | |
| CCE482 | Embedded Systems | ■ | ■ | | | ■ | | ■ | ■ | | ■ | |

| Code | Course Title | Lectures | Tutorials | Cooperative education | Self–study | Reports and Researches | Problem Solving | Projects | Laboratory | Online Learning | Hybrid Education | Field Visits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CCE451 | Computer and Network Security | ■ | ■ | | | ■ | | ■ | | | ■ | |
| CCE362 | Database Systems | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE461 | Big-Data Analytics | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE462 | Cloud Computing | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE463 | Operating Systems | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE464 | Software Engineering | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE483 | Internet Of Things | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | |
| CCE465 | Data Mining | ■ | ■ | | | ■ | ■ | ■ | | | ■ | |
| CCE491 | Communications and Computers Graduation Project (1) | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| CCE392 | Communications and Computers Graduation Project (2) | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Computers Engineering Elective (1) | | | | | | | | | | | | |
| CCE466 | Object-Oriented Programming | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CCE484 | Computational Intelligence | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CCE485 | Microcontrollers and Applications | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Computers Engineering Elective (2) | | | | | | | | | | | | |
| CCE452 | Selected Topics in Computer networks and Security | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE453 | Introduction to Network Operations and Management | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE486 | Artificial Intelligence and its Applications | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Computers Engineering Elective (3) | | | | | | | | | | | | |
| CCE467 | Selected Topics in Distributed and Mobile Computing | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE468 | Mobile and Web Application Development | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| CCE487 | Fundamentals of Deep Learning | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | |

- **Competencies VS Courses Matrix for Communications and Computers Engineering Program**

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | C1a | C1b | C2a | C2b | C3a | C3b | C4a | C4b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | | | | | | | | | |
| NUB111 | History of Engineering | | | | | ■ | | ■ | | | | | | | | | | | | | | | | |
| NUB112 | Modern history of Egypt | | | | | ■ | | ■ | | | | | | | | | | | | | | | | |
| NUB113 | History of Civilizations | | | | | ■ | | ■ | | | | | | | | | | | | | | | | |
| NUB114 | Fundamentals of Engineering | ■ | | ■ | | | | | | | | | | | | | | | | | | | | |
| NUB121 | Report Writing and Communication Skills | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | | | |
| NUB122 | Climate Change, Energy and Water Issues | | | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| NUB123 | Scientific Thinking | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | | |
| NUB131 | Professional Legislations and Engineering Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | | | |
| NUB132 | Literature and Arts | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | | | |
| NUB133 | Human Rights | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | | | |
| NUB134 | Professional Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | | | |
| NUB141 | Building Safety and Fire Protection | ■ | | | ■ | | | | | | | | | | | | | | | | | | | |
| NUB142 | Entrepreneurship and Startups | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | | |
| NUB143 | Business Administration | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | | |
| NUB144 | Principle of General Management | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | ■ | | | | | | | | | | | | | | | | | | | | | | |
| BAS112 | Mathematics (2) | ■ | | | | | | | | | | | | | | | | | | | | | | |
| BAS113 | Probability and Statistics | | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS121 | Vibration and Waves | ■ | | | | | | | | | | | | | | | | | | | | | | |
| BAS122 | Electricity and Magnetism | ■ | | | | | | | | | | | | | | | | | | | | | | |
| BAS131 | Engineering Chemistry | ■ | | | | | | | | | | | | | | | | | | | | | | |
| BAS141 | Statics | | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS142 | Dynamics | | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | | | | | ■ | ■ | | | | | | | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | ■ | ■ | | | | | | | | | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | ■ | ■ | | | | | | | | | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | | | | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | C1a | C1b | C2a | C2b | C3a | C3b | C4a | C4b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | | | | | | | |
| CCE312 | Software Project Management | ■ | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | | | | | |
| CCE216 | Properties of Electrical Materials | | ■ | | ■ | | | | | | ■ | ■ | | ■ | | | | | | | | | | |
| GME141 | Production Engineering | ■ | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | | | | | |
| CCE111 | Electrical Installations and Construction Equipment | | | | ■ | | | | ■ | | ■ | | ■ | ■ | | | | | | | | | | |
| BAS211 | Mathematics (3) | ■ | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS213 | Mathematics (4) | ■ | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS311 | Mathematics (5) | ■ | | | | ■ | | | | | | | | | | | | | | | | | | |
| CCE161 | Computer Programming | | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | | |
| CCE211 | Electrical Circuits (1) | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | | | |
| CCE214 | Electrical Circuits (2) | | ■ | | | | | | | | | ■ | ■ | | | | ■ | | | | | | | |
| CCE212 | Electromagnetic Fields | ■ | ■ | | | | | | | | | | | | ■ | | | | | | | | | |
| CCE251 | Logic Circuits Design | | | ■ | | | | | | | | | ■ | | | | | | ■ | ■ | | | | |
| CCE213 | Electrical Measurements and Instrumentation | | ■ | | | | | | | | | | | | ■ | | ■ | | | | ■ | | | |
| CCE231 | Electronic Devices | | | | | | | | | | | | ■ | | ■ | | ■ | | | | | | | |
| CCE252 | Advanced Logic Circuits Design | | | | | | | | | | | | ■ | ■ | | | | | ■ | | | | ■ | |
| CCE221 | Signal Analysis | | | | | | | | | | ■ | ■ | | | ■ | | | | | | | | | |
| CCE215 | Modeling and System Analysis | ■ | | | | | | | ■ | | | | ■ | ■ | | | | | | | | | | |
| CCE321 | Electrical Communications | | | | | | | | | | ■ | | | | ■ | | | | | | | | | |
| CCE331 | Electronic Circuits | | | | | | | | | | | | ■ | | ■ | | ■ | | | | | | | |
| CCE341 | Optoelectronics | ■ | ■ | | | | | | | | | | | | ■ | | | | | | | | | |
| CCE351 | Computer Organization and Architecture | | | | | | | | | | | | ■ | | | | | ■ | | | | | | |
| CCE311 | Control Systems | ■ | ■ | | | | | | | | | | ■ | | | | | | | | | | | |
| CCE352 | Microprocessors and Applications | | | | | | | | | | | | ■ | ■ | | | | | | ■ | | | | ■ |
| CCE332 | Digital Circuit design | | | | | | | | | | | | ■ | | ■ | | ■ | | | | | | | |
| CCE353 | Computer Networks | | | ■ | | | | | | | | | | ■ | | | | ■ | | | | | ■ | |
| CCE322 | Digital Signal Processing | | ■ | | | | | | | | ■ | ■ | | | ■ | | | | | | | | | |
| Communications Engineering Minor Requirements | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | | | ■ |
| CCE481 | Computer Vision | | | | | | | | | | | | | | | | | | | ■ | | | | ■ |
| CCE482 | Embedded Systems | | | | | | | | | | | | | ■ | | ■ | | | | | | | | |
| CCE451 | Computer and Network Security | | | ■ | | | | | | | | | | ■ | | | | ■ | | | | | ■ | |
| CCE323 | Digital Communication Systems | | | | | | | | | ■ | | | ■ | | ■ | | | | | | | | ■ | |
| CCE421 | Communication Networks | | | | | | | | | ■ | | | ■ | ■ | | | | | | | | ■ | | |
| CCE441 | Antenna and Wave Propagation | ■ | | | | | | | | | | | ■ | | | | ■ | | | | | | ■ | |
| CCE442 | Optical communication Systems | ■ | | | | | | | | | | | ■ | | | | ■ | | | | ■ | | | |
| CCE422 | Information and Coding Theory | | | | | | | | | ■ | ■ | | ■ | | ■ | | | | | | | | ■ | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | C1a | C1b | C2a | C2b | C3a | C3b | C4a | C4b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CCE443 | Microwave Devices and Circuits | ■ | | | | | | | | | | | ■ | | | | ■ | | | | ■ | | | |
| CCE423 | Mobile communications | | | | | | | | | | | | | | | | | | ■ | | ■ | | | |
| CCE491 | Communications and Computers Graduation Project (1) | ■ | | ■ | | | | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ |
| CCE492 | Communications and Computers Graduation Project (2) | ■ | | ■ | | | | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ |
| Communications Engineering Elective (1) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE431 | Integrated Circuits Design | | | | | | | | | | | | ■ | ■ | | | | | | | | | ■ | |
| CCE424 | Telephony Systems | | | | | | | | | | | | ■ | | | | | | ■ | | | | ■ | |
| CCE425 | Acoustics | | | | | ■ | | | | ■ | | | | | | | | | ■ | | | | ■ | |
| Communications Engineering Elective (2) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE432 | VLSI Technology | | | | | | | | | | | | | ■ | ■ | | | | | | ■ | | | |
| CCE426 | Satellite Communication | | | | | | | | | | | | | ■ | | | ■ | | | | ■ | | | |
| CCE427 | Selected Topics in Communication Systems | | | | | | | | | | | | | ■ | | | | | ■ | | ■ | | | |
| Communications Engineering Elective (3) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE444 | RF Integrated Circuits Design | ■ | | | | | | | | | | | ■ | | | | ■ | | | | ■ | | | |
| CCE445 | Photonics Micro-Systems | | | | | | | | | | | | ■ | | | | | | | | ■ | | ■ | |
| CCE446 | Radar Systems | | | | | | | | | | | | | | | | | | ■ | | ■ | | ■ | |
| CCE447 | Bioelectromagnetics | | | | | ■ | | | | | | | ■ | | | | | | ■ | | | | ■ | |
| Computers Engineering Minor Requirements | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | | | ■ |
| CCE481 | Computer Vision | | | | | | | | | | | | | | | | | | | ■ | | | | ■ |
| CCE482 | Embedded Systems | | | | | | | | | | | | | ■ | | ■ | | | | | | | | ■ |
| CCE451 | Computer and Network Security | | | ■ | | | | | | | | | | ■ | | | | ■ | | | | | ■ | |
| CCE362 | Database Systems | ■ | | | | | | | | | ■ | | | ■ | | | | | | ■ | | | | |
| CCE461 | Big-Data Analytics | | | | | | | | | | | | ■ | | | | | | | | | | | ■ |
| CCE462 | Cloud Computing | | | | | | | | | | ■ | | | | ■ | | | | | | | | | ■ |
| CCE463 | Operating Systems | ■ | | | | | | | | | ■ | | | ■ | | | | | | ■ | | | | |
| CCE464 | Software Engineering | ■ | | | | | ■ | | | | | | | ■ | | | | | | ■ | | | | |
| CCE483 | Internet Of Things | | | | | | | | | | | | ■ | | | | | | | | | | ■ | |
| CCE465 | Data Mining | ■ | | | | | | | | | ■ | | | ■ | | | | | | ■ | | | | |
| CCE491 | Communications and Computers Graduation Project (1) | ■ | | ■ | | | | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ |
| CCE392 | Communications and Computers Graduation Project (2) | ■ | | ■ | | | | | | ■ | | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ |
| Computers Engineering Elective (1) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE466 | Object-Oriented Programming | ■ | | | | | | | | | ■ | | | ■ | | | | | | ■ | | | | |
| CCE484 | Computational Intelligence | | | | | | | | | | | | | ■ | | | | | | ■ | | | | ■ |
| CCE485 | Microcontrollers and Applications | | | | | | | | | | | | ■ | ■ | | | | | | ■ | | | | ■ |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | C1a | C1b | C2a | C2b | C3a | C3b | C4a | C4b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Computers Engineering Elective (2) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE452 | Selected Topics in Computer networks and Security | | | ■ | | | | | | | | | | ■ | | | | ■ | | | | | ■ | |
| CCE453 | Introduction to Network Operations and Management | | | | | | | | | | | | ■ | | | | | | | ■ | | | ■ | |
| CCE486 | Artificial Intelligence and its Applications | | | | | | | | | | | | | ■ | | | | | | ■ | | | | ■ |
| Computers Engineering Elective (3) | | | | | | | | | | | | | | | | | | | | | | | | |
| CCE467 | Selected Topics in Distributed and Mobile Computing | | | | | | | | | | | | | ■ | | | | | ■ | | ■ | | | |
| CCE468 | Mobile and Web Application Development | | | | | | | | | | | | ■ | ■ | | | | | | ■ | | | | ■ |
| CCE487 | Fundamentals of Deep Learning | | | | | | | | | | | | | ■ | | | | | | ■ | | | | ■ |

- **Targeted Sustainable Development and Egyptian Cabinet Goals**

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS112 | Mathematics (2) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS113 | Probability and Statistics | | | | ■ | | | | | ■ | | | | | | | | ■ |
| BAS121 | Vibration and Waves | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS122 | Electricity and Magnetism | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS131 | Engineering Chemistry | | | | ■ | | ■ | | | ■ | | | ■ | | | | | |
| BAS141 | Statics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS142 | Dynamics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | ■ | | | | | ■ | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | |
| BAS211 | Mathematics (3) | | | | ■ | | | | | | | | | | | | | |
| BAS213 | Mathematics (4) | | | | ■ | | | | | | | | | | | | | |
| BAS311 | Mathematics (5) | | | | ■ | | | | | | | | | | | | | |
| CCE161 | Computer Programming | | | | ■ | | | | | | | | | | | | | |
| CCE211 | Electrical Circuits (1) | | | | ■ | | | | | | | | | | | | | |
| CCE214 | Electrical Circuits (2) | | | | ■ | | | | | | | | | | | | | |
| CCE212 | Electromagnetic Fields | | | | ■ | | | | | | | | | | | | | |
| CCE251 | Logic Circuits Design | | | | ■ | | | | | | | | | | | | | |
| CCE213 | Electrical Measurements and Instrumentation | | | | ■ | | | | | | | | | | | | | |
| CCE231 | Electronic Devices | | | | ■ | | | | | | | | | | | | | |
| CCE252 | Advanced Logic Circuits Design | | | | ■ | | | | | | | | | | | | | |
| CCE221 | Signal Analysis | | | | ■ | | | | | | | | | | | | | |
| CCE215 | Modeling and System Analysis | | | | ■ | | | | | | | | | | | | | |
| CCE321 | Electrical Communications | | | | ■ | | | | | | | | | | | | | |
| CCE331 | Electronic Circuits | | | | ■ | | | | | | | | | | | | | |
| CCE341 | Optoelectronics | | | | ■ | | | | | ■ | | | | | | | | |
| CCE351 | Computer Organization and Architecture | | | | ■ | | | | | | | | | | | | | |
| CCE311 | Control Systems | | | | ■ | | | | | | | | | | | | | |
| CCE352 | Microprocessors and Applications | | | | ■ | | | | | ■ | | | | | | | | |
| CCE332 | Digital Circuit design | | | | ■ | | | | | | | | | | | | | |
| CCE353 | Computer Networks | | | | ■ | | | | | ■ | | | | | | | | |
| CCE322 | Digital Signal Processing | | | | ■ | | | | | | | | | | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Communications Engineering Minor Requirements | | | | | | | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | | | | ■ | | | | | | | | | | | | | |
| CCE481 | Computer Vision | | | | ■ | | | | | ■ | | | | | | | | |
| CCE482 | Embedded Systems | | | | ■ | | | | | ■ | | | | | | | | |
| CCE451 | Computer and Network Security | | | | ■ | | | | | | | | | | | | | |
| CCE323 | Digital Communication Systems | | | | ■ | | | | | | | | | | | | | |
| CCE421 | Communication Networks | | | | ■ | | | | | | | | | ■ | | | | |
| CCE441 | Antenna and Wave Propagation | | | | ■ | | | | | ■ | | | | ■ | | | | |
| CCE442 | Optical communication Systems | | | | ■ | | | | | | | | | | | | | |
| CCE422 | Information and Coding Theory | | | | ■ | | | | | | | | | | | | | |
| CCE443 | Microwave Devices and Circuits | | | | ■ | | | | | ■ | | | | ■ | | | | |
| CCE423 | Mobile communications | | | | ■ | | | | | ■ | | | | ■ | | | | |
| CCE491 | Communications and Computers Graduation Project (1) | | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ |
| CCE492 | Communications and Computers Graduation Project (2) | | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ |
| | Communications Engineering Elective (1) | | | | | | | | | | | | | | | | | |
| | Communications Engineering Elective (2) | | | | | | | | | | | | | | | | | |
| | Communications Engineering Elective (3) | | | | | | | | | | | | | | | | | |
| CCE431 | Integrated Circuits Design | | | | ■ | | | | | ■ | | | | | | | | |
| CCE424 | Telephony Systems | | | | ■ | | | | | | | | | | | ■ | | |
| CCE425 | Acoustics | | | | ■ | | | | | | | | | | | | | |
| CCE432 | VLSI Technology | | | | ■ | | | | | ■ | | | | | | | | |
| CCE426 | Satellite Communication | | | | ■ | | | | | ■ | | | | ■ | | ■ | | |
| CCE427 | Selected Topics in Communication Systems | | | | ■ | | | | | ■ | | | | | | | | |
| CCE444 | RF Integrated Circuits Design | | | | ■ | | | | | ■ | | | | ■ | | | | |
| CCE445 | Photonics Micro-Systems | | | | ■ | | | | | ■ | | | | | | | | |
| CCE446 | Radar Systems | | | | ■ | | | | | ■ | | | | ■ | ■ | ■ | | |
| CCE447 | Bioelectromagnetics | | | | ■ | | | | | ■ | | | | ■ | ■ | ■ | | |
| Computers Engineering Minor Requirements | | | | | | | | | | | | | | | | | | |
| CCE361 | Data Structure and Algorithms | | | | ■ | | | | | ■ | | | | | | | | |
| CCE481 | Computer Vision | | | | ■ | | | | | ■ | | | | | | | | ■ |
| CCE482 | Embedded Systems | | | | ■ | | | | | ■ | | | | | | | | |
| CCE451 | Computer and Network Security | | | | ■ | | | | | ■ | | | | | | | | |
| CCE362 | Database Systems | | | | ■ | | | | | | | | | | | | | |
| CCE461 | Big-Data Analytics | | | | ■ | | | | | ■ | | | | | | | | |
| CCE462 | Cloud Computing | | | | ■ | | | | | ■ | | | | | | | | |
| CCE463 | Operating Systems | | | | ■ | | | | | | | | | | | | | |
| CCE464 | Software Engineering | | | | ■ | | | | | ■ | | | | | | | | ■ |
| CCE483 | Internet Of Things | | | | ■ | | | | | ■ | | | | | | | | ■ |
| CCE465 | Data Mining | | | | ■ | | | | | ■ | | | | | | | | |
| CCE491 | Communications and Computers Graduation Project (1) | | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ |
| CCE392 | Communications and Computers Graduation Project (2) | | | ■ | ■ | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Computers Engineering Elective (1) | | | | | | | | | | | | | | | | | |
| | Computers Engineering Elective (2) | | | | | | | | | | | | | | | | | |
| | Computers Engineering Elective (3) | | | | | | | | | | | | | | | | | |
| CCE466 | Object-Oriented Programming | | | | ■ | | | | | ■ | | | | | | | | |
| CCE484 | Computational Intelligence | | | | ■ | | | | | | | | | | | | | |
| CCE485 | Microcontrollers and Applications | | | | ■ | | | | | ■ | | | | | | | | |
| CCE452 | Selected Topics in Computer networks and Security | | | | ■ | | | | | | | | | | | | | |
| CCE453 | Introduction to Network Operations and Management | | | | ■ | | | | | ■ | | | | | | | | |
| CCE486 | Artificial Intelligence and its Applications | | | | ■ | | | | | ■ | | | | | | | | |
| CCE467 | Selected Topics in Distributed and Mobile Computing | | | | ■ | | | | | | | | | | | | | |
| CCE468 | Mobile and Web Application Development | | | | ■ | | | | | ■ | | | | | | | | |
| CCE487 | Fundamentals of Deep Learning | | | | ■ | | | | | ■ | | | | | | | | |

# Program 4: Mechatronics and Intelligent Machines Engineering Program

- ## Program Description

Mechatronics and Intelligent Machines Engineering Program is a multidisciplinary field of science that includes a combination of mechanical engineering, electronics, computer engineering, telecommunications engineering, systems engineering and control engineering. As technology advances, the subfields of engineering multiply and adapt. This program can enrich the student's basic theoretical and practical knowledge of mechatronics system components, and design methodologies of mechatronics systems.

- ## Career Prospects

The graduate of the program is expected to get a job in one of the following positions:

1. Embedded systems
2. Projects using Heavy earthmoving equipment and hydraulic and pneumatic machines,
3. Sales engineer for robotics and automation,
4. Automated manufacturing and production systems,
5. Control engineer,
6. Maintenance engineer,
7. Robotics and automation industry,
8. Business Intelligence Engineering and supply chains.

- ## Relation to Sustainable Development Goals

| | | | | | |
|---|---|---|---|---|---|
| ☒ GOAL 1: No Poverty | ☒ GOAL 2: Zero Hunger | ☒ GOAL 3: Good Health & Well-being | ☒ GOAL 4: Quality Education | ☒ GOAL 5: Gender Equality | ☒ GOAL 6: Clean Water & Sanitation |
| ☒ GOAL 7: Affordable & Clean Energy | ☒ GOAL 8: Decent Work & Economic Growth | ☒ GOAL 9: Industry, Innovation & Infrastructure | ☒ GOAL 10: Reduced Inequality | ☒ GOAL 11: Sustainable Cities & Communities | ☒ GOAL 12: Responsible Consumption & Production |
| ☒ GOAL 13: Climate Action | ☒ GOAL 14: Life Below Water | ☒ GOAL 15: Life on Land | ☒ GOAL 16: Peace & Justice Strong Institutions | ☒ GOAL 17: Partnerships to achieve. the Goal | |

- ## Program Concentrations

1. Autotronics: The concentration is to incorporate elements of mechanical, electrical, electronics, software and safety engineers as applied to the design, manufacture, and operation of automobiles.
2. Robotics and Artificial Intelligence: The concentration of this area is to integrate Artificial Intelligence with the industrial manipulators and mobile robots to perform tasks that require intelligence, perception, and decision-making.
3. Industrial Automation: The concentration of this area is to enhance efficiency, productivity, and reliability in manufacturing and other industrial processes.
4. Advanced Manufacturing: The concentration of this area is to improve efficiency, reduce costs, and increase flexibility in production, leads to the creation of more complex and customized products, as well as sustainable and resource-efficient manufacturing practices.
5. Business Intelligence Engineering: The concentration of this area is the use of technology, processes, and tools to collect, analyze, and present business data to support decision-making within an organization.

- ## Program Competences

**According to the National Academic Reference Standards (NARS-2018), the competences for Graduates from NHADA University and all Engineering Programs, graduate must be able to (A-Level):**

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

A6. Plan, supervise and monitor implementation of engineering projects.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

**In addition to the Competencies for all Engineering Programs, the Basic Mechanical Engineering graduate must be able to (B-Level):**

B1. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

B2. Carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.

B3. Select conventional mechanical equipment according to the required performance.

B4. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain mechanical equipment and systems.

**In addition to the Competencies for the Basic Mechanical Engineering, graduate must be able to (D Level):**

D1. Synthesize and integrate mechatronic subsystems to create custom solutions for different engineering problems while dealing with technical uncertainties.

D2. Integrate a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline.

D3. Put the necessary specifications measuring instruments, workshops and describing the different variants of mechatronic equipment such as Robotics, CNC machines, CAD/CAM systems, pneumatic and hydraulic equipment, etc. for purpose of purchasing and contracting.

D4. Distinguish the layout and the key parameters to the field of the concentration within the mechatronics and automation engineering as listed below.

| Concentration | Graduate attributes |
|---|---|
| Industrial Automation | 4a. Demonstrate proficient knowledge and skills in industrial automation systems, including PLC programming, HMI design, SCADA systems, and industrial networking. |
| Autotronics | 4b. Demonstrate a comprehensive understanding of automotive electrical systems, including wiring diagrams, circuits, sensors, actuators, and control modules. |
| Advanced Manufacturing | 4c. Demonstrate a comprehensive understanding of advanced manufacturing processes, including additive manufacturing, subtractive manufacturing, CNC machining, and robotic automation. |
| Artificial Intelligence and Robotics | 4d. Develop a solid understanding of AI principles, including machine learning, deep learning, neural networks, and natural language processing. |
| Business Intelligence Engineering | 4e. Demonstrate proficiency in data analysis techniques and visualization tools to extract insights from large datasets and communicate findings effectively to stakeholders. |

- **Graduate Attributes**
  - Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
  - Use the basic theoretical and practical knowledge of mechatronic and automation system components in his/her practical field.
  - Use the state-of-the-art technologies of the multidisciplinary specialization of Mechatronics and automation engineering program to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability.
  - Identify, formulate and solve fundamental engineering problems.
  - Design a system, component, or process to find affordable and reliable solutions, to improve the daily quality of life.
  - Conduct Research and Development (R&D) activities to create innovative mechatronic solutions having direct impact on industrial, commercial, and social scales.
  - Solve problems in the areas of integrated mechanics, electronics, computers, and software systems.
  - Analyze and investigate the inter-disciplinary characteristics of mechanical, electrical, and hydraulic systems.
  - Design, develop, and maintain safety critical mechatronic systems.
  - Apply the learned management and business skills to effectively contribute and compete in local, regional and international markets.
  - Engage in self- and life- long learning.
  - Work within a multidisciplinary team during the analysis, design and implementation phases of mechatronics engineering projects.

- Work effectively in multidisciplinary teams, leveraging their diverse skill sets to tackle complex engineering challenges and communicate technical concepts to non-technical stakeholders.
- Understand the ethical implications of their work in mechatronics and adhere to professional standards and codes of conduct, considering societal impact, safety, and environmental sustainability in their engineering practice.
- Communicate complex technical concepts, both orally and in writing, to diverse audiences, including colleagues, clients, and the broader community.
- Have the potential to take on leadership roles in engineering projects and organizations, demonstrating entrepreneurship, innovation, and the ability to drive positive change in the field of mechatronics.

## • Required Courses

To get a Bachelor of Science Degree in this program and to satisfy the Program Competences, the following set of courses need to be completed.

## • List of Mechatronics and Intelligent Machines Engineering Program Requirements Courses

| Course Title | Weight | | | Contact Hours | | | | % |
|---|---|---|---|---|---|---|---|---|
| | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| University Requirements | 11 | 18 | 450 | 12 | 0 | 0 | 12 | 8 % |
| Faculty of Engineering Requirements | 33 | 55 | 1375 | 24 | 19 | 8 | 51 | 23 % |
| Major Requirements of Mechatronics and Intelligent Machines Engineering | 58 | 97 | 2425 | 45 | 24 | 19 | 88 | 40 % |
| Minor Requirements of Mechatronics and Intelligent Machines Engineering | 42 | 70 | 1750 | 27 | 14 | 26 | 67 | 29 % |
| Total | 144 | 250 | 6250 | 108 | 57 | 53 | 218 | 100% |

# Major Requirements of Mechatronics and Intelligent Machines Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| CCE171 | Computing in Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | - |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| BME251 | Thermodynamics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS131 |
| MIM211 | Measurement and Instrumentation | 3 | 5 | 125 | 2 | 2 | 1 | 5 | - |
| BME211 | Theory of Machines | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS142 |
| BME26٢ | Fluid Mechanics and Aerodynamics | 2 | 4 | 100 | 2 | 0 | 1 | 3 | BME251 |
| CCE272 | Electrical and Electronic Circuits | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS122 |
| MIM213 | Sensors and Measurement Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | MIM211 |
| CCE273 | Digital Logic and Microcontrollers | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE171 |
| MIM221 | Modeling and Simulation of Mechatronic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS113 |
| BME241 | Strength of Materials | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| CCE274 | Introduction to Embedded Systems and Interfacing | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE171 |
| MIM214 | Electrical Power and Machines | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE272 |
| MIM311 | Power Electronics and Motor Drives | 3 | 5 | 125 | 2 | 2 | 1 | 5 | MIM214 |
| BME351 | Heat Transfer | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BME251 |
| BME311 | Mechanical Vibrations | 3 | 5 | 125 | 2 | 2 | 0 | 4 | - |
| BME321 | Machine Elements Design | 3 | 5 | 125 | 2 | 2 | 0 | 4 | - |
| BME411 | Machine Construction | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| CCE471 | Computer Vision in Mechatronic Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | MIM322 |
| MIM481 | MIM Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | 101 CH<br>MIM381 |
| MIM411 | Industrial Project Management | 2 | 3 | 75 | 2 | 1 | 0 | 3 | - |
| MIM412 | Maintenance Planning and Scheduling | 2 | 4 | 100 | 2 | 1 | 0 | 3 | - |
| CCE371 | Object-Oriented Computer Programming | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE171 |
| Total | | **58** | **97** | **2425** | **45** | **24** | **19** | **88** | |

## Minor Requirements of Mechatronics and Intelligent Machines Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| MIM321 | Introduction to Industrial Automation | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| MIM322 | Design of Mechatronics Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM111 |
| MIM323 | Industrial Robotics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BME241 |
| MIM324 | Hydraulics and Pneumatics Control | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| MIM325 | Intelligent Mechatronic Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM221 |
| - | MIM Elective (1) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM381 | Capstone | 1 | 2 | 50 | 0 | 1 | 1 | 2 | MIM322 |
| MIM421 | Cyber-Physical Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE274 |
| MIM422 | Artificial Intelligence for Mechatronic Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | MIM221 |
| - | MIM Elective (2) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM423 | Industrial Communications and Networks Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | MIM Elective (3) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| - | MIM Elective (4) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| - | MIM Elective (5) | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| MIM482 | MIM Graduation Project (2) | 3 | 5 | 125 | 1 | 0 | 4 | 5 | MIM481 |
| Total | | **42** | **70** | **1750** | **27** | **14** | **25** | **66** | |

**Elective Courses of Mechatronics and Intelligent Machines Engineering is distributed in five electives.**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Elective 1 Select 3 Credit hrs. (one course) | | | | | | | | | |
| MIM331 | Industrial Automation | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM321 |
| MIM341 | Introduction to Automotive | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM351 | Advanced Machining Processes | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM361 | Advanced Robotics Analysis and Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM371 | Business Analytics and Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Elective 2 Select 3 Credit hrs. (one course) | | | | | | | | | |
| MIM431 | Process Instrumentation and Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM441 | Automotive Engines and Fuel Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM451 | CNC Operations | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM461 | Mobile Robotic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| CCE472 | Data Mining and Visualization | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| Elective 3 Select 3 Credit hrs. (one course) | | | | | | | | | |
| MIM432 | PLC and HMI (Human-Machine Interface) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM442 | Automotive Mechatronic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM452 | Ceramics and Polymers | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM462 | Human-Robot Interaction | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| CCE473 | Database Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| Elective 4 Select 3 Credit hrs. (one course) | | | | | | | | | |
| MIM433 | Automation Systems and Supervisory Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM443 | Road Vehicle Dynamics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM453 | Additive Material Technology | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM463 | Perception and Learning for Robotics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| MIM471 | Supply Chain Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| Elective 5 Select 3 Credit hrs. (one course) | | | | | | | | | |
| MIM434 | Quality Control | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM331 |
| MIM444 | Design of Autonomous Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM341 |
| MIM454 | Non-Traditional Machining | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM351 |
| MIM464 | Selected Topics in Robotics and Artificial intelligence | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM361 |
| MIM472 | Decision making and governance | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM371 |

## Mechatronics and Intelligent Machines Engineering Concentrations Requirements Courses.

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Pool of MIM Elective Courses for 'Industrial Automation" Concentration | | | | | | | | | |
| MIM331 | Industrial Automation | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM321 |
| MIM431 | Process Instrumentation and Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM432 | PLC and HMI (Human-Machine Interface) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM433 | Automation Systems and Supervisory Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM331 |
| MIM434 | Quality Control | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM331 |
| Pool of MIM Elective Courses for 'Autotronics' Concentration | | | | | | | | | |
| MIM341 | Introduction to Automotive | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM441 | Automotive Engines and Fuel Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM442 | Automotive Mechatronic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM443 | Road Vehicle Dynamics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM341 |
| MIM444 | Design of Autonomous Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM341 |
| Pool of MIM Elective Courses for "Advanced Manufacturing" Concentration | | | | | | | | | |
| MIM351 | Advanced Machining Processes | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM322 |
| MIM451 | CNC Operations | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM452 | Ceramics and Polymers | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM453 | Additive Material Technology | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM351 |
| MIM454 | Non-Traditional Machining | 3 | 5 | 125 | 2 | 1 | ١ | ٤ | MIM351 |
| Pool of MIM Elective Courses for 'Artificial Intelligence and Robotics' Concentration | | | | | | | | | |
| MIM361 | Advanced Robotics Analysis and Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM323 |
| MIM461 | Mobile Robotic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| MIM462 | Human-Robot Interaction | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| MIM463 | Perception and Learning for Robotics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM361 |
| MIM464 | Selected Topics in Robotics and Artificial intelligence | 3 | 5 | 125 | 2 | 1 | 1 | 4 | MIM361 |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Pool of MIM Elective Courses for 'Business Intelligence Engineering' Concentration | | | | | | | | | |
| MIM371 | Business Analytics and Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| CCE472 | Data Mining and Visualization | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| CCE473 | Database Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| MIM473 | Supply Chain Management | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM371 |
| MIM474 | Decision making and governance | 3 | 5 | 125 | 2 | 1 | ١ | ٤ | MIM371 |

- **Proposed Study Plan**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 1 | | | | | | | | | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS121 | Vibration and Waves | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| - | University Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| - | University Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | **18** | **30** | **750** | **13** | **11** | **2** | **26** | |
| Semester 2 | | | | | | | | | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| BAS142 | Dynamics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| BAS113 | Probability and Statistics | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| MIM111 | Basics of Mechatronics | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| BME131 | Production Engineering | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| CCE171 | Computing in Engineering | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| Total | | **18** | **30** | **750** | 15 | 7 | 4 | 26 | |
| Semester 3 | | | | | | | | | |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| BME251 | Thermodynamics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS131 |
| MIM211 | Measurement and Instrumentation | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| MIM٢12 | Computer Aided Drawing | 2 | 3 | 75 | 1 | 1 | 2 | 4 | BAS143 |
| BME211 | Theory of Machines | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS142 |
| BME241 | Strength of Materials | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| CCE272 | Electrical and Electronic Circuits | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS122 |
| Total | | **18** | **30** | **750** | **13** | **11** | **4** | **27** | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 4 | | | | | | | | | |
| MIM213 | Sensors and Measurement Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | MIM211 |
| MIM214 | Electrical Power and Machines | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE272 |
| MIM221 | Modeling and Simulation of Mechatronic Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS113 |
| CCE273 | Digital Logic and Microcontrollers | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE171 |
| BME26٢ | Fluid Mechanics and Aerodynamics | 2 | 4 | 100 | 2 | 0 | 1 | 3 | BME251 |
| MIM21٦ | Engineering Economy | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CCE274 | Introduction to Embedded Systems and Interfacing | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE171 |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | ENG111 |
| Total | | **18** | **30** | **750** | **15** | **4** | **9** | **28** | |
| Semester 5 | | | | | | | | | |
| MIM321 | Introduction to Industrial Automation | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE273 |
| MIM322 | Design of Mechatronics Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM111 |
| MIM323 | Industrial Robotics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BME241 |
| CCE371 | Object-Oriented Computer Programming | 2 | 3 | 75 | 2 | 0 | 1 | 3 | CCE271 |
| MIM311 | Power Electronics and Motor Drives | 3 | 5 | 125 | 2 | 2 | 1 | 5 | MIM214 |
| BME351 | Heat Transfer | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BME251 |
| - | University Elective (3) | 1 | 2 | 50 | 2 | 0 | 0 | 2 | |
| Total | | **18** | **30** | **750** | **14** | **5** | **9** | **28** | |
| Semester 6 | | | | | | | | | |
| BME311 | Mechanical Vibrations | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| MIM324 | Hydraulics and Pneumatics Control | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| MIM325 | Intelligent Mechatronic Control | 3 | 5 | 125 | 2 | 1 | 2 | 5 | MIM221 |
| BME321 | Machine Elements Design | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| MIM381 | Capstone | 1 | 2 | 50 | 0 | 1 | 1 | 2 | MIM322 |
| - | MIM Elective (1) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | ENG112 |
| Total | | **18** | **30** | **750** | **12** | **8** | **6** | **26** | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 7 | | | | | | | | | |
| BME411 | Machine Construction | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| CCE471 | Computer Vision in Mechatronic Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | MIM322 |
| MIM421 | Cyber-Physical Systems | 3 | 5 | 125 | 2 | 1 | 1 | 4 | CCE274 |
| MIM422 | Artificial Intelligence for Mechatronic Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | MIM221 |
| - | MIM Elective (2) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| MIM481 | MIM Graduation Project (1) | 2 | 4 | 100 | 1 | 0 | 3 | 4 | 101 CH<br>MIM381 |
| - | University Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| Total | | **18** | **30** | **750** | **13** | **6** | **8** | **27** | |
| Semester 8 | | | | | | | | | |
| MIM411 | Industrial Project Management | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| MIM412 | Maintenance Planning and Scheduling | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| MIM423 | Industrial Communications and Networks Systems | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| - | MIM Elective (3) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| - | MIM Elective (4) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| - | MIM Elective (5) | 3 | 5 | 125 | 2 | 1 | 1 | 4 | |
| MIM482 | MIM Graduation Project (2) | 3 | 5 | 125 | 1 | 0 | 4 | 5 | MIM481 |
| Total | | **18** | **30** | **750** | **13** | **5** | **11** | **28** | |

Mechatronics and Intelligent Machines Engineering Program
Level (1) 18+18
Semester 1
BAS111 Mathematics (1) 2 2 0 3 CH
BAS121 Vibration and Waves 2 2 1 3 CH
BAS141 Statics 2 2 0 3 CH
BAS131 Engineeriing Chemistry 2 2 1 3 CH
BAS143 Engineering Drawing (1) 1 3 0 2 CH
-- University Elective (1) 2 0 0 2 CH
-- University Elective (2) 2 0 0 2 CH
Semester 2
BAS112 Mathematics (2) 3 2 0 3 CH
BAS122 Electricity and Magnetism 2 1 2 3 CH
BAS142 Dynamics 2 2 0 3 CH
BAS113 Probability and statistics 2 1 0 2 CH
BME131 Production Engineering 2 0 1 2 CH
MIM111 Basics of Mechatronics 2 0 1 2 CH
CCE171 Computing in Engineering 2 1 0 2 CH
ENG111 English (1) 1 0 0 1 CH
Level (2) 18+18
Semester 1
MIM212 Computer Aided Drawing 1 1 2 2 CH
BAS211 Mathematics (3) 2 1 0 2 CH
CCE272 Electrical and Electronic Circuits 2 2 1 3 CH
BME211 Theory of Mechines 2 2 0 3 CH
MIM211 Measurement and Instrumentation 2 2 1 3 CH
BME251 Thermodynamics (1) 2 2 0 3 CH
BME241 Strength of material 2 1 0 2 CH
Semester 2
MIM212 Engineering Economy 2 1 0 2 CH
MIM221 Modeling and Simulation of Mechatronic Systems 2 1 2 3 CH
MIM214 Electrical Power and Machines 2 1 2 3 CH
MIM213 Sensors and Measurement Systems 2 0 1 2 CH
BME262 Fluid Mechatronics and Aerodynamics 2 0 1 2 CH
CCE273 Digital Logic and Microcontrollers 2 0 1 2 CH
CCE274 Introduction to Embedded Systems and Interfacing 2 1 2 3 CH
ENG112 English (2) 1 0 0 1 CH
Level (3) 18+18
Semester 1
MIM311 Power Electronics and Motor Drives 2 2 1 3 CH
CCE371 Object-Oriented Computer Programming 2 0 1 2 CH
BME351 Heat Trasfer 2 0 2 3 CH
MIM322 Design of Mechatroics Systems 2 1 2 3 CH
MIM323 Industrial Robotics 2 1 2 3 CH
MIM321 Introduction Industrial Automation 2 1 1 3 CH
-- University Elective 3 2 0 0 1 CH
Semester 2
BME311 Mechanical Vibrations 2 2 0 3 CH
BME321 Machine Elements Design 2 2 0 3 CH
MIM325 Intelligent Mechatronic Control 2 1 2 3 CH
MIM381 Capstone 0 1 1 1 CH
-- MIM Elective (1) 2 1 2 3 CH
MIM324 Hydraulics and Pneumatics Control 2 1 1 3 CH
ENG113 English (3) 2 0 0 2 CH
Level (4) 18+18
Semester 1
BME222 Mschine Construction 2 2 0 3 CH
MIM481 MIM Graduation Project (1) 1 0 3 2 CH
CCE471 Computer Vision in Mechatronic Systems 2 0 1 2 CH
MIM422 Artificial Intelligence For Mechatronic Systems 2 2 1 3 CH
MIM421 Cyber-Physical Systems 2 1 1 3 CH
-- MIM Elective (2) 2 1 2 3 CH
-- NUB Elective 4 2 0 0 2 CH
Semester 2
MIM411 Industrial Project Management 2 1 0 2 CH
MIM412 Maintenance Planning and Scheduling 2 1 0 2 CH
MIM482 MIM Graduation Project (2) 1 0 4 3 CH
MIM423 Industrial Communications and Networks Systems 2 1 1 2 CH
-- MIM Elective (3) 2 1 2 3 CH
-- MIM Elective (4) 2 1 2 3 CH
-- MIM Elective (5) 2 1 2 3 CH
MIM
TRN 2x1 Field Training (1) 0 5 8 0 CH
TRN 3x1 Field Training (2) 0 5 8 0 CH
- The maximum allowed study duration is 8 academic years
- Cumulative GPA at any main semester < 2.0
- 10 Weeks of Field
- Training can be Started at the end of level 2 (Sophomore level)
University Req. 11 CH
Program. Major Req 58 CH
Faculty Req. 33 CH
Program. Minor Req 42 CH
Course Code
Course Title
Lec Tut Lab
# CH

- **Mechatronics and Intelligent Machines Engineering Program Course Content**

## Courses offered by Mechatronics and Intelligent Machines Engineering Program (MIM)

| MIM111 | Basics of Mechatronics | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content |
|---|
| Introduction to mechatronics systems: definitions, impact on industry and the techno commercial benefits, mechatronics system hierarchy, basic mechatronics modules. Mechatronics design methodology: traditional approaches, V-model, nested, simplified examples. Essential tools for the mechatronics design approach using the V- model: MATLAB/SIMULINK, PROTEUS VSM, SOLID WORKS packages with examples. Basic mechatronics modules and its relation to the hierarchy of the mechatronic systems. Design and implementation of the Discrete Event Mechatronics Module (DE-MM): Choice of sensors, actuators, controller, implementation in the form of mini projects |
| Laboratory |
| |
| References |
| • "Mechatronics: Principles and Applications" by Godfrey C. Onwubolu (2018)<br>• "Mechatronics: Principles and Applications" by Mahalik (2005) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 4٠% |

| MIM211 | Measurement and Instrumentation | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Characteristics of Sensors, Flow rate Measurement Principles, Orifice-Meter, Venturi-Meter, Coriolis Flow Meter, Turbine Flow Meter, Rotameter, Velocity Measurements, Pitot Tube, Vane Anemometer, Hot Wire Anemometer, Laser Doppler Anemometer, Particle Image Velocimetry, Pressure Measurement, Manometer, Bourdon Tube Gauge, Piezoelectric Sensor, Temperature Measurement, Thermometer, Thermocouple, Thermistor, Optical Pyrometer, Rotational Speed Meters, Tachometer, Torque Measurement, Strain Gauges, Gas Analysis, Electro-Chemical Gas Analyzer, Accuracy, Precision, Statistical Methods Error Analysis and Uncertainty. |
| Laboratory |
| • Statical Analysis of Calibration Data of a Pressure Gauge.<br>• Probability Analysis of Scattered Data Obtained Randomly for An Experimental Error.<br>• Using the Temperature Measurement Bench for Calibrating a Thermocouple and Resistance Thermometers.<br>• Temperature Measurements Using the Optical Pyrometer.<br>• Calibrating Different Kinds of Pressure Transducers Fitted on an Experimental pressure Measurement Bench.<br>• Using the Dead Weight Tester to Calibrate a Bourdon Tube Pressure Gauge.<br>• Calibrating Different Kinds of Flow Meters Fitted on an Experimental Flow Measurement Bench.<br>• Using the Pitot Tube to Measure the Distribution Over the Tube Cross Section of the Velocity of air Flowing Inside the Tube<br>• Using the Orsat Apparatus to Analyze the Products of Combustion Gases Products |
| References |
| • Sawhney, A. K., A Course in Mechanical Measurements and Instrumentation, Dhanpat and Sons, Delhi, 1989.<br>• Doebelin, Erest O., Measurement Systems Applications and Design, McGraw Hill, 1990.<br>• Holman, J. P., Experimental Methods for Engineers, McGraw Hill, 1999. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 10% | 20% | 40% |

| MIM21٦ | Engineering Economy | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Origins of engineering economy, Principles of engineering economy, Design and manufacturing processes and EE, Cost estimation and cost terminology, Accounting, Balance sheet, Profit loss statement, Concept of equivalence, Money time relationships, Simple and compound interest rates, Single amounts and uniform series, Increasing and decreasing gradient, Application of money, Time relationships, Present value, Internal rate of return, External rate of return, Payback period, Evaluation of alternatives for different useful life and study period, Depreciation methods, Replacement analysis, Determination of the economic life of challenger and defender, Engineering economy techniques for evaluation of public projects. |
| Laboratory |
| |

| References |
|---|
| • 'Engineering Economy' – 7th Edition Authors: Leland T. Blank & Anthony J. Tarquin. McGraw-Hill - ISBN 0073376301<br>• 'Basics of Engineering Economy', Anthony J. Tarquin. McGraw-Hill – ISBN 978–0–07–340129–4 ISBN 0–07–340129–3 (hard copy : alk. paper)<br>• 'Engineering Economy Analysis', Newman, Lavelle and Eschenbach, Engineering Press (8th edition). |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM213 | Sensors and Measurement Systems | 2 CH |
|---|---|---|
| Prerequisites | Measurement and Instrumentation – MIM211 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | - | 1 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

| Course Content |
|---|
| Fundamentals of sensors and measurement systems. Instrument types and performance Characteristics. Intelligent sensors. Sensor technologies. Temperature measurement. Pressure measurement. Flow measurement. Level measurement. Mass, force, and torque measurement. Translational motion, vibration, and shock Measurement. Rotational motion transducers. |
| Laboratory |
| • Temperature Sensor Calibration and Characterization<br>• Pressure Sensor Performance Analysis<br>• Proximity Sensor Testing and Optimization |

- Optical Sensor Calibration and Alignment
- Accelerometer Calibration and Dynamic Response Analysis
- Strain Gauge Application and Measurement
- Force and Torque Sensor Calibration
- Data Acquisition and Signal Processing

Sensor Fusion for Robotics Applications

References

- A. S. Morris, R. Langari, Measurement and Instrumentation: Theory and Application, third edition, Elsevier Inc. (2021).
- Walter Lang, Sensors and Measurement Systems, River Publishers (2021).

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM214 | Electrical Power and Machines | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical and Electronic Circuits – CCE272 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Power system components: Generation, transmission, distribution, substations, DC Machines: Construction, operation, characteristics (motors and generators) Starting, speed control, applications, Transformers: Construction, operation, equivalent circuits, regulation, AC Machines: Three-phase induction motors: Construction, operation, types, characteristics, speed control, Special Machines: Stepper motors, brushless DC motors, servomotors, universal motor.

Laboratory

- Transformer Testing and Analysis
- Induction Motor Performance Testing
- Generator Operation and Synchronization
- Power System Protection and Relay Testing

References

- "Electric Machinery Fundamentals" by Stephen J. Chapman (2017)
- "Electrical Machines, Drives, and Power Systems" by Theodore Wildi and Muhammad H. Rashid (2013)
- "Electric Machinery and Transformers" by Bhag S. Guru and Huseyin R. Hiziroglu (2001)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM311 | Power Electronics and Motor Drives | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Power and Machines – MIM214 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to power electronics, devices and circuits. Rectifier circuits. AC Voltage controllers & AC static switches. DC to DC Converters. PWM inverters. DC motor Drives. AC motor Drives.

Laboratory

- DC-DC Converter Design and Analysis
- Inverter Control and PWM Techniques
- Motor Drive Performance Testing
- Power Semiconductor Devices Characterization

References

- "Power Electronics: Converters, Applications, and Design" by Ned Mohan, Tore M. Undeland, and William P. Robbins (2003)
- "Power Electronics Handbook: Devices, Circuits, and Applications" by Muhammad H. Rashid (2018)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM411 | Industrial Project Management | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Definitions used in project management, The project life cycle, Project stages, Relationships and responsibilities of the different project parties, The Art and Science of Project Leadership. Building Team Culture and Personal Authority. Foundation principles of project management. Agile and waterfall development process. Project productivity, Quality management.

| Laboratory | | | |
|---|---|---|---|
| | | | |
| References | | | |
| • Eric Verzuh - The Fast Forward MBA in Project Management, Wiley (2021)<br>• Project Management Institute - A Guide to the Project Management Body of Knowledge (PMBOK (R) Guide) (PMBOK® Guide)-Project Management Institute (2021). | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM412 | Maintenance Planning and Scheduling | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |
| Course Content | | | |
| Introduction and concepts in maintenance management, Maintenance organization, Types of maintenances: preventive, predictive, programed, emergency, repair, etc. Maintenance planning and scheduling, spare parts management, and control. Total Productive Maintenance (TPM), maintenance information system, maintenance cost, maintenance safety. Different approaches to evaluate Overall Equipment Effectiveness (OEE) and understanding Six Major Equipment Losses. | | | |
| Laboratory | | | |
| | | | |
| References | | | |
| • Nyman, D., & Levitt, J. (2001). Maintenance planning, scheduling, and coordination. Industrial Press Inc. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM221 | Modeling and Simulation of Mechatronic Systems | 3 CH |
|---|---|---|
| Prerequisites | Probability and statistics – BAS113 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Introduction to systems and their classifications, open loop and closed loop systems, Mathematical Modeling fundamentals of: mechanical systems including: mechanical vibration fundamentals such as: natural frequency, underdamping, overdamping, etc. Modeling using block diagrams or any other relevant method. Control systems analysis: plant and system responses in the time and frequency domains .Using software packages such as MATLAB. Industrial controllers (P, PI, PID etc.) and their corresponding specifications and effect on the system. The control system analysis tools and performance evaluation (e.g. steady state error, stability and performance indices). P, PI, and PID controller tuning using Zeigler-Nichols

**Laboratory**

- Introduction to Simulation Software: introduced to simulation software commonly used in mechatronic systems, such as MATLAB/Simulink, LabVIEW, or SolidWorks.
- Modeling Mechanical Systems:
- Modeling Electrical Systems
- Integration of Mechanical and Electrical Systems:

**References**

- "Modeling and Simulation of Mechatronic Systems: With Applications" by Annalisa Milella Donato Di Paola, and Grazia Cicirelli (2019).
- "Mechatronics: Principles and Applications" by Godfrey Onwubolu (2018).
- "Modeling and Simulation of Mechatronic Systems using Simscape" by Nassim Khaled (2017).
- "Mechatronics: A Foundation Course" by Clarence W. de Silva (2016).

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM321 | Introduction to Industrial Automation | | 3 CH |
|---|---|---|---|
| Prerequisites | Digital Logic and Microcontrollers – CCE273 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Definition and scope of industrial automation - Historical evolution of automation - Sensors and actuators - Control systems - Types of automation (fixed, programmable, flexible, integrated)- Supervisory Control and Data Acquisition (SCADA) - Distributed Control Systems (DCS) - Introduction Programmable Logic Controllers (PLC) - Industrial IoT (IIoT) and Smart Factories - Basics of Motion Control Systems.

Laboratory

- PLC Programming Basics
- Sensor Integration and Data Acquisition
- HMI (Human-Machine Interface) Design
- PLC Networking and Communication
- Introduction to Industrial Robotics

References

- "Industrial Automation: Hands-On" by Frank Lamb (2013)
- "Introduction to Industrial Automation and Control" by R.K. Rajput (2017)
- "Industrial Automation and Robotics: An Introduction" by A.K. Gupta (2014)

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| MIM322 | Design of Mechatronics Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Basics of Mechatronics – MIM111 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Mechatronic product development process, Product requirements and needs (customer and engineering requirements/specifications), design constraints, modular mechatronic systems and hierarchy. Mechatronics design methodology: traditional approaches, VDI 2206, V-model, nested Vmodel, simplified examples and case studies. Selections of mechanisms, actuators, sensors, and controllers, actuator and motor sizing. Essential tools for the mechatronics system design using the V-model: MATLAB/SIMULINK, LabVIEW, PROTEUS VSM, SOLIDWORKS, microcontrollers, etc. packages. Design and implementation of mechatronic systems via mini-projects

Laboratory

- Demonstration and presentation of at least two mechatronic systems.
- Performing some experiments on some basic components.

Using an ADDA card to control two types of systems through a PC, based system.

References

- Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
- Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 40% | - |

| MIM323 | Industrial Robotics | 3 CH |
|---|---|---|
| Prerequisites | Strength of Materials – BME241 | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 2 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Introduction to robotics: history of robotics, types of robotics (Serial, parallel, walking, bipedal, etc.), robotics applications, Transformation. Kinematics analysis: generalized coordinates, rotation representations, Euler angles, rotation matrix, homogeneous transformation matrix, Denavit Hartenberg rules, forward and inverse kinematics, Jacobian matrix, singularities. Trajectory planning: trajectory generation problem, joint and Cartesian planning, cubic polynomial, higher order polynomials. Dynamics analysis: joint space dynamics, Newton-Euler algorithm, inertia tensor, Lagrange equations, inverse and forward dynamics. Control: computed torque techniques, joint space control, PD control stability, trajectory tracking.

Laboratory

| |
|---|
| Industrial Robotics 1st Edition by Harry Colestock (Author) |
| References |
| • Ulrich Nehmzow, Mobile Robotics: A Practical Introduction, Springer Verlag, 1999.<br>• Murphy, Robin R., Introduction to Al Robotics, MIT Press, 2000.<br>• Jadran Lenarcic and Federico Thomas, Advances in Robot Kinematics: Theory and Applications, Kluwer Academic Publishers, 2002. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 20% | 20% | 20% | 40% |

| MIM324 | Hydraulics and Pneumatics Control | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Physical principles and fundamentals of fluidic control systems, applications of pneumatic and hydraulic systems. Hydraulic control system components: power units, reservoirs, filters, piping and hoses, accumulators, pumps (positive versus non-positive displacement pumps, vane pumps, gear pumps, variable displacement pumps, piston pumps, swashplate pumps, pump control systems), valves, actuators (motors and cylinders), hydraulic and electrohydraulic circuits design, interfacing and control. Case studies from industry, heavy and earthmoving equipment. Pneumatic systems: service unit, compressors (piston, screw, rotary), filters, air dryers, lubricators, pressure regulation valves, control valves, etc., electro-pneumatic circuits design and control using sequential approaches. |
| Laboratory |
| • Basic Hydraulic System Setup such as pumps, cylinders, valves, and reservoirs, and learn how to connect them using hydraulic hoses and fittings.<br>• Pneumatic Control Circuits: different types of pneumatic circuits, such as single-acting and double-acting cylinders<br>• Hydraulic and Pneumatic Actuators: various types of hydraulic and pneumatic actuators, such as hydraulic cylinders, hydraulic motors, pneumatic cylinders, and rotary actuators.<br>• Fluid Power Control with PLCs<br>• Troubleshooting and Maintenance |
| References |
| • Anthony Esposito, Fluid Power with Applications, Prentice Hall, 2003. |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 20% | 20% | 20% | 40% |

| MIM325 | Intelligent Mechatronic Control | | 3 CH |
|---|---|---|---|
| Prerequisites | Modeling and Simulation of Mechatronic Systems – MIM221 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Automatic control fundamentals, review on poles and zeros in the S-Plane, PID controller design and tuning techniques, design controllers using root locus, state space modelling: basics and Canonical forms (controllable and observable canonical forms), conversion from state space to transfer function and transfer function to state space, stability in state space form, state feedback controller design pole placement, observers, and observer design. Digital control and discrete systems: Introduction, digitization, analysis of discrete systems, Z-transform, pulse transfer function, stability in Z-domain, fundamentals of digital control systems design. Fuzzy logic control, neural network control in Mechatronic systems.

Laboratory

- Fuzzy Logic Control Implementation
- Neural Network-Based Control Design
- Reinforcement Learning for Mechatronic Systems
- Integrated Control of Mechatronic Systems

References

- K. Ogata, Modern Control Engineering, Pearson, 5th. Ed., 2009.
- El- Hawary, M., Control System Engineering, Prentice Hall, 1984.
- Franklin, G.F. and Ponell, D., Digital Control of Dynamic Systems, Addison Wesley, 1992.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| MIM421 | Cyber-Physical Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Introduction to Embedded Systems and Interfacing – CCE274 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Cyber Physical System Introduction, Sensors and Actuators for Physical Processes, System Modeling, Model based Design, and Timed-Automata, Real-time Scheduling with Resource-constrained Platform, Feedback Control for Computing Systems, Networked System Composition, Applications of Cyber-Physical Systems in robotics, medical devices, and smart manufacturing plants.

Laboratory

- Sensor Integration and Data Fusion
- Real-Time Embedded Systems Development
- Networked Control Systems Implementation
- System Integration and Testing:

References

- "Cyber-Physical Systems: A Computational Perspective" by Rajeev Alur and Luca Carloni (2016)
- "Cyber-Physical Systems: Foundations, Principles and Applications" edited by Houbing Song, Danda B. Rawat, Sabina Jeschke, and Christian Brecher (2016)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM422 | Artificial Intelligence for Mechatronic Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Modeling and Simulation of Mechatronic Systems – MIM221 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to artificial intelligence (AI) and its applications in mechatronic engineering. Fundamentals of machine learning and deep learning. AI algorithms and techniques relevant to mechatronic systems, such as neural networks, genetic algorithms, and fuzzy logic. Integration of AI techniques with mechatronic systems for optimization, control, and decision-making. AI-based sensing and perception for autonomous mechatronic systems. AI-driven design and optimization of mechatronic components and systems. Case studies and real world applications of AI in mechatronic engineering, such as robotics, automation, and smart manufacturing. Ethical considerations and challenges in the deployment of AI in mechatronic systems.

Laboratory

- Machine Learning for Sensor Data Processing
- Reinforcement Learning for Robot Control
- Deep Learning for Image Processing in Robotics
- Natural Language Processing for Human-Robot Interaction

References

- Ahmad, Rizwan, et al. "Artificial intelligence applications in mechatronics." International Journal of Advanced Robotic Systems 15.4 (2018)
- Chang, Chia-Hung, et al. "Integration of artificial intelligence and mechatronics—A review." Sensors and Actuators A: Physical 259 (2017)

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| MIM423 | Industrial Communications and Networks Systems | 2 CH |
|---|---|---|
| Prerequisites | - | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 75 | 3 |

Course Content

Introduction: signaling, data communication, protocols, layered architecture, network standards. Industrial network standards and protocols: EIA-232, EIA-485, DH-485 and industrial local area networks, industrial Ethernet, Power over Ethernet (PoE), fiber optics, Modbus, Modbus+, Modbus/TCP, HART, AS-I, Device Net, Controller Area Network (CAN) and CAN bus, Field Bus, Profibus, TCP/IP. ZigBee wireless sensor and control network: IEEE 802.15.4 protocol, addressing, routing, ZigBee RF4CE. Industrial network security: vulnerabilities, threat detection, risk assessment, monitoring and control, standards and regulations, securing industrial networks. Applications

| Laboratory |
|---|
| • data communication<br>• protocols<br>• layered architecture<br>• network standards |
| References |
| • Industrial Communication Technology Handbook" edited by Richard Zurawski (2005)<br>• "Industrial Ethernet: A Pocket Guide" by John Rinaldi (2004)<br>• "Industrial Communication Systems" by Jürgen Jasperneite, Peter Neumann, and Michael Weber (2011) Garold Oberlender |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM331 | Industrial Automation | 3 CH |
|---|---|---|
| Prerequisites | Introduction to Industrial Automation, MIM321 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| Industrial Processes: Understanding different industrial processes - Applications of automation in various industries. Automation Components: Basic components (sensors, controllers, actuators) - PLC Architecture and Working Principle. Ladder Logic Programming Basics - PLC Inputs, Outputs, and Communication - Fieldbus Protocols (Modbus, Profibus, DeviceNet, etc.) - Industrial Ethernet (Profinet, EtherNet/IP) - Automation System Benefits. |
| Laboratory |
| • PLC Programming Basics<br>• Sensor Integration and Data Acquisition<br>• HMI (Human-Machine Interface) Design<br>• PLC Networking and Communication<br>Introduction to Industrial Robotics |
| References |
| • "Industrial Automation: Hands-On" by Frank Lamb (2013)<br>• "Introduction to Industrial Automation and Control" by R.K. Rajput (2017)<br>• "Industrial Automation and Robotics: An Introduction" by A.K. Gupta (2014) |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | - | 40% |

| MIM431 | Process Instrumentation and Control | | 3 CH |
|---|---|---|---|
| Prerequisites | Industrial Automation, MIM331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Instrumentation Basics: Types of sensors and transducers - Measurement principles (temperature, pressure, flow). Control Systems: Feedback and feedforward control - PID controllers - Tuning of control loops. Signal conditioning, signal transmission, process control, Process Instrumentation: Detailed study of instruments in industrial processes - Calibration and maintenance.

Laboratory

- Calibration and Testing of Instrumentation Devices
- PID Controller Tuning and Optimization
- PLC Programming for Process Control
- HMI Design and Visualization for Process Monitoring
- Safety Instrumented Systems (SIS) Implementation

References

- "Process Control: Modeling, Design, and Simulation" by B. Wayne Bequette (2003)
- "Process Dynamics and Control" by Dale E. Seborg, Duncan A. Mellichamp, Thomas F. Edgar, and Francis J. Doyle III (2010)

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | - | 40% |

| MIM432 | PLC and HMI (Human-Machine Interface) | | 3 CH |
|---|---|---|---|
| Prerequisites | Industrial Automation, MIM331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| PLC Fundamentals: Programming languages (Ladder Logic, Function Block Diagram) - Input and output modules. HMI Design: Principles of HMI design - Creating user-friendly interfaces. Integration: Connecting PLCs and HMIs - Hands-on programming exercises. |
| Laboratory |
| • Advanced PLC Programming Techniques<br>• HMI Design and Development<br>• PLC-HMI Integration and Communication:<br>• Simulation and Testing of PLC-HMI Systems |
| References |
| • "Programmable Logic Controllers: Principles and Applications" by John W. Webb and Ronald A. Reis (2016)<br>• "PLC Programming using RSLogix: Understanding Ladder Logic and the Studio Platform" by Gary Dunning (2017) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 20% | 20% | 20% | 40% |

| MIM433 | Automation Systems and Supervisory Control | | 3 CH |
|---|---|---|---|
| Prerequisites | Industrial Automation, MIM331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Overview of Automation Systems: Integrated automation solutions -Distributed control systems. Supervisory Control and Data Acquisition (SCADA): SCADA architecture and components - Real-time monitoring and control. Case Studies: Implementation of automation systems in industries - Troubleshooting and optimization. |
| Laboratory |
| |
| References |
| • Dorrell, David, and Andrew Remenyte-Prescott. "Supervisory control and data acquisition (SCADA) systems: An overview of research trends and applications." (2019):<br>• Cacace, Francesco, et al. "Cybersecurity challenges in supervisory control and data acquisition (SCADA) systems: (2020): 101733. |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | - | 40% |

| MIM434 | Quality Control | | 3 CH |
|---|---|---|---|
| Prerequisites | Industrial Automation, MIM331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | ١ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction to Quality Control, Quality Management Systems, The elements of a quality management system, Quality planning,Statistical Process Control, Inspection and Testing, Corrective and Preventive Actions, Root cause analysis, Corrective action plans, Preventive action plans, Quality Tools and Techniques, Advanced Quality Control Topics, Six Sigma, Lean manufacturing, Total Quality Management (TQM), Quality function deployment (QFD) |
| Laboratory |
| • Measurement Systems Analysis (MSA)<br>• Statistical Process Control (SPC)<br>• Design of Experiments (DOE)<br>• Six Sigma Methodology |
| References |
| • "Introduction to Statistical Quality Control" by Douglas C. Montgomery (2017)<br>• "Total Quality Management: Key Concepts and Case Studies" by Subburaj Ramasamy (2018) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM341 | Introduction to Automotive | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|

Ground vehicle types. Vehicle main structure. Engine: types, starting system, fuel supply system and ignition system. Clutch: dry friction, wet friction, hydraulic torque converter. Transmission: manual transmission, automatic transmission. Differential and final drive. Tires: construction and manufacturing methods. Wheels: Wheel alignments and angles. Braking systems: types, components, and actuation. Suspension systems: types, components, construction. Steering system: types, powered assisted systems. Introduction to automotive advanced technologies.

Laboratory

- Engine: types
- Starting system
- Fuel supply system
- Ignition system.
- Clutch

References

- Automotive Technology: Principles, Diagnosis, and Service" by James D. Halderman (2020)
- "Automotive Mechanics" by William H. Crouse and Donald L. Anglin (2015)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM441 | Automotive Engines and Fuel Systems | 3 CH |
|---|---|---|
| Prerequisites | Introduction to Automotive, MIM341 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Classification of internal combustion engines, Standard Otto and Diesel cycles, Actual working cycles, Standard air and fuel cycles. Combustion in spark ignition engines, Combustion periods, Ignition points, Flammability limits, Detonation, Flame propagation, Pressure rise, Combustion chambers. Combustion in compression ignition engine. Friction and lubrication, Lubrication system, Lubricating oil and additives properties, Oil consumption, Oil filters. Engine cooling. Objectives of fuel systems. Classification of fuel systems. Fuel requirement at different operating conditions. Spark ignition and compression ignition engines fuel calibration. Mechanical and Electronic injection systems of spark ignition and compression ignition engines. Procedures for testing of injection systems.

Laboratory

- Spark ignition and compression ignition
- Engines fuel calibration.
- Mechanical and Electronic injection systems of spark ignition and compression ignition engines. Procedures for testing of injection systems.

References

- "Automotive Technology: Principles, Diagnosis, and Service" by James D. Halderman (2020)
- "Automotive Mechanics" by William H. Crouse and Donald L. Anglin (2015)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM442 | Automotive Mechatronic Systems | 3 CH |
|---|---|---|
| Prerequisites | Introduction to Automotive, MIM341 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Introduction to Mechatronics, Sensors, transducers, and Actuators in automotive systems. Basics of Applied electronics in modern vehicles: signal condition of sensors, drive circuits of actuators. Automotive systems, smart chassis, X-By-Wire, etc. Electric drive vehicles. Autonomous vehicles and its infrastructure. Introduction to microcontrollers. (Project based lab).

Laboratory

- Engine Control Unit (ECU) Diagnostics
- Vehicle Dynamics Testing and Analysis
- Advanced Driver Assistance Systems (ADAS) Calibration
- Hybrid and Electric Vehicle (HEV/EV) Powertrain Testing
- Vehicle Communication Network Diagnosis

References

- "Automotive Mechatronics: Operational and Practical Issues" by B. T. Fijalkowski and Dawid Szynowski (2011)
- "Automotive Mechatronics: Automotive Networking, Driving Stability Systems, Electronics" by Konrad Reif (2015)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM443 | Road Vehicle Dynamics | 3 CH |
|---|---|---|
| Prerequisites | Introduction to Automotive, MIM341 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Steering Systems: Steering mechanisms, equivalent steering gear ratio, design, Steering of dependent and independent suspension. Concepts of neutral, oversteer and understeer vehicles, vehicle directional stability. Vehicle comfort criteria: sources of vibration inputs. International standards limit of human response to in-vehicle vibrations.

**Laboratory**

- Vehicle Handling Characteristics Testing
- Braking Performance Testing
- Suspension System Analysis
- Tire Testing and Analysis
- Vehicle Dynamics Simulation

**References**

- "Vehicle Dynamics: Theory and Application" by Reza N. Jazar (2008)
- "Road Vehicle Dynamics: Fundamentals and Modeling" by Georg Rill and Wolfgang Wiedemann (2012)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM444 | Design of Autonomous systems | 3 CH |
|---|---|---|
| Prerequisites | Introduction to Automotive, MIM341 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | ١ |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Introduction to autonomous systems: autonomous versus automatic systems, automated and autonomous human-centered technical systems, semi-autonomy, and autonomous behavior. Perception: multi-sensor fusion, localization, navigation and mapping, obstacle recognition and

detection. Planning and actuation: task decomposition, reactive behavior, preplanned knowledge and skill-based behavior. Knowledgebase: facts and procedures, acquisition, exploration, skill transfer, learning. Autonomous systems architecture: behavioral principles, expert systems, knowledge-bases, multi-level control concepts. Applications of autonomous systems.

Laboratory

- Autonomous Navigation and Path Planning
- Sensor Fusion and Perception
- Machine Learning for Autonomous Systems

References

- Beni, Gerardo, and Jing Wang. Swarm Intelligence in Autonomous Robotics. Springer, 2008.
- Thrun, Sebastian, Wolfram Burgard, and Dieter Fox. Probabilistic Robotics. MIT Press, 2005.
- LaValle, Steven M. Planning Algorithms. Cambridge University Press, 2006.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 20% | 20% | 20% | 40% |

| MIM351 | Advanced Machining Processes | 3 CH |
|---|---|---|
| Prerequisites | | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 1 | 2 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

Introduction, Different manufacturing Processes identifying, Common characteristics of traditional machining, Machining definitions and Characteristics, Working and Auxiliary Motions in Machine Tools, Concept of Speed, Feed, Depth of Cut, and Machining Time calculations, Element of Machining processes Types of cutting process, Lathe operations, Considerations for Machining Operations, Single Point cutting tool, Tool signature, Different types of cutting tools, Drilling operations, Drilling tool nomenclature, Milling operations, Grinding operations, Chip mechanism and types, Cutting tool Life, Boring, Trepanning, Reaming, Gear Manufacturing Operations, Broaching.

Laboratory

- Electrical Discharge Machining (EDM)
- Abrasive Jet Machining (AJM)
- Ultrasonic Machining (USM)
- Electrochemical Machining (ECM)

- Laser Machining and Additive Manufacturing

References

- "Advanced Machining Processes of Metallic Materials: Theory, Modelling and Applications" by Wit Grzesik (2008)
- "Advanced Machining Processes" by Hassan El-Hofy (2005)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM451 | CNC operations | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Machining Processes, MIM351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction, Understanding of machining process procedure, Differences between Machines with and without CNC system, Basics of Machining Operations, Working and Auxiliary Motions in Machine Tools, Types and Materials of Cutting Tools, Concepts of Speed, Feed, Depth of Cut, and Machining Time, Calculations and Selection of Machining Parameters, CNC Lathe Components Fillet Operation, Grooving Operation, Drilling Operation (Cycles), Combine Operations, ARTCAM, Powermill, , Fusion 360. Basics of Milling and Drilling Operations, Working and Auxiliary Motions in Machine Tools, Types and Materials of Cutting Tools (Cutters and Twist Drillers), Concepts of Speed, Feed, Depth of Cut, and Machining Time, Calculations and Selection of Machining Parameters, Milling operations: Rapid Motion, Motion with Feed, Plane Functions, Cutter Compensating, Circular Interpolation, Drilling canned cycle, Tapping

Laboratory

- CNC Programming Fundamentals
- CNC Machine Setup and Tooling
- Advanced CNC Machining Techniques
- CNC Machine Calibration and Maintenance
- CNC Machining Optimization and Process Improvement

References

- "CNC Machining Handbook: Building, Programming, and Implementation" by Alan Overby (2013)
- "CNC Programming Techniques: An Insider's Guide to Effective Methods and Applications" by Peter Smid (2019)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM452 | Ceramics and Polymers | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Machining Processes, MIM351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to the non-metal and non-polymer class of materials, including glass, Ceramics and binding materials. Principles of glasses: glassy status, structure, thermodynamics, examples of glass viscosity and brittleness, density and thermal strain, heat capacity and heat transfer, failure, dispersion and optic glasses, absorption, Ligandenfeld theory, coloration, ionic construction, electric conduction, dielectric loss, chemical resistance, corrosion, aging, dissolution, permeability, diffusion. Principles of ceramics: review on atomic structure characteristics. Principles of adhesive agents and construction materials: physical and chemical principles of multi material systems, Portland cements, other cements, calk, Testing and standardization, development of mineral, adhesive agents.

Laboratory

- Ceramic processing techniques such as powder compaction, sintering, and glazing.
- Prepare ceramic samples using various processing methods and characterize their properties using techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM), and mechanical testing.

References

- "Introduction to Ceramics" by W.D. Kingery, H.K. Bowen, and D.R. Uhlmann (1976)
- "Ceramic Materials: Science and Engineering" by C. Barry Carter and M. Grant Norton (2013)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM453 | Additive Material Technology | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Machining Processes, MIM351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

General overview, Definition of Additive Manufacturing, Additive Manufacturing Technologies for Metallic Materials: Feedstocks, processes, applications Metallurgical aspects for additive Additive manufacturing technologies for Polymers, Additive manufacturing Technologies for Ceramics, The Generic AM Process, CAD, Cura, The Generic AM Process, Automated Fabrication (Autofab), Freeform Fabrication or Solid Freeform Fabrication, Additive Manufacturing or Layer-Based, Rapid Prototyping, Stereolithography or 3D Printing, Computer-Aided Engineering/Technologies (CAX), Liquid Polymer Systems, Discrete Particle Systems, Molten Material Systems, Solid Sheet Systems, Heat Sources.

Laboratory

- Set up and calibrate additive manufacturing machines such as 3D printers
- Print Quality Assessment and Optimization
- Post-Processing Techniques for Additive Manufacturing Parts
- Advanced Additive Manufacturing Applications

References

- "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing" by Ian Gibson, David W. Rosen, and Brent Stucker (2014)
- "Additive Manufacturing: 3D Printing for Prototyping and Manufacturing" by Andreas Gebhardt (2016)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM454 | Non-Traditional Machining | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Machining Processes, MIM351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | ١ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction, Different between traditional and nontraditional machining, Mechanical non-traditional machining: Ultra-sonic machining (USM), Water Jet Machining (WJM), Air Jet Machining (AJM) and Abrasive Water Jet Machining (AWJM), Chemical non-traditional machining: Chemical milling (CHM), Electrical non-traditional machining: Electro-chemical machining (ECM), Thermal non-traditional machining: Electrical Discharge Machining (EDM), Wire Electrical Discharge Machining (WEDM), Laser Beam Machining (LBM) and Plasma Beam Machining (PBM), Practicing on Lasre, and Plasma CNC machines. |
| Laboratory |
| • Electrochemical Machining (ECM)<br>• Ultrasonic machining techniques for machining hard and brittle materials such as ceramics, glass, and advanced composites ultrasonic machining techniques for machining hard and brittle materials such as ceramics, glass, and advanced composites<br>• Abrasive jet machining processes for precision material removal using high-velocity abrasive particles |
| References |
| • "Nontraditional Machining Processes: Research Advances" by J. Paulo Davim (2013)<br>• "Non-Traditional Machining Handbook" by Arthur J. W. Brooks (2007) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM361 | Advanced Robotics Analysis and Control | | 3 CH |
|---|---|---|---|
| Prerequisites | Industrial Robotics, MIM323 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Review on kinematics of open-kinematic chains and serial robots, Analysis of the robot workspace, kinematic analysis of: complex chain robots such as tree structure robots with fixed and float bases, closed-kinematic chains, parallel robots, Dynamic analysis of open-kinematic chains and serial robots, complex chain robots such as tree structure robots with fixed and float bases, closed-kinematic chains, parallel robots. Geometric calibration of robots, Motion, Compliant and force control in robotics |
| Laboratory |

- Kinematic analysis of robotic manipulators using simulation software such as MATLAB or ROS
- Dynamic modeling and simulation of robotic systems to analyze their motion and control behavior
- Implementt various control algorithms for robot manipulators, such as PID control, computed torque control, and adaptive control.

References

- "Robot Modeling and Control" by Mark W. Spong, Seth Hutchinson, and M. Vidyasagar (2005)
- "Robotics: Modelling, Planning and Control" by Bruno Siciliano and Lorenzo Sciavicco (2009)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM461 | Mobile Robotic Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Robotics Analysis and Control, MIM361 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to mobile robots, types, Principle of mobile robot locomotion and its types, Steering mechanisms. Types of mobile robots: ground robots (wheeled and legged robots), aerial robots, underwater robots and water surface robots. Kinematics of wheeled mobile robot, degree of freedom and bots. Dynamics of mobile robot, Computer based dynamic. Motion control of mobile robots: Motion controlling methods, kinematic control, dynamic control and cascaded control. Swarm robots, cooperative and collaborative robots, mobile manipulators, autonomous mobile robots. This course will include projects on mechanical Design of a mobile robot, integration of a mobile robot Robot design, Actuator sizing, system Modeling, and implementations

Laboratory

- Kinematics of wheeled mobile robot, degree of freedom and bots.
- Dynamics of mobile robot, Computer based dynamic.
- Motion control of mobile robots: Motion controlling methods, kinematic control, dynamic control and cascaded control. Swarm robots

References

- "Introduction to Autonomous Robots" by Nikolaus Correll, Bradley Hayes, and Gregory

| |
|---|
| Dudek (2019)<br>• "Mobile Robotics: A Practical Introduction" by Ulrich Nehmzow (2012) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| MIM462 | Human-Robot Interaction | 3 CH |
|---|---|---|
| Prerequisites | Advanced Robotics Analysis and Control, MIM361 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 2 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

| Course Content |
|---|
| Evolution of HRI, robot hardware (sensors (vision, audio, tactile sensors, etc.) and actuators, robot software (Software architecture, Software-implementation platform, Machine learning, and Computer vision ), application of HRI such as collaborative robots, self-driving cars, remotely operated robots, service robots (cleaning robots, delivery robots, tour guide robots, receptionist robots, security robots, and robots for sales promotion), robots for learning, robots for entertainment (an adaptive personal space using adaptive neural fuzzy inference system or ANFIS), Modeling Human-Robot Interaction with GOMS technique (Goals, Operations, Methods, and Selection rules ), Nonverbal Interaction, and facial expression recognition, Verbal Interaction (Automatic Speech Recognition (ASR)), Emotion, Behavioral Perception Architecture for Human-Robot Interaction, case study (Human-Robot Interface for end effectors) |
| Laboratory |
| • Robot hardware<br>• Modeling Human-Robot |
| References |
| • "Human-Robot Interaction: An Introduction" by Kerstin Dautenhahn (2017)<br>• "Human-Robot Interaction" edited by Cynthia Breazeal (2016) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM463 | Perception and Learning for Robotics | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Robotics Analysis and Control, MIM361 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Perception and Decision-Making in Robotics Overview, understanding of basic machine learning concepts, stochastic gradient descent for neural networks, reinforcement learning basics and fundamentals, Bayesian Filtering, deep Reinforcement learning, computer vision, Sensors and Sensor fusion, Kalman filters, localization, Pose Estimation, Learning based approaches to Depth and Motion Estimation. Using ROS to apply this course contents on Robotics |
| Laboratory |
| • basic machine learning<br>• gradient descent for neural networks |
| References |
| • "Probabilistic Robotics" by Sebastian Thrun, Wolfram Burgard, and Dieter Fox (2005)<br>• "Computer Vision: Algorithms and Applications" by Richard Szeliski (2010) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM464 | Selected Topics in Robotics and Artificial intelligence | | 3 CH |
|---|---|---|---|
| Prerequisites | Advanced Robotics Analysis and Control, MIM361 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | ١ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Selected topics in recent directions and applications in Robotics and Artificial intelligence will be presented in this course |
| Laboratory |
| |

| References | | | |
|---|---|---|---|
| | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM371 | Business Analytics and Management | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction to Business Analytics, business intelligence analytics, data analytics lifecycle. Real data-driven businesses, importance of analytics to business decision-making, types of analytics used to solve business problems. Relationship between project management and business analysis: Data handling, queries and reports to discover patterns and generate information associated with products, services and customers, business analytics uses data and models to explain the performance of a business and how it can be improved. This course discusses the benefits of employing analytics and a structured approach to problem-solving in management.

**Laboratory**

- data analytics lifecycle.
- Real data-driven businesses

**References**

- Business Analytics: Data Analysis & Decision Making" by S. Christian Albright, Wayne L. Winston, and Christopher J. Zappe (2020)
- "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett (2013)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM471 | Supply Chain Management | | 3 CH |
|---|---|---|---|
| Prerequisites | Business Analytics and Management, MIM371 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Concept of value-driven supply chains; design and management of effective supply chains; emphasis on current practice and recent trends. Coordinating supply chain: sales & operations planning, bullwhip effect. |
| Laboratory |
| • current practice and recent trends |
| References |
| • Chopra, Sunil, and Peter Meindl. Supply Chain Management: Strategy, Planning, and Operation. Pearson, 2019.<br>• Simchi-Levi, David, et al. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill Education, 2019. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM472 | Decision making and governance | | 3 CH |
|---|---|---|---|
| Prerequisites | Business Analytics and Management, MIM371 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | ١ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| The course entails an in-depth exploration of management control and performance measurement systems. It focuses on stages of the decision-making process, how to make decisions quickly within government/business institutions and governance of the decision-making process. |
| Laboratory |
| • Depth exploration of management control |
| References |

- "Thinking, Fast and Slow" by Daniel Kahneman (2011)
- "Governance and Decision-Making: A Sociological Introduction" by Anne Petersen and Lars Bo Kaspersen (2013)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| MIM381 | Capstone | | 1 CH |
|---|---|---|---|
| Prerequisites | Design of Mechatronics Systems – MIM322 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 0 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 50 | | 2 | |

Course Content

In this course, students are required to form teams, tackle challenging practical or research problems, and develop effective solutions for them, in which they integrate what they have learned through the program. This course is aimed at cultivating the following skills: problem formulation and analysis, system design and implementation, planning, time management, teamwork, research, self-learning, oral communication, and technical writing. Project topics are encouraged to be linked to the community, interdisciplinary, or at the technology cutting edge.

References

Laboratory

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | - | 50% | - |

| MIM481 | MIM Graduation Project (1) | | 2 CH |
|---|---|---|---|
| Prerequisites | After completing 101 CH ,Capstone – MIM381 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 3 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content | | | |
|---|---|---|---|
| This course represents the first part of the graduation project, where the students work in the graduation projects under the supervision of faculty members. The graduation project should be linked with the Mechatronics concentrations. | | | |
| References | | | |
| | | | |
| Laboratory | | | |
| | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | - | 50% | - |

| MIM482 | MIM Graduation Project (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | MIM Graduation Project (1) – MIM481 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 4 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content | | | |
|---|---|---|---|
| This course represents the first part of the graduation project, where the students work in the graduation projects under the supervision of faculty members. The graduation project should be linked with the Mechatronics concentrations. | | | |
| References | | | |
| | | | |
| Laboratory | | | |
| | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | - | 50% | - |

# Courses offered by Basic Science Depratment Engineering in Mechatronics and Intelligent Machines Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | BAS111 | Mathematics (3) |
| 2 | BME211 | Theory of Machines |
| 3 | BME241 | Strength of Materials |
| 4 | BME321 | Machine Elements Design |
| 5 | BME411 | Machine Construction |
| 6 | BME311 | Mechanical Vibrations |
| 7 | BME251 | Thermodynamics (1) |
| 8 | BME26٢ | Fluid Mechanics and Aerodynamics |
| 9 | BME351 | Heat Transfer |

| BME211 | Theory of Machines | | 3 CH |
|---|---|---|---|
| Prerequisites | Dynamics – BAS142 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Mechanisms: Definitions, open-chain and closed-chain systems, constraints, degrees of freedom, steering mechanisms, inversions of mechanisms. Kinematics of machines: position analysis, velocity analysis, acceleration analysis. Kinetics of machines: equilibrium of machines, D'Alembert's principle, force analysis, power analysis, inertia-effects and flywheel design. Synthesis of mechanisms. Cams: Types of cams, cam design, kinematics and kinetics of cam. Gears: Concept of gear motion, transmission, gear geometry and gear trains. Rotation matrix, homogeneous transformation matrix, direct and inverse kinematics

**Laboratory**

**References**

- "Theory of Machines" by R.S. Khurmi and J.K. Gupta
- "Theory of Machines and Mechanisms" by John J. Uicker, Gordon R. Pennock, and Joseph E. Shigley

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| BME241 | Strength of Materials | | 2 CH |
|---|---|---|---|
| Prerequisites | Theory of Machines – BME211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content |
|---|
| Introduction, principles of mechanical properties, problems of engineering materials, testing types of mechanical properties, common methods of static and dynamic testing: tension, compression, bending, shear, hardness, impact, creep and fatigue. types of fracture, non-destructive testing of materials. |
| Laboratory |
| |
| References |
| • "Mechanics of Materials" by Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, and David F. Mazurek (2020).<br>• "Strength of Materials" by R.K. Bansal (2019).<br>• "Mechanics of Materials" by James M. Gere and Barry J. Goodno (2018).<br>• "Strength of Materials" by Timoshenko, S. P., and Gere, J. M. (2017). |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME321 | Machine Elements Design | | 3 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction to Design Concepts, General Concepts of (Deflection, Buckling and Thermal Stresses), Design for Fatigue, Design of Machine Elements (Bolts, Power Screws, Rivets, Keys, Welded Joints, Springs), Design of Power Transmission Elements (Shafts, Couplings, |

| |
|---|
| Gears, Belt Drives, Chain Drives), Selection of Bearings, Design of Pressure Cylinders. Use of interactive Finite Element computer programs for problem solving is illustrated and used. |
| Laboratory |
| |
| References |
| • Shigley, M., Mechanical Engineering Design, McGraw Hill, 1997.<br>• Orlov, P., Fundamentals of Machine Design, MIR Publisher, 1998.<br>• Jain, R. K., Machine Design, Khanna Publishers, 1999. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

| BME411 | Machine Construction | | 3 CH |
|---|---|---|---|
| Prerequisites | Statics – BAS141 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | - | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Loading Diagrams, General concepts of Stress and Strain, Types of Stresses (Normal Stresses and Shear Stresses), Combined Stresses, Theories of Elastic Failure, and Safety Factor. Constructional details as affected by manufacturing, assembly, and strength considerations, Connections (Centering, Flanged, Riveted, Keyed, Splined, Screwed), Power Screw and its joints, Seals, Springs, Stress Concentrations, Reverse Engineering. |
| Laboratory |
| |
| References |
| • Orlove, Fundamentals of Machine Design, MIR Publisher, 1977.<br>• Shigly, Machine Design, McGraw Hill Co., 1999. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | - | 40% |

## Courses offered by Communication and Computer Engineering in Mechatronics and Intelligent Machines Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | CCE171 | Computing in Engineering |
| 2 | CCE272 | Electrical and Electronic Circuits |
| 3 | CCE273 | Digital Logic and Microcontrollers |
| 4 | CCE274 | Introduction to Embedded Systems and Interfacing |
| ٥ | CCE371 | Object-Oriented Computer Programming |
| ٦ | CCE472 | Data Mining and Visualization |
| ٧ | CCE473 | Database Management |

| CCE171 | Computing in Engineering | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | - | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

The course covers numbering systems and its operations, computational thinking, problem solving, Abstraction, Problems Analysis, algorithms, flowcharts, Introduction to C++: elementary data types and related operations, type casting, variables, scope of variables, expressions syntax, semantics, assignment statements, input-output statements. Boolean expressions, relational operators, logical operators, Increment/Decrement Operators, operator precedence, control structures, repetition structures.

Laboratory

- The Problems Analysis, the problems solving, determine the input, the output and the processing of the problems.
- Design the algorithms and flowcharts for the problems.

The students should prepare a complete program design using C++ Programming Language.

References

- Peter Van-Roy, SeifHaridi, Concepts, techniques, and models of computer programming, MIT Press USA, 2004.
- Bjarne Stroustrup, the C++ Programming Language, Pearson Education, 4th Edition, 2013.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE272 | Electrical and Electronic Circuits | | 3 CH |
|---|---|---|---|
| Prerequisites | Electricity and Megnetism – BAS122 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Electrical Circuits variables and elements, Simple resistive circuits, Analysis of electrical circuits, ohm's law, Kirchhoff's laws, series parallel equivalent, star delta transformation, source transformation, Network theorems: Mesh current method, Nodal voltage method, Thevenin's equivalent, Norton's equivalent, superposition principles. Sinusoidal steady state analysis, Phasor diagram representation, Applications of network theorems on alternating current circuits, Electric power in alternating current circuits, complex power calculations, power factor, circuits with nonlinear resistances voltage doubler, clipping, rectification, regulation. Transistor operation and models: analog amplifier, digital gates. Op- Amp model. Op-Amp applications: Inverting, non-inverting, buffer, adder, subtractor, integrator, differentiator, electronic analogue computation, I to V and V to I converters. Comparators. Schmitt trigger. Analog and Digital signals. A/D and D/A converters

**Laboratory**

- Ohm's Law and DC Circuits:
- AC Circuits:
- Passive Components:

Circuit Simulation and Design:

**References**

- "Fundamentals of Electric Circuits" by Charles K. Alexander and Matthew N.O. Sadiku, 2000
- "Electric Circuits" by James W. Nilsson and Susan Riedel
- "Microelectronic Circuits" by Adel S. Sedra and Kenneth C. Smith

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CVE273 | Digital Logic and Microcontrollers | | 2 CH |
|---|---|---|---|
| Prerequisites | Computing in Engineering – CCE171 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Introduction to digital systems and number representation. Combinational systems and sequential logic. Counter design and registers. Synchronous sequential design. Microprocessor applications, memory and I/O systems. Microcontrollers: features, architecture and programming model. Introduction to assembly language and microcontroller programming. Addressing modes, assembling and linking programs. Timer/counter programming. ADC, DAC, and sensor interfacing. |
| Laboratory |
| • Sequential Logic Circuits: covers sequential logic circuits, including flip-flops (e.g., D flip-flops, JK flip-flops)<br>• Microcontroller Programming and Interfacing introduced to microcontrollers, such as Arduino or PIC microcontrollers, and learn how to program them using a high-level language like C or C++: |
| References |
| • "Digital Design: Principles and Practices" by John F. Wakerly (2017)<br>• "Digital Electronics: Principles and Applications" by Roger L. Tokheim (2016)<br>• "Digital Systems: Principles and Applications" by Ronald J. Tocci, Neal S. Widmer, and Greg Moss (2015) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE274 | Introduction to Embedded Systems and Interfacing | | 3 CH |
|---|---|---|---|
| Prerequisites | Computing in Engineering – CCE171 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Introduction: the importance of microcontrollers, the roles and functions of microcontrollers. Acquaintance with microcontrollers and their simulators and debuggers. Understanding different addressing modes. Programming, debugging, and simulating assembly language programs. Developing a prototype for an embedded system. Interrupts and serial, I/O. Memory Expansion. Microcontroller interfaces. Interfacing techniques. Interfacing requirements. A typical microcontroller system is utilized in this course with typical software-based applications. Interfacing with USB, I2C, SPI, CAN, LIN. |
| Laboratory |
| |
| References |
| • Hintz, K. and Tabak, D., Microcontrollers: Architecture, Implementation and Programming, McGraw Hill, 1992.<br>• Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.<br>• Douglass, Bruce Powel, Real- Time Design Patterns: Robust Scalable Architecture for Real-Time Systems, Addison Wesley Professional: Book and CD- ROM Ed., 2002. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE371 | Object-Oriented Computer Programming | | 2 CH |
|---|---|---|---|
| Prerequisites | Computing in Engineering – CCE171 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Structured and object-oriented programming paradigms. Classes, Objects, Methods, Interfaces, Polymorphism, Inheritance, Data hiding, Constructors, Destructors, Access specifiers, Operator overloading, Function overloading, Virtual functions, Friend functions, Abstract classes, Implementation of dynamic data structures, Template functions and classes, Graphical User Interface (GUI) programming, Graphics, Event-driven programming, Concurrency and multi-threaded programming. |
| Laboratory |

- Using C++, write programs for classes then execute these programs to see the output.
- Using C++, write examples for overloading, data abstraction, information hiding.
- Encapsulation, inheritance, polymorphism.
- File processing, templates, exceptions, container classes.
- Mapping of UML design to C++ implementation and object-oriented considerations for software design.

References

- Robert Lafore, Object-Oriented Programming in C++, Fourth Edition, 2002.
- Brett D. McLaughlin, Gary Pollice, and Dave West, Head First Object-Oriented Analysis and Design, O'Reilly Medi, 1st Edition, 2006.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| CCE471 | Computer Vision in Mechatronic Systems | | 2 CH |
|---|---|---|---|
| Prerequisites | Design of Mechatronics Systems – MIM322 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | - | 1 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

Basics of image processing techniques and algorithms: image preprocessing, filters, image enhancement, edge detection, image segmentation. Basics of computer vision techniques: Lighting, optics, Camera model, Camera calibration and surface reconstruction, stereo camera system - transfer standards, correlation and stereo vision. Applications: interior surveillance, bar code scanning, object recognition, 3D scanning, 3D tracking.

Laboratory

- The analysis of the patterns in visual images with the view to understanding the objects

References

- Pedram Azad, TiloGockle, R. Dillmann, Computer Vision: Principles and Practice, Elektor Electronics Publishing, 2008.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | - | 40% |

| CCE472 | Data Mining and Visualization | | 3 CH |
|---|---|---|---|
| Prerequisites | Business Analytics and Management, MIM371 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduces Data Mining and Visualization topics in both theory and application. Data science topics include database and API connections, data preparation and manipulation, and data structures. Model fitting, tuning and prediction, end-to-end problem solving, feature engineering and feature selection, overfitting, generalization, classification, regression, dimensionality reduction and clustering. Covers software packages for statistical analysis, data visualization and machine learning. Introduces best practices related to source control, system architecture, cloud computing frameworks and modules, security, emerging financial technologies and software process.

Laboratory

- API connections, data preparation and manipulation
- Data structures. Model fitting, tuning and prediction, end-to-end problem solving,

References

- "Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei (2011)
- "Introduction to Data Mining" by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar (2005)

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| CCE473 | Database Management | | 3 CH |
|---|---|---|---|
| Prerequisites | Business Analytics and Management, MIM371 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

| |
|---|
| Introduces databases, data analysis, and machine learning topics. Covers data modeling, relational databases, SQL queries, data mining, non-relational databases, and data warehouses. Introduces data analysis tools for visualization, regression, supervised and unsupervised techniques including principal component analysis and clustering. Term project includes implementation of data model, database, visualization and data analysis, Data Governance. |
| Laboratory |
| • , data analysis, and machine learning topics. |
| References |
| • "Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei (2011)<br>• "Introduction to Data Mining" by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar (2005) |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

- **Competencies VS Courses Matrices for Mechatronics and Intelligent Machines Program**

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 | D2 | D3 | D4 | D4a | D4b | D4c | D4e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | | | | | | | | |
| NUB111 | History of Engineering | | | | | ■ | | ■ | | | | | | | | | | | | | | | |
| NUB112 | Modern history of Egypt | | | | | ■ | | ■ | | | | | | | | | | | | | | | |
| NUB113 | History of Civilizations | | | | | ■ | | ■ | | | | | | | | | | | | | | | |
| NUB114 | Fundamentals of Engineering | ■ | | ■ | | | | | | | | | | | | | | | | | | | |
| NUB121 | Report Writing and Communication Skills | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | | |
| NUB122 | Climate Change, Energy and Water Issues | | | ■ | ■ | | | | | | | | | | | | | | | | | | |
| NUB123 | Scientific Thinking | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | |
| NUB131 | Professional Legislations and Engineering Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | | |
| NUB132 | Literature and Arts | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | | |
| NUB133 | Human Rights | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | | |
| NUB134 | Professional Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | | |
| NUB141 | Building Safety and Fire Protection | ■ | | | ■ | | | | | | | | | | | | | | | | | | |
| NUB142 | Entrepreneurship and Startups | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | |
| NUB143 | Business Administration | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | |
| NUB144 | Principle of General Management | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS112 | Mathematics (2) | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS113 | Probability and Statistics | | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS121 | Vibration and Waves | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS122 | Electricity and Magnetism | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS131 | Engineering Chemistry | ■ | | | | | | | | | | | | | | | | | | | | | |
| BAS141 | Statics | | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS142 | Dynamics | | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | | | | | ■ | ■ | | | | | | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | ■ | ■ | | | | | | | | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | ■ | ■ | | | | | | | | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | | | | | | |
| MIM216 | Engineering Economy | ■ | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | | | | |
| MIM111 | Basics of Mechatronics | | ■ | | ■ | | | | | | ■ | ■ | ■ | | | | | | | | | | |
| GME141 | Production Engineering | ■ | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 | D2 | D3 | D4 | D4a | D4b | D4c | D4e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MIM112 | Computer Aided Drawing | | | | ■ | | | | ■ | | ■ | ■ | ■ | | | | | | | | | | |
| CCE171 | Computing in Engineering | ■ | | | | | | | | | | | | | ■ | | | | | | | | |
| BAS211 | Mathematics (3) | ■ | ■ | | | | | | | | | | | | | | | | | | | | |
| BME251 | Thermodynamics (1) | ■ | ■ | | | | | | | | | ■ | | ■ | | | | | | | | | |
| MIM211 | Measurement and Instrumentation | ■ | | | ■ | | | | | | | ■ | | | | | | | | | | | |
| BME211 | Theory of Machines | ■ | ■ | | | | | | | | | ■ | | | | | | | | | | | |
| BME262 | Fluid Mechanics and Aerodynamics | | ■ | | | | ■ | | | | | ■ | | | ■ | | | | | | | | |
| CCE272 | Electrical and Electronic Circuits | ■ | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | |
| MIM213 | Sensors and Measurement Systems | | | | ■ | ■ | | | | | | | | ■ | | | | | | | | | |
| CCE273 | Digital Logic and Microcontrollers | | | ■ | | | ■ | | ■ | | | | | | | | | | | | | | |
| MIM221 | Modeling and Simulation of Mechatronic Systems | | ■ | | | | | | | | | ■ | | | ■ | ■ | | | | | | | |
| BME241 | Strength of Materials | | | | | | | | | | | ■ | ■ | | | | | ■ | | | | | |
| CCE274 | Introduction to Embedded Systems and Interfacing | | | ■ | | | ■ | | ■ | | | | ■ | | | | ■ | | | | | | |
| MIM214 | Electrical Power and Machines | | ■ | | | | ■ | | | | | | | | | | | | | | | | |
| MIM311 | Power Electronics and Motor Drives | | ■ | | | | ■ | | | | | | | | | | | | | | | | |
| BME351 | Heat Transfer | | ■ | | | | | | | | | ■ | | | ■ | | | | | | | | |
| BME311 | Mechanical Vibrations | | ■ | | | | | | | | | ■ | ■ | ■ | | | | | | | | | |
| BME321 | Machine Elements Design | | | | ■ | | | | | | | ■ | ■ | | | | | | | | | | |
| BME411 | Machine Construction | | ■ | | ■ | | | | | | | | ■ | | | | | | | | | | |
| CCE471 | Computer Vision in Mechatronic Systems | | | ■ | | | ■ | | ■ | | | | | | | | | | | | | | |
| MIM481 | MIM Graduation Project (1) | ■ | | | | | | | | | | | | | | | | | | | | | |
| MIM411 | Industrial Project Management | | | | | ■ | | ■ | | | ■ | | | | | | | | | | | | |
| MIM412 | Maintenance Planning and Scheduling | ■ | | | | | | | | | | ■ | ■ | ■ | ■ | | ■ | | | | | | |
| CCE371 | Object-Oriented Computer Programming | ■ | | | | | | | | | | | ■ | | | | | ■ | | | | | |
| MIM321 | Introduction to Industrial Automation | ■ | ■ | | | | | | | | | | | | | | | | ■ | | | | |
| MIM322 | Design of Mechatronics Systems | | ■ | ■ | | ■ | | | | | | ■ | ■ | | | ■ | ■ | ■ | | | | | |
| MIM323 | Industrial Robotics | | ■ | ■ | ■ | | | | | | | | ■ | | | | | | | ■ | | ■ | |
| MIM324 | Hydraulics and Pneumatics Control | | ■ | | | | | | | | | ■ | | | | | | | ■ | | | | |
| MIM325 | Intelligent Mechatronic Control | ■ | ■ | | | | | | | | | ■ | ■ | | | | | | ■ | | | | |
| MIM381 | Capstone | ■ | | | | | | | | | | | | | | | | | | | | | |
| MIM421 | Cyber-Physical Systems | ■ | | | | | ■ | | | | ■ | | | | | ■ | ■ | | | | | | |
| MIM422 | Artificial Intelligence for Mechatronic Systems | | | | | | ■ | | | | ■ | | | | | | ■ | | | | | ■ | |
| MIM423 | Industrial Communications and Networks Systems | | | ■ | | | | | | | | | | ■ | | ■ | ■ | ■ | | ■ | | | |
| MIM482 | MIM Graduation Project (2) | ■ | | | | | | | | | ■ | ■ | ■ | | | ■ | ■ | | | | | | |
| - | MIM Elective (1) | | | | | | | | | | | | | | | | | | | | | | |
| - | MIM Elective (2) | | | | | | | | | | | | | | | | | | | | | | |
| - | MIM Elective (3) | | | | | | | | | | | | | | | | | | | | | | |
| - | MIM Elective (4) | | | | | | | | | | | | | | | | | | | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | D1 | D2 | D3 | D4 | D4a | D4b | D4c | D4e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | MIM Elective (5) | | | | | | | | | | | | | | | | | | | | | | |
| MIM331 | Industrial Automation | | | | | | | | | | | | | | | | ■ | ■ | ■ | | | | |
| MIM431 | Process Instrumentation and Control | | | | | | | | | | | | | | | | | | ■ | | | | |
| MIM432 | PLC and HMI (Human-Machine Interface) | | | | | | | | | | | | | | | ■ | ■ | | ■ | | | | |
| MIM433 | Automation Systems and Supervisory Control | | | | | | | | | | | | | | | ■ | ■ | | ■ | | | | |
| MIM434 | Quality Control | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | | | | |
| MIM341 | Introduction to Automotive | | | | | | | | | | | | | | | ■ | ■ | | | ■ | | | |
| MIM441 | Automotive Engines and Fuel Systems | | | | | | | | | | | | | | | | ■ | | | ■ | | | |
| MIM442 | Automotive Mechatronic Systems | | | | | | | | | | | | | | | ■ | | ■ | | ■ | | | |
| MIM443 | Road Vehicle Dynamics | | | | | | | | | | | | | | | ■ | | ■ | | ■ | | | |
| MIM444 | Design of Autonomous Systems | | | | | | | | | | | | | | | ■ | ■ | | | ■ | | | |
| MIM351 | Advanced Machining Processes | | | | | | | | | | | | | | | | ■ | ■ | | | ■ | | |
| MIM451 | CNC Operations | | | | | | | | | | | | | | | | ■ | | | | ■ | | |
| MIM452 | Ceramics and Polymers | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | | |
| MIM453 | Additive Material Technology | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | | |
| MIM454 | Non-Traditional Machining | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | | |
| MIM361 | Advanced Robotics Analysis and Control | | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | |
| MIM461 | Mobile Robotic Systems | | | | | | | | | | | | | | | ■ | | ■ | | | | ■ | |
| MIM462 | Human-Robot Interaction | | | | | | | | | | | | | | | ■ | | | ■ | | | ■ | |
| MIM463 | Perception and Learning for Robotics | | | | | | | | | | | | | | | ■ | | | ■ | | | ■ | |
| MIM464 | Selected Topics in Robotics and Artificial intelligence | | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | |
| MIM371 | Business Analytics and Management | | | | | | | | | | | | | | | | ■ | | | | | | ■ |
| CCE472 | Data Mining and Visualization | | | | | | | | | | | | | | | ■ | | ■ | | | | | ■ |
| CCE473 | Database Management | | | | | | | | | | | | | | | | ■ | | | | | | ■ |
| MIM471 | Supply Chain Management | | | | | | | | | | | | | | | ■ | ■ | | | | | | ■ |
| MIM472 | Decision making and governance | | | | | | | | | | | | | | | ■ | | | | | | | ■ |

- **Targeted Sustainable Development Goals**

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS112 | Mathematics (2) | | | | ■ | | | | | ■ | | | | | | | | |
| BAS113 | Probability and Statistics | | | | ■ | | | | | ■ | | | | | | | | ■ |
| BAS121 | Vibration and Waves | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS122 | Electricity and Magnetism | | | | ■ | | | ■ | | ■ | | | | | | | | |
| BAS131 | Engineering Chemistry | | | | ■ | | ■ | | | ■ | | | ■ | | | | | |
| BAS141 | Statics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS142 | Dynamics | | | | ■ | | | | | ■ | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | ■ | | | | | ■ | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| TRN3x1 | Field Training (2) | | | | ■ | | | | ■ | ■ | | | | | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | |
| CCE171 | Computing in Engineering | | | | ■ | | | | ■ | | | | | | | | | |
| BAS211 | Mathematics (3) | | | | ■ | | | | | | | | | | | | | |
| BME251 | Thermodynamics (1) | | | | | | | ■ | | | | | | | | ■ | | |
| MIM211 | Measurement and Instrumentation | | | | | | | | | | | ■ | ■ | | | | | |
| BME211 | Theory of Machines | | | | | | | | ■ | ■ | | | | | | | | |
| BME26٢ | Fluid Mechanics and Aerodynamics | | | | | | | ■ | ■ | | | | | | | | | |
| CCE272 | Electrical and Electronic Circuits | | | | | | | | | ■ | | ■ | | | ■ | | | |
| MIM213 | Sensors and Measurement Systems | | | | | | | | | | | ■ | | | ■ | | | |
| CCE273 | Digital Logic and Microcontrollers | | | | ■ | | | | | ■ | | | | | | | | |
| MIM221 | Modeling and Simulation of Mechatronic Systems | | | | | | | | ■ | ■ | | | | | | | | ■ |
| BME241 | Strength of Materials | | | | | | | | ■ | ■ | | | | | | | | |
| CCE274 | Introduction to Embedded Systems and Interfacing | | | | ■ | | | | | | | | ■ | | | | | |
| MIM214 | Electrical Power and Machines | | | | | | | | ■ | ■ | | | | | | | | |
| MIM311 | Power Electronics and Motor Drives | | | | | | | ■ | | | | | ■ | | | | | |
| BME351 | Heat Transfer | | | | | | | ■ | | | | | | | | ■ | | |
| BME311 | Mechanical Vibrations | | | | | | | | ■ | ■ | | | | | | | ■ | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BME321 | Machine Elements Design | | | | ■ | | | | ■ | ■ | | | | | | | | |
| BME411 | Machine Construction | | | | ■ | | | | ■ | ■ | | | ■ | | | | | |
| CCE471 | Computer Vision in Mechatronic Systems | | | | | | | | | ■ | | | ■ | | ■ | ■ | | |
| MIM481 | MIM Graduation Project (1) | | | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| MIM411 | Industrial Project Management | | | | ■ | | | | ■ | | ■ | | | | | | | |
| MIM412 | Maintenance Planning and Scheduling | | | | | | | | ■ | ■ | | | | | | | | |
| CCE371 | Object-Oriented Computer Programming | | | | | | | | | ■ | | | | | ■ | | | |
| MIM321 | Introduction to Industrial Automation | | | | | | | | ■ | ■ | | | | | | | | |
| MIM322 | Design of Mechatronics Systems | | | | | | | | | ■ | | | ■ | | | | | |
| MIM323 | Industrial Robotics | | | | | | | | ■ | ■ | | ■ | | | | | | |
| MIM324 | Hydraulics and Pneumatics Control | | | | | | | | | ■ | | | ■ | | | | | |
| MIM325 | Intelligent Mechatronic Control | | | | | | | | ■ | | | ■ | | | | | | |
| MIM381 | Capstone | | | | | | | | | | ■ | | | | | | ■ | ■ |
| MIM421 | Cyber-Physical Systems | | | | ■ | ■ | | | ■ | ■ | | | | | | | ■ | ■ |
| MIM422 | Artificial Intelligence for Mechatronic Systems | | | | | | | | ■ | ■ | | | | | | | | |
| MIM423 | Industrial Communications and Networks Systems | | | | ■ | | | | | ■ | | | | | | ■ | | |
| MIM482 | MIM Graduation Project (2) | | | | ■ | ■ | | | ■ | | ■ | | | | | | | ■ |
| - | MIM Elective (1) | | | | | | | | | | | | | | | | | |
| - | MIM Elective (2) | | | | | | | | | | | | | | | | | |
| - | MIM Elective (3) | | | | | | | | | | | | | | | | | |
| - | MIM Elective (4) | | | | | | | | | | | | | | | | | |
| - | MIM Elective (5) | | | | | | | | | | | | | | | | | |
| MIM331 | Industrial Automation | | | | | | | | ■ | ■ | | ■ | ■ | | | | | |
| MIM431 | Process Instrumentation and Control | | | | | | | | | ■ | | | ■ | | | | | |
| MIM432 | PLC and HMI (Human-Machine Interface) | | | | | | | | | | | ■ | ■ | | | | | |
| MIM433 | Automation Systems and Supervisory Control | | | | | | | | ■ | ■ | | ■ | ■ | | | | | |
| MIM434 | Quality Control | | | | | | ■ | ■ | ■ | ■ | | ■ | ■ | | | | | |
| MIM341 | Introduction to Automotive | | | | | | | ■ | | ■ | | | | | | ■ | | |
| MIM441 | Automotive Engines and Fuel Systems | | | | | | | ■ | | | | | ■ | | | | | |
| MIM442 | Automotive Mechatronic Systems | | | | | | | | ■ | ■ | | | | | | | | |
| MIM443 | Road Vehicle Dynamics | | | ■ | | | | | | | | ■ | | | | | | |
| MIM444 | Design of Autonomous Systems | | | | | | | | ■ | ■ | | ■ | ■ | | | | | |
| MIM351 | Advanced Machining Processes | | | | | | | | ■ | ■ | | | | | | | | |
| MIM451 | CNC Operations | | | | | | | | ■ | ■ | | | | | | | | |
| MIM452 | Ceramics and Polymers | | | | | | | ■ | ■ | | | | | ■ | | | | |
| MIM453 | Additive Material Technology | | | | | | | ■ | ■ | | | | | ■ | | | | |
| MIM454 | Non-Traditional Machining | | | | | | | | ■ | ■ | | ■ | | | | | | |
| MIM361 | Advanced Robotics Analysis and Control | | | | | | | | ■ | ■ | | | | | | ■ | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MIM461 | Mobile Robotic Systems | | | | | | | | ■ | ■ | | ■ | ■ | | | ■ | | |
| MIM462 | Human-Robot Interaction | | | | ■ | | | | | | | ■ | | | | | | |
| MIM463 | Perception and Learning for Robotics | | | | ■ | | | | ■ | | | ■ | | | | | | |
| MIM464 | Selected Topics in Robotics and Artificial intelligence | | | | | | | | ■ | | | ■ | ■ | | | | | |
| MIM371 | Business Analytics and Management | ■ | | | | | | | ■ | | | | | | | | ■ | ■ |
| CCE472 | Data Mining and Visualization | | | | ■ | | | | ■ | | | | | | | | | ■ |
| CCE473 | Database Management | | | | ■ | | | | ■ | | | | | | | | | |
| MIM471 | Supply Chain Management | | | | | | | | ■ | ■ | | | | | | | | |
| MIM472 | Decision making and governance | | | | | | | | ■ | ■ | | ■ | ■ | | | | | ■ |

# Program 5: Electrical Power and Renewable Energy Engineering Program (EPRE)

- ## Program Description

The Electrical Power and Renewable Energy Engineering Program (EPRE), is designed to qualify its graduates for both fundamental and modern trends in electrical power and renewable energy systems, design, operation and control. The program is structured in a hierarchical manner based on strong mathematical and physics background while moving gradually up to fundamental electrical engineering subjects. Then, reaching to the major specialty courses of power systems design, operation, installation, control, and economics. The program pays significant attention to renewable electrical energy resources as well as the smart grid operation and control with the objective of environmental conservation and economical aspects. The program adapts the updated approaches and methodology in teaching, learning activities and assessment with focus on achieving balance among academic background and professional skills of the graduates. Students in the program are centered of focus by implanting self-learning attitude, peer discussions, and courses embedded engineering skills. The assessment techniques are devised in a way to avoid passing the courses unless the student gets the required Competencies.

The Electrical Power and Renewable Energy Engineering Program is specialized in teaching all the courses related to Electrical Power and Renewable Energy Engineering, including courses for renewable energy systems, photovoltaic energy, solar energy, wind energy, energy transmission and distribution systems, energy systems analysis, generation and operation economics, power system protection, automatic control systems, electrical machines, power electronics, measurements and instrumentation, and graduation project. The Electrical Power and Renewable Energy Engineering Program is also specialized in research and specialized studies in the field of electrical power and renewable energy engineering. After completing the study of the courses mentioned in the list (144 credit hours) below, the students receive a bachelor's degree in electrical power and renewable energy engineering.

- ## Career Prospects

This program is an electrical program that covers different topics to serve future engineers to understand the electrical power and renewable energy sources, how they work, and how to use them in different applications. Electricity is the main reason for technological progress in all aspects of life. All factories, companies and institutions need operational and maintenance engineers. Energy engineers are responsible for operation, maintenance, control, and protection of electrical network, which consists of generation, transmission, and distribution. Energy engineers play an important role in running the factories that use electricity in manufacturing.

Also, Energy engineers play an important role in running the hospitals, touristic, educational, and administrative buildings is a sizable market for the graduates of the program in engineering contracting field. The renewable energy engineer also plays a key role in operating and maintaining renewable energy plants such as wind power plants and solar power plants, photovoltaic, solar thermal, hydro, fuel cell, energy storage systems and the modern related technologies spread throughout the world.

- ## Relation to Sustainable Development Goals

| | | | | | |
|---|---|---|---|---|---|
| □ GOAL 1: No Poverty | □ GOAL 2: Zero Hunger | □ GOAL 3: Good Health & Well-being | ☒ GOAL 4: Quality Education | □ GOAL 5: Gender Equality | ☒ GOAL 6: Clean Water & Sanitation |
| ☒ GOAL 7: Affordable & Clean Energy | □ GOAL 8: Decent Work & Economic Growth | ☒ GOAL 9: Industry, Innovation & Infrastructure | □ GOAL 10: Reduced Inequality | ☒ GOAL 11: Sustainable Cities & Communities | □ GOAL 12: Responsible Consumption & Production |
| ☒ GOAL 13: Climate Action | □ GOAL 14: Life Below Water | □ GOAL 15: Life on Land | □ GOAL 16: Peace & Justice Strong Institutions | □ GOAL 17: Partnerships to achieve the Goal | |

- ## Program Concentrations

There are no specified concentrations in this Program.

- ## Program Competences

**According to the National Academic Reference Standards (NARS-2018), the competences for Graduates from NHADA University and all Engineering Programs, graduate must be able to (A-Level):**

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
A5. Practice research techniques and methods of investigation as an inherent part of learning.
A6. Plan supervises and monitors implementation of engineering projects.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies

**In addition to the competences for all Engineering Programs (A-Level), the competences for the Basic Electrical Engineering Programs, Graduate must be able to (B-Level):**

B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
B3. Design and implement elements, modules, sub-systems or systems using technological and professional tools.
B4. Estimate and measure the performance of an electrical/electronic system and circuit under specific input excitation and evaluate its suitability for a specific application.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

**In addition to the competences for all Engineering Programs (A-Level), the competences for the Basic Electrical Engineering Programs (B-Level), the competences for the Electrical Power and Renewable Energy Engineering Program, graduate must be able to (D-Level):**

D1. Identify, analyze and evaluate the energy's conversion processes and management techniques.
D2. Analyze the performance of electric power and renewable energy generation, control and distribution systems.
D3. Design of electrical power and renewable energy systems using appropriate materials via both traditional and computer-aided tools.
D4. Test and evaluate the performance and suitability of electrical power and renewable energy systems.

D5. Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer-controlled systems.

D6. Apply modern techniques, skills and engineering tools to electrical power and renewable energy engineering systems.

- ## Graduate Attributes

**The graduates of the Electrical Power and Renewable Energy Engineering program must be able to:**

- Recognize his/her role in promoting the electrical power and renewable energy field and contribute to the envelopment of the profession and the community.
- Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- Use techniques, skills and modern engineering tools necessary for engineering practice.
- Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- Design of electrical power and renewable energy systems using appropriate materials via both traditional and computer-aided tools.
- Identify, analysis and evaluate the energy's conversion processes and management techniques.
- Distinguish the layout for Power generation stations and their related distribution network.

- ## Required Courses

- ## List of Electrical Power and Renewable Energy Engineering Program

| Course Title | Weight | | | Contact Hours | | | | % |
|---|---|---|---|---|---|---|---|---|
| | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Nahda University Requirements | 11 | 18 | 450 | 11 | 0 | 0 | 11 | **8%** |
| Faculty of Engineering Requirements | 33 | 64 | 1600 | 24 | 27 | 24 | 75 | **23%** |
| Major Requirements of Electrical Power and Renewable Energy Engineering Program | 60 | 100 | 2500 | 44 | 30 | 18 | 92 | **42%** |
| Minor Requirements of Electrical Power and Renewable Energy Engineering Program | 40 | 68 | 1700 | 25 | 15 | 25 | 65 | **27%** |
| Total | **144** | **250** | **6250** | **104** | **72** | **67** | **243** | **100** |

## Major Requirements of Electrical Power and Renewable Energy Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| BAS213 | Mathematics (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS211 |
| BME251 | Thermodynamics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS131 |
| BME261 | Fluid and Aerodynamics | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS142 |
| BME351 | Heat Transfer | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BME251 |
| CCE161 | Computer Programming | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |
| EPR161 | Energy Resources and Renewable Energy | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| CCE211 | Electrical Circuits (1) | 3 | 5 | 25 | 2 | 2 | 1 | 5 | BAS122 |
| EPR211 | Electric and Magnetic Fields | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112, BAS122 |
| EPR212 | Energy Conversion | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS122 |
| EPR213 | Electric Circuits (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| EPR214 | Electrical and Electronic Measurements | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE211 |
| EPR221 | Direct Current Machines and Transformers | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR211, CCE211 |
| EPR241 | Fundamentals of Electronic Circuits | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| EPR321 | Alternating Current Machines | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR221, CCE214 |
| EPR331 | Electrical Power Engineering | 3 | 5 | 125 | 2 | 1 | 1 | 4 | EPR211, CCE211 |
| EPR341 | Power Electronics (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR241, EPR213 |
| EPR351 | Modelling and Simulation of Engineering Systems | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BAS213 |
| EPR332 | Economics of Generation, Transmission, and Operation | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR331 |
| EPR342 | Power Electronics (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR341 |
| EPR352 | Automatic Control Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR351 |
| EPR431 | Power System Analysis | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR331 |
| Total | | **60** | **100** | **2500** | **44** | **31** | **17** | **92** | |

# Minor Requirements of Electrical Power and Renewable Energy Engineering

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| EPR361 | Fundamentals of Photovoltaics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | EPR241 |
| EPR362 | Renewable Energy (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR161 ,BME261, BME351 |
| EPR363 | Renewable Energy (2) | 3 | 6 | 150 | 2 | 2 | 1 | 5 | EPR362, EPR3٦1 |
| EPR491 | Utilization and Management of Electrical Energy | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR321 |
| EPR433 | High Voltage Engineering | 3 | 4 | 100 | 2 | 0 | 2 | 4 | EPR431 |
| EPR434 | Power System Protection | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR214, EPR432 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| EPR455 | Industrial Control and SCADA Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR352 |
| EPR481 | EPR Graduation Project (1) | 3 | 5 | 125 | 1 | 0 | 5 | 6 | 101 CH |
| EPR482 | EPR Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | EPR481 |
| - | EPR Elective (1) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| - | EPR Elective (2) | 3 | 5 | 125 | 2 | 0 | 2 | 4 | |
| - | EPR Elective (3) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| - | EPR Elective (4) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| Total | | **40** | **68** | **1700** | **25** | **15** | **25** | **65** | |

## Elective Courses of Electrical Power and Renewable Energy Engineering is distributed in five electives

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Elective 1 Select 2 Credit hrs. (one course) | | | | | | | | | |
| EPR461 | Storage Energy Technologies | 3 | 5 | 125 | 2 | 1 | 2 | 5 | EPR342, EPR362 |
| EPR462 | Ocean Energy | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BME261 |
| EPR463 | Biomass and waste Conversion Technology | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BME351 |
| EPR464 | Renewable Energy Resources Interfacing | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR342, EPR362 |
| EPR465 | Artificial Intelligence Applications in Renewable Energy Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | EPR352, EPR363 |
| EPR466 | Selected Topics in Renewable Energy | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| Elective 2 Select 2 Credit hrs. (one course) | | | | | | | | | |
| EPR421 | Electric Drives | 3 | 5 | 125 | 2 | 0 | 2 | 4 | EPR342, EPR321 |
| EPR432 | Electrical Distribution Systems Installations | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| EPR451 | Digital Control Systems | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR352 |
| EPR452 | Microcontroller Applications in Power Engineering | 3 | 5 | 125 | 2 | 0 | 2 | 4 | CCE251 |
| EPR453 | Computer Applications in Power Engineering | 3 | 5 | 125 | 2 | 0 | 2 | 4 | EPR431 |
| EPR454 | Selected Topics in Control Systems | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| Elective 3 Select 2 Credit hrs. (one course) | | | | | | | | | |
| EPR435 | Smart Grid | 2 | 4 | 100 | 2 | 1 | 0 | 3 | EPR431 |
| EPR471 | Energy Management Essentials | 2 | 4 | 100 | 2 | 1 | 0 | 3 | EPR214 |
| EPR472 | Renewable Energy and Buildings | 2 | 4 | 100 | 2 | 1 | 0 | 3 | EPR362 |
| EPR473 | Renewable Energy Management | 2 | 4 | 100 | 2 | 1 | 0 | 3 | EPR363 |
| EPR474 | Thermal Power Plants | 2 | 4 | 100 | 2 | 1 | 0 | 3 | BME351, BME261 |

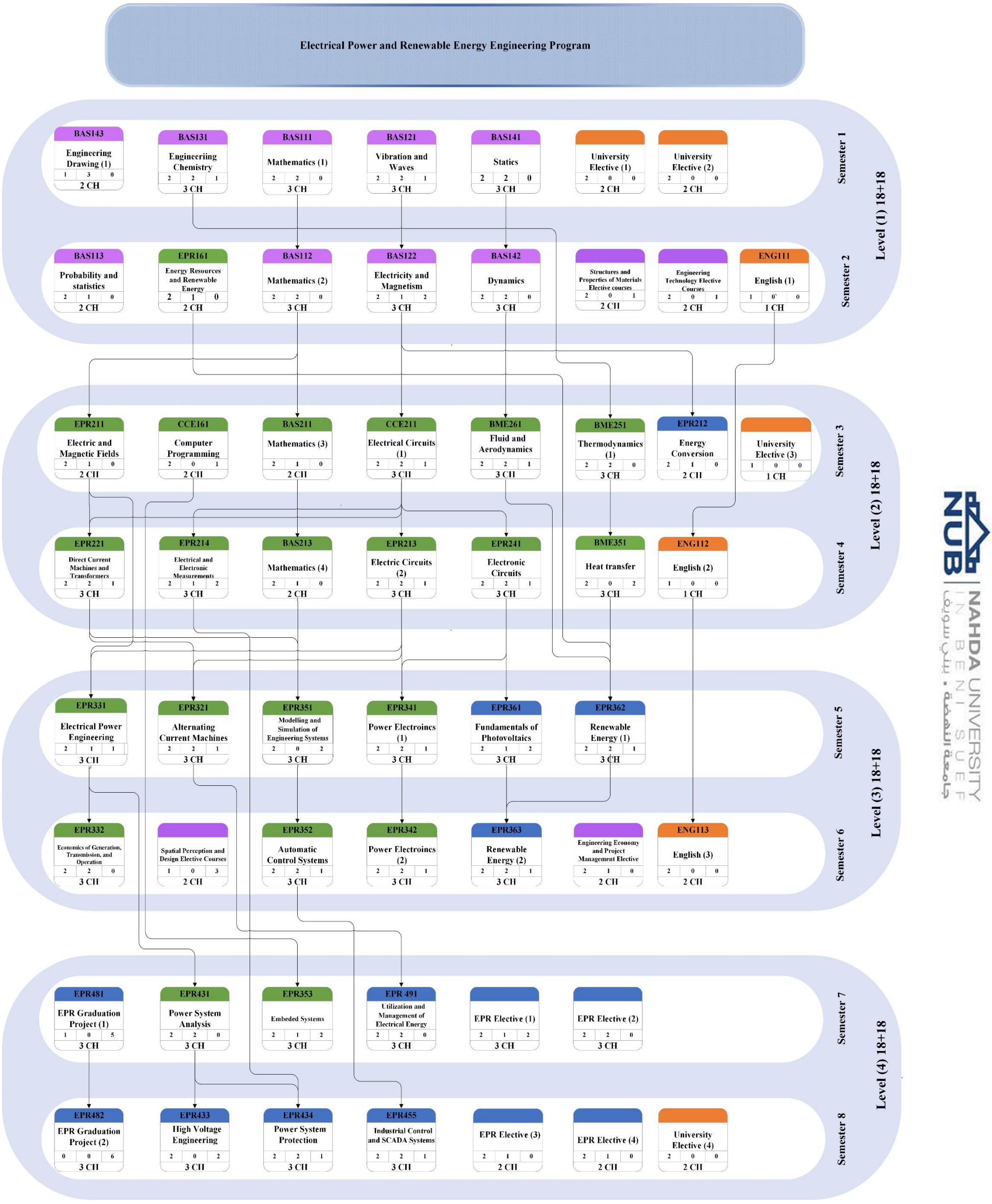
| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| EPR475 | Selected Topics in Energy Management | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| Elective 4 Select 2 Credit hrs. (one course) | | | | | | | | | |
| EPR353 | Microprocessor-Based Automated Systems | 2 | 4 | 100 | 2 | 0 | 1 | 3 | CCE161 |
| EPR436 | Power Distribution Systems | 2 | 4 | 100 | 2 | 0 | 1 | 3 | EPR432 |
| EPR492 | Power Quality for Energy Applications | 2 | 4 | 100 | 2 | 0 | 1 | 3 | EPR331, EPR342 |
| EPR493 | Environmental Impact of Projects | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |
| EPR494 | Quality Systems and Assurance | 2 | 4 | 100 | 2 | 0 | 1 | 3 | BAS122 |
| EPR495 | Applications of Nanotechnology in Renewable Energy Systems | 2 | 4 | 100 | 2 | 0 | 1 | 3 | EPR331, EPR362, EPR363 |
| EPR496 | Selected Topics in Quality Control | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |

- **Proposed Study Plan**

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 1 | | | | | | | | | |
| BAS111 | Mathematics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS121 | Vibration and Waves | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS141 | Statics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| BAS131 | Engineering Chemistry | 3 | 5 | 125 | 2 | 2 | 1 | 5 | |
| BAS143 | Engineering Drawing (1) | 2 | 4 | 100 | 1 | 3 | 0 | 4 | |
| | University Elective (1) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| | University Elective (2) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| **Total** | | **18** | **30** | **750** | **13** | **11** | **2** | **26** | |
| Semester 2 | | | | | | | | | |
| BAS112 | Mathematics (2) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS111 |
| BAS113 | Probability and Statistics | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| BAS122 | Electricity and Magnetism | 3 | 5 | 125 | 2 | 1 | 2 | 5 | BAS121 |
| BAS142 | Dynamics | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS141 |
| EPR161 | Energy Resources and Renewable Energy | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| | Engineering Technology Elective Courses | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| | Structures and Properties of Materials Elective Courses | 2 | 3 | 75 | 2 | 0 | 1 | 3 | |
| ENG111 | English (1) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| **Total** | | **18** | **30** | **750** | **15** | **7** | **4** | **26** | |
| Semester 3 | | | | | | | | | |
| BAS211 | Mathematics (3) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112 |
| BME251 | Thermodynamics (1) | 3 | 5 | 125 | 2 | 2 | 0 | 4 | BAS131 |
| BME261 | Fluid and Aerodynamics | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS142 |
| CCE161 | Computer Programming | 2 | 4 | 100 | 2 | 0 | 1 | 3 | |
| CCE211 | Electrical Circuits (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | BAS122 |
| EPR211 | Electric and Magnetic Fields | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS112, BAS122 |
| EPR212 | Energy Conversion | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS122 |
| | University Elective (3) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| **Total** | | **18** | **30** | **750** | **15** | **8** | **4** | **27** | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 4 | | | | | | | | | |
| BAS213 | Mathematics (4) | 2 | 3 | 75 | 2 | 1 | 0 | 3 | BAS211 |
| BME351 | Heat Transfer | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BME251 |
| EPR213 | Electric Circuits (2) | 3 | 5 | 125 | 2 | 2 | 1 | 8 | CCE211 |
| EPR214 | Electrical and Electronic Measurements | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE211 |
| EPR221 | Direct Current Machines and Transformers | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR211, CCE211 |
| EPR241 | Fundamentals of Electronic Circuits | 3 | 5 | 125 | 2 | 2 | 1 | 5 | CCE211 |
| ENG112 | English (2) | 1 | 2 | 50 | 1 | 0 | 0 | 1 | ENG111 |
| **Total** | | **18** | **30** | **750** | **13** | **8** | **7** | **28** | |
| Semester 5 | | | | | | | | | |
| EPR321 | Alternating Current Machines | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR221 EPR213 |
| EPR331 | Electrical Power Engineering | 3 | 5 | 125 | 2 | 1 | 1 | 4 | EPR211 EPR213 |
| EPR341 | Power Electronics (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR241 EPR213 |
| EPR351 | Modelling and Simulation of Engineering Systems | 3 | 5 | 125 | 2 | 0 | 2 | 4 | BAS213 |
| EPR361 | Fundamentalsof Photovoltaics | 3 | 5 | 125 | 2 | 1 | 2 | 5 | EPR241 |
| EPR362 | Renewable Energy (1) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR161 BME261 BME351 |
| **Total** | | **18** | **30** | **750** | **12** | **8** | **8** | **28** | |

| Code | Course Title | Credits | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Semester 6 | | | | | | | | | |
| EPR332 | Economics of Generation, Transmission, and Operation | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR331 |
| EPR342 | Power Electronics (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR341 |
| EPR352 | Automatic Control Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR351 |
| | | | | | | | | | |
| EPR363 | Renewable Energy (2) | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR362 EPR361 |
| | Engineering Economy and Project Management Elective | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| | Spatial Perception and Design Elective Courses | 2 | 3 | 75 | 1 | 0 | 3 | 4 | |
| ENG113 | English (3) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | ENG112 |
| **Total** | | **18** | **30** | **750** | **13** | **9** | **6** | **28** | |
| Semester 7 | | | | | | | | | |
| EPR431 | Power System Analysis | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR331 |
| CCE482 | Embedded Systems | 3 | 5 | 125 | 2 | 1 | 2 | 5 | CCE161 |
| EPR481 | EPR Graduation Project (1) | 3 | 5 | 125 | 1 | 0 | 5 | 6 | 101 CH |
| EPR491 | Utilization and Management of Electrical Energy | 3 | 5 | 125 | 2 | 2 | 0 | 4 | EPR321 |
| | EPR Elective (1) | 3 | 5 | 125 | 2 | 1 | 2 | 5 | |
| | EPR Elective (2) | 3 | 5 | 125 | 2 | 0 | 2 | 4 | |
| **Total** | | **18** | **30** | **750** | **11** | **6** | **11** | **28** | |
| Semester 8 | | | | | | | | | |
| EPR433 | High Voltage Engineering | 3 | 4 | 100 | 2 | 0 | 2 | 4 | EPR431 |
| EPR434 | Power System Protection | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR214, EPR432 |
| EPR455 | Industrial Control and SCADA Systems | 3 | 5 | 125 | 2 | 2 | 1 | 5 | EPR352 |
| EPR482 | EPR Graduation Project (2) | 3 | 5 | 125 | 0 | 0 | 6 | 6 | EPR481 |
| | EPR Elective (3) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| | EPR Elective (4) | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| | University Elective (4) | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| | **Total** | **18** | **30** | **750** | **12** | **6** | **10** | **28** | |


Electrical Power and Renewable Energy Engineering Program
Level (1) 18+18
Semester 1
BAS143 Engineering Drawing (1) 1 3 0 2 CH
BAS131 Engineeriing Chemistry 2 2 1 3 CH
BAS111 Mathematics (1) 2 2 0 3 CH
BAS121 Vibration and Waves 2 2 1 3 CH
BAS141 Statics 2 2 0 3 CH
University Elective (1) 2 0 0 2 CH
University Elective (2) 2 0 0 2 CH
Semester 2
BAS113 Probability and statistics 2 1 0 2 CH
EPR161 Energy Resources and Renewable Energy 2 1 0 2 CH
BAS112 Mathematics (2) 2 2 0 3 CH
BAS122 Electricity and Magnetism 2 1 2 3 CH
BAS142 Dynamics 2 2 0 3 CH
Structures and Properties of Materials Elective courses 2 0 1 2 CH
Engineering Technology Elective Courses 2 0 1 2 CH
ENG111 English (1) 1 0` 0 1 CH
Level (2) 18+18
Semester 3
EPR211 Electric and Magnetic Fields 2 1 0 2 CH
CCE161 Computer Programming 2 0 1 2 CH
BAS211 Mathematics (3) 2 1 0 2 CH
CCE211 Electrical Circuits (1) 2 2 1 3 CH
BME261 Fluid and Aerodynamics 2 2 1 3 CH
BME251 Thermodynamics (1) 2 2 0 3 CH
EPR212 Energy Conversion 2 1 0 2 CH
University Elective (3) 1 0 0 1 CH
Semester 4
EPR221 Direct Current Machines and Transformers 2 2 1 3 CH
EPR214 Electrical and Electronic Measurements 2 1 2 3 CH
BAS213 Mathematics (4) 2 1 0 2 CH
EPR213 Electric Circuits (2) 2 2 1 3 CH
EPR241 Electronic Circuits 2 2 1 3 CH
BME351 Heat transfer 2 0 2 3 CH
ENG112 English (2) 1 0 0 1 CH
Level (3) 18+18
Semester 5
EPR331 Electrical Power Engineering 2 1 1 3 CH
EPR321 Alternating Current Machines 2 2 1 3 CH
EPR351 Modelling and Simulation of Engineering Systems 2 0 2 3 CH
EPR341 Power Electroincs (1) 2 2 1 3 CH
EPR361 Fundamentals of Photovoltaics 2 1 2 3 CH
EPR362 Renewable Energy (1) 2 2 1 3 CH
Semester 6
EPR332 Economics of Generation, Transmission, and Operation 2 2 0 3 CH
Spatial Perception and Design Elective Courses 1 0 3 2 CH
EPR352 Automatic Control Systems 2 2 1 3 CH
EPR342 Power Electroincs (2) 2 2 1 3 CH
EPR363 Renewable Energy (2) 2 2 1 3 CH
Engineering Economy and Project Management Elective 2 1 0 2 CH
ENG113 English (3) 2 0 0 2 CH
Level (4) 18+18
Semester 7
EPR481 EPR Graduation Project (1) 1 0 5 3 CH
EPR431 Power System Analysis 2 2 0 3 CH
EPR353 Embeded Systems 2 1 2 3 CH
EPR 491 Utilization and Management of Electrical Energy 2 2 0 3 CH
EPR Elective (1) 2 1 2 3 CH
EPR Elective (2) 2 2 0 3 CH
Semester 8
EPR482 EPR Graduation Project (2) 0 0 6 3 CH
EPR433 High Voltage Engineering 2 0 2 3 CH
EPR434 Power System Protection 2 2 1 3 CH
EPR455 Industrial Control and SCADA Systems 2 2 1 3 CH
EPR Elective (3) 2 1 0 2 CH
EPR Elective (4) 2 1 0 2 CH
University Elective (4) 2 0 0 2 CH
EPR
TRN 2x1 Field Training (1) 0 5 8 0CH
TRN 3x1 Field Training (2) 0 5 8 0 CH
- The maximum allowed study duration is 8 academic years
- Cumulative GPA at any main semester < 2.0
- 4 Weeks of Field
- Training can be Started at the end of level 2 (Sophomore level)
University Req. 11 CH
Program. Major Req 60 CH
Faculty Req. 33 CH
Program. Minor Req 40 CH
Course Code
Course Title
Lec Tut Lab
# CH

- **Electrical Power and Renewable Energy Engineering Program Courses Content**

## Courses offered by Electrical Power and Renewable Energy Engineering Program (EPRE)

| EPR111 | Materials of Electrical Science | 2 CH |
|---|---|---|
| Prerequisites | | |

| Number of weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 0 | 1 |
| Required SWL | | Equivalent ECTS |
| 75 | | 3 |

**Course Content**

Atoms and atomic structure of conducting materials, Materials Classification, Conductors, High/low - Resistive Materials, Semiconductors, Insulators, Magnetic Materials: B-H curve for different magnetic materials, magnetic losses, reduction of losses, Ferro-resonance, Study and Measurement of Electrical, Magnetic, and Optical Properties of Materials, Materials for Electronic Components, Materials used in electrical power and renewable energy systems and energy storage systems.

**Laboratory**

- Conductivity (σ) of insulators, semiconductors, and conductors' materials.
- Mechanical characteristics of insulators, semiconductors, and conductors' materials.
- Magnetic characteristics of materials: B-H curve for different magnetic materials.
- Magnetic losses, reduction of losses, Ferro-resonance.
- Materials used in electrical power and renewable energy systems and energy storage systems.

**References**

- S. O. Kasap, Principles of Electrical Engineering Materials, McGraw - Hill, 2000.
- J. Dekker, Electrical Engineering Materials, Prentice Hall, 1970.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR161 | Energy Resources and Renewable Energy | 2 CH |
|---|---|---|
| Prerequisites | - | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | ٠ |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

| Course Content |
|---|
| Overview of energy use and related issues, Identifying all energy resources: thermal, chemical, nuclear, kinetic, gravitational field, magnetic field, electric field. Rank and classification of different energies. Regenerative energy resources: solar, wind, biomass, wave energy, geothermal. Energy transfer, conversion, transmission, and storage. Climate change and sustainability issues. Cautionary and safety measures. |
| References |
| • Chapman. Stephen J. 'Electric machinery fundamentals' © The McGraw-Hill Companies, 7th ed, ISBN 0--07246523, 2020.<br>• Rolf E. Hummel Understanding material science Springer 2016.<br>• Charles K. Alexander, Matthew N. O. Sadiku., 'Fundamentals of electric circuits', The McGraw-Hill Companies, 5th ed, TK454.A452, 2013.<br>• William H. Hayt and John A. Buck Engineering Electromagnetic 8th Edition McGraw Hill 2010. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR211 | Electric and Magnetic Fields | | 2 CH |
|---|---|---|---|
| Prerequisites | Mathematics (2) - BAS112, Electricity and Magnetism - BAS122 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ١ | ٠ | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

| Course Content |
|---|
| Vector analysis, Electrostatic Fields, Coulomb’s law, Electric field intensity, Electric flux, Gauss’s law, Divergence, Electric energy and potential, Electric conductors, Electrical resistance, Dielectric materials, Electrical capacitance, Poisson’s equation, Laplace’s equation. Steady magnetic fields, Static magnetic fields, Biot-Savart Law, Ampere’s law, Convolution theorem, Stokes Theorem, Magnetic field intensity, Magnetic forces and torques, Magnetic materials, Magnetic circuits, Inductance. Time varying magnetic fields, Maxwell’s equations. |
| References |
| • William H. Hayt, JR, Engineering Electromagnetics, McGraw Hill Pub. 9th Edition 2017.<br>• Matthew N. O. Sadiku, Elements of Electromagnetics, Oxford university press, 7th edition, 2017.<br>• John D. Kraus, Electromagnetics, McGraw Hill Pub. 8th Edition 2010. |
| Assessment Criteria |

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| EPR212 | Energy Conversion | | 2 CH |
|---|---|---|---|
| Prerequisites | Electricity and Magnetism – BAS122 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ١ | ٠ | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Fundamentals of Energy conversion, Photovoltaic Energy Conversion, Energy Conversion in Fuel Cells, Fuel and Combustion, Thermoelectric Power Generation, Magneto Hydrodynamic Power Generation, Thermo Ionic Power Generation, Electro Ionic Power Generation, Electro Chemical Power Generation, Electromechanical Power Generation, Nuclear Power Generation, Illumination Engineering, Electric Traction Systems, Environmental Effects of Energy Resources.

References


- Chapman. Stephen J. 'Electric machinery fundamentals' © The McGraw-Hill Companies, 7th ed, ISBN 0--07246523, 2020.
- Rolf E. Hummel Understanding material science Springer 2016.
- Charles K. Alexander, Matthew N. O. Sadiku., 'Fundamentals of electric circuits', The McGraw-Hill Companies, 5th ed, TK454.A452, 2013.
- William H. Hayt and John A. Buck Engineering Electromagnetic 8th Edition McGraw Hill 2010.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| EPR213 | Electric Circuits (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Circuits (1) - CCE211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

AC power analysis, Three - phase Circuits, Magnetic circuits, Mutual Inductance, Resonance Circuits, Introduction to Frequency Selective Circuits, Laplace Transform in Electric Circuits, Transfer Function, Fourier Series in Electric Circuits, Fourier Transform in Electric Circuits, Two Port Networks, Circuit Analysis using PSPICE Software.

Laboratory

- Phase circuits.
- Using PSPICE SW: Transient analysis of AC circuits.
- Using PSPICE SW: Transfer function.
- Using PSPICE SW: Frequency response.

References


- J. David Irwin & R. Mark Nelms, Engineering Circuit Analysis, 11th Edition, John Wiley &Sons, 2019. ISBN: 9781118957509
- James W. Nilsson, Electric Circuits, 10th Edition, Pearson prentice Hall, 2018.
- F. P. Yatsko and D. M. Hata, Circuits: Principles, Harcourt Brace College Publishers, 1992


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40 % |

| EPR214 | Electrical and Electronic Measurements | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Circuits (1)-CCE211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Measurement errors, Accuracy, Reproducibility, Statistical analysis, Static Calibration, Resolution and Precision, Dynamic Response, Moving coil and iron instruments, Electro-dynamic instruments, Induction type instruments, Current and voltage measurement instruments, Measurement units and standards, Measurement of power, current, potential transformers, energy and charge, Measurements of frequency and power factor, Measurements of loading effect and nonelectrical parameters, Cathode Ray Oscilloscope applications, DC and AC bridges, Resistance and capacitance measurements, Locating of cable faults, Strain gauges, temperature, Displacement, velocity and acceleration transducers, Force and pressure transducers, Light transducers, Data converters, Voltage to frequency converters, Digital measurements devices: Digital AVO meters, Digital frequency meters, Measurement of Solar Radiation, Measurement of wind speed and direction.

Laboratory

- Errors in experimental data.
- Basic Statistical Sampling.
- Voltmeter Calibration using the Potentiometer.
- Oscilloscope operation and Measurements
- Function Generator.
- Measuring frequency and phase shift with the oscilloscope.
- Measurement of Radiation Solar
- Measurement of Speed & Direction Wind

References


- H S. Kalsi, Electronic Instrumentation and Measurements, 4th edition, McGraw Hill, March 25, 2019.
- G N Srinivas and S Narasimha, Electrical and Electronic Measurements and instrumentation, Jul 4, 2018.
- Gupta J.B, A Course in Electronic and Electrical Measurements and Instrumentation, S.K. Kataria and Sons, Delhi, 2012.
- A K Sawhney 2014, Electrical and Electronic Measurements and Instrumentation, Nineteenth Revised Edition 2011 Reprint 2014, Dhanpat Rai & Sons.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| EPR221 | Direct Current Machines and Transformers | 3 CH |
|---|---|---|
| Prerequisites | Electrical Circuits (1)-CCE211, Electromagnetic Fields-EPR211 | |

Number of Weekly Contact Hours

| Lecture | Tutorial | Laboratory |
|---|---|---|
| 2 | 2 | 1 |

| Required SWL | Equivalent ECTS |
|---|---|
| 125 | 5 |

Course Content

DC Machines: the generation of EMF torque, construction of DC machine, the magnetic circuit of the DC machine, armature windings, armature reaction, methods of excitation, load characteristics of DC generators and motors, efficiency, testing of dc machines. Transformers: transformer construction, fundamental laws, equivalent circuits, transformer efficiency, transformer testing, transformer connections and harmonics, auto transformers and tap changers, parallel operation, transformer cooling.

Laboratory

- Characteristics of Separately - excited, Shunt and Compound DC Generators and Motors.
- Separation of Iron, Friction Losses, and Estimation of Parameters of DC Machines.
- Speed Control of DC Motors.
- Study of Excitation Phenomena in Single - Phase Transformers.

- Open Circuit and Short Circuit Tests of Single - Phase Transformers.
- Load Test and Parallel Operation of Single - Phase Transformers.
- Back - to - Back Testing of Single-Phase Transformers.

References


- Fitzgerald A. E., Kingsley C., Umans S. D. Electric Machinery McGraw-Hill Publishers, 7th edition, 2014.
- Sen P. C. Principles of Electric Machines and Power Electronics 3rd editions J. Wiley Publishers, 2014.
- Chapman S. J. Electric Machinery Fundamentals McGraw-Hill Publishers, 5th edition, 2011.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR321 | Alternating Current Machines | 3 CH |
|---|---|---|
| Prerequisites | Direct Current Machines and Transformers - EPR221, Electric Circuits (2) - EPR213 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

Course Content

Rotating fields of single and three phase machines. Synchronous machines: construction, fundamental laws, basic tests, synchronous motors, power formulae, stability and damper bars, synchronization of machines, transient performance. Permanent Magnet Synchronous Generators and Switched Reluctance Machine. Induction machines: construction, principles of operation, torque, slip characteristics, conditions, and methods of starting of three phase induction motor, speed control of three phase induction motor, induction generator, testing of three phase induction motor.

Laboratory

- Three-phase synchronous generator testing
- Synchronization of a three-phase machine to an infinite busbar
- Synchronous motors
- Power angle characteristic of synchronous generator
- Three-phase induction motor testing (1) & (2)
- Three-phase induction regulator
- The synchronous - induction motor

References

- Fitzgerald A. E., Kingsley C., Umans S. D. Electric Machinery McGraw-Hill Publishers, 7th edition, 2014.
- Sen P. C. Principles of Electric Machines and Power Electronics 3rd editions J. Wiley Publishers, 2014.
- Chapman S. J. Electric Machinery Fundamentals McGraw-Hill Publishers, 5th edition, 2011.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR421 | Electric Drives | | 3 CH |
|---|---|---|---|
| Prerequisites | Alternating Current Machines - EPR321, Power Electronics (2) - EPR342 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ٠ | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Elements of drive systems, requirements of drive systems, Criteria for selecting drive components, DC motor drives, regenerative braking and quadrant operation, Induction motor drives, slip power recovery, Doubly Fed Induction Machine drive, performance analysis of induction motor drives with variable voltage or current source and variable frequency supply and field-oriented control, synchronous motor drives, Permanent Magnet Synchronous Machine drive: Stepper motor drives. Basics of testing and maintaining major components of a drive system.

**Laboratory**

- 1-phase Half & Full Controlled Converter.
- Characteristics of 1-phase Cycloconverter.
- The construction of a three-phase induction motor with the help of a model.
- The starters of three phase induction motors.
- Tthe power modulator & control unit.
- To perform the Speed control of DC shunt Motor by Armature control. 7. To Start DC shunt motor by using three-point starter.
- To obtain the Speed control of DC shunt Motor by Field control.
- To study the detailed structure of wind power station.

**References**


- J. Pyrhonen, V. Hrabovcova, and R. S. Semken, Electrical Machine Drives Control: An Introduction, Wiley, 2016.
- M. H. Rashid, Power electronics: circuits, devices, and applications, Pearson Prentice Hall, 4th edition, 2014.
- Pimal K. Bose, Modern Power Electronics and AC Drives, Prentice Hall PTR, Inc. 2002.

- Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.
- Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
- Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR331 | Electrical Power Engineering | | 3 CH |
|---|---|---|---|
| Prerequisites | Electromagnetic Fields - EPR211, Electric Circuits (2) - EPR213 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction to electric power system, power system components, applications of high voltage in electric power system, overhead transmission lines: parameter calculation, modeling, performance, and mechanical design, electric power distribution, underground cables, Determination of faults in underground cables, design of electrical distribution systems, earthing and safety, Introduction to power system planning. Introduction to high voltage DC transmission system.

**Laboratory**

- Overhead AC transmission Line Performance Characteristics.
- Electrolytic Tank Model for Assessment of Underground Cable Electric Fields.
- Balancing of Unbalanced Three - Phase Loads.
- Measurement of Earth Resistance.
- Monopolar, Homopolar and Bipolar DC Transmission Systems.

**References**


- High Voltage Engineering M.S. Naidu, and V. Kamaraju, 2018.
- Electric Power Transmission and Distribution P.J. Freeman 2016.
- Power System Analysis Hadi Saadat 2014.
- HVDC Transmission, S. Kamakshaiah& V. Kamaraju, Tata McGraw hill education


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR332 | Economics of Generation, Transmission, and Operation | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Power Engineering - EPR331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | ٠ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Load curves, Variation in demand, Load diversity. Power plant layout, Main equipment, Auxiliaries, Bus-bar arrangements. Power plant economics: Capital cost, Operating cost, Fixed charge rate, Selection of plant and size and unit size, Operation and economics of spinning reserve, economic analysis of a transmission system, tariffs, power factor, all-thermal generation allocation problem, hydro-thermal coordination, new energy resources. Transmission access fees assessment and calculations.

References


- Weber, C., Möst, D., & Fichtner, W. (2024). Economics of power systems: Fundamentals for sustainable energy transitions. Springer.
- Tanaka, M., Conejo, A. J., & Siddiqui, A. S. (2023). Economics of power systems. Springer.
- Kirschen, D. S., & Strbac, G. (2018). Fundamentals of power system economics. John Wiley & Sons.
- Berrie, T. W., Power System Economics, Peregrinus Publishers, 1998.
- Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.
- Glover, J. and Sarma, M., Power System Analysis and Design, PWS Publishers, 1987.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| EPR333 | AutoCAD Electrical Drawing | | 2 CH |
|---|---|---|---|
| Prerequisites | Engineering Drawing (1) - BAS143 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | ٠ | 3 | |
| Required SWL | | Equivalent ECTS | |
| 75 | | 3 | |

Course Content

This course covers the indispensable core topics for working with the AutoCAD Electrical software and electrical terminology. In this course, you will learn how to use many of the powerful electrical drawing creation tools in the software. You will create schematic drawings (ladder logic

and point to point), panel drawings, and PLC-I/O circuits using automated commands for symbol insertion, component tagging, wire numbering, and drawing modification. In addition, you are introduced to methods of customizing electrical symbols, circuits, and databases. Other topics covered include title block linking, reporting tools, templates, and project files.

References

•Mastering AutoCAD 2019 and AutoCAD LT 2019. by George Omura (Author), Brian C. Benton (Author)
•Adobe Photoshop CC Classroom in a Book (2019 Release) by Andrew Faulkner (Author), Conrad Chavez (Author) Photographic Rendering with V-Ray for Sketchup by Brian Bradley,2014.
•Mastering AutoCAD 2019 and AutoCAD LT 2019. by George Omura (Author), Brian C. Benton (Author.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR431 | Power System Analysis | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Power Engineering - EPR331 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | ٠ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Symmetrical components: Symmetrical components, Unsymmetrical faults on transmission lines. Synthesis of unsymmetrical phasor diagrams from their symmetrical components, The symmetrical components of unsymmetrical systems, Power in terms of symmetrical components, Positive, negative, and zero phase sequence networks, Unsymmetrical faults: Shunt faults, Series faults, Network matrices: Network topology, System admittance and system impedance matrices, Load flow solutions and control: Load flow equations, The Gauss-Seidel method, Newton-Raphson method and approximations, De-coupling methods, Regulating transformers.

References

- P.S.R. Murty, Power Systems Analysis Elsevier Science & Technology, ISBN: 9780081012345, 2nd Edition June 9, 2017
- John J. Grainger, William D. Stevenson Power Systems Analysis, McGraw-Hill Education, ISBN 9781259008351, 2016
- Hadi Saadat, Milwaukee School of Engineering, Power System Analysis, McGraw-Hill Companies, USA, 1999.
- Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.

- Gross, C.A., Power System Analysis, John Wiley, 1980.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR432 | Electrical Distribution Systems Installations | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction of electric installation design, engineering drawings and documents, Wiring system, symbols, schematic diagram and work scope. Load estimation. Primary and Secondary distribution system configurations and design. Codes and standards of electrical installations. Power distribution in residential and public buildings, Illumination technologies installations, Installation of electrical components, Electrical hazards, Inspection and testing, Design of emergency and earthing systems, Voltage drop calculations, Short circuit calculations, Protection of distribution systems, LV switchgear: functions & selection.

**Laboratory**

- Illumination test
- AUTOCAD 2D Design Drawings (Lighting, Sockets, Power and light current systems)
- AUTOCAD 2D Shop Drawings (Lighting, Sockets, Power and light current systems)

**References**


- Rahmani-Andebili, M. (2023). Power System Analysis: Practice Problems, Methods, and Solutions. Springer Nature.
- Tleis, N. D. (2020). Power Systems Modelling and Fault Analysis: Theory and Practice. Elsevier.
- Gupta, B. R. (2019). Power System Analysis. S.K. Kataria and Sons.
- El-Hawary, M. E. (1995). Electrical Power Systems: Design and Analysis. IEEE Press.
- Stevenson, W. D., Elements of Power System Analysis- Third Edition, McGraw Hill, 1995.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR433 | High Voltage Engineering | | 3 CH |
|---|---|---|---|
| Prerequisites | Power System Analysis - EPR431 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ٠ | 2 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Introduce Basic Components of High and Extra High voltage AC power System Components, Electrostatic Fields and their Effects on Human Beings. Breakdown in Gases, Liquids and Solids. Power Insulated Cables, Types, Sizing and Selectivity. Earthing Systems, Definition, Important, Types and Design Rules. Introduction to the Generation of High Voltages and Currents, Measurement of High Voltages and Currents. The Overvoltage Phenomenon and Insulation Coordination in Electric Power Systems. Non-Destructive Testing of Materials and Electrical Apparatus.

Laboratory

- Layout of High Voltage Lab.
- Measure Earth Resistance of High Voltage Lab and High-Tension Supply Pole.
- Study Breakdown of Air Using 100 KV AC Test set and Using Sphere to Sphere Gaps, Sphere to Plane Gap, Point to Plane Gap.
- Generation of HVDC with 140 KV, DC Set-Up.
- Generation and Measurements Positive and Negative Impulse Voltage Waveforms Using 280 KV, 2 Stages and 1.96 KJ Impulse Test Set.
- Generation of Switching Waves (Positive and Negative) With Two Stages, 280 KV Impulse Generator.
- 100 KVA Motorized Fully Automatic Insulating Oil Testing Machine.
- Measurements of Partial Discharge Using Test Set.

References

- Rizk, Farouk AM, and Giao N. Trinh. High voltage engineering. CRC Press, 2018.
- Naidu, Motukuru S. High voltage engineering. Tata McGraw-Hill Education, 2013.
- C. L WADHWA, "High Voltage Engineering," 2nd edition, 2007.
- Rakosh Das Begamudre, "Extra High Voltage AC Transmission Engineering," 3rd edition, 2006.
- E. Kuffel and W.S. Zaengl, "High Voltage Engineering Fundamentals," 2nd edition, 2002.
- Mazen Abdel-Salam, Hussein Anis, Ahdab El-morshedy and Roshdy Radwan, "High Voltage Engineering, Theory and Practice," 2nd edition, 2000.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| EPR434 | Power System Protection | | 3 CH |
|---|---|---|---|
| Prerequisites | Power System Analysis - EPR431,<br>Electrical and Electronic Measurements - EPR214 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Effects of Short-circuits on power systems. Basic elements of protection gear, Current and potential transformers, Protective relays, Electromechanical and static relays. Circuit breakers, Types, Construction, Performance, and ratings. Types of electromechanical relays, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders. Protection relaying philosophy. Transmission line protection, Compensating distance relaying. Rotating machinery protection: Relay protection for AC generators, Loss of field relay protection, Power transformer protection, Relay input sources.

**Laboratory**

- Study of electromechanical & numerical type IDMT over current relay
- Study of directional over current relay
- Study of earth fault relay
- Study of numerical type differential relay
- Study the application of numerical type over current relay for distribution feeder protection and synchrophasor assisted current differential relay for transmission/distribution line protection.
- Study of transmission line fault detection, classification and location estimation using distance relays by simulating different faults on the WSCC 9-bus test power system through PSCAD/EMTDC software or MATLAB/Simulink
- Study of Power Swing and its impact on distance relaying-based transmission line protection scheme through PSCAD/EMTDC software or MATLAB/Simulink

**References**


- Flurscheim, C. H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 2018.
- Horwitz, S. H. and Phadke, A. G., Power System Relaying, John Wiley, 2016.
- Rao. S. S, Switchgear & Protection, Khann Publishers, 2013
- Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| EPR435 | Smart Grid | 2 CH |
|---|---|---|
| Prerequisites | Power System Analysis-EPR431 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

This course will present and discuss fundamental principles, concepts, contexts, issues, applications and future developments of Smart grids and sustainable Energy Systems from the multidisciplinary perspectives. The course will provide a detailed analysis of technical and technology aspects of Sustainable Energy Systems and smart grids, including energy conversions, smart metering infrastructure, demand side management, electric vehicles, and transition from conventional to renewable energy resources in different sectors.

**References**

- A B M Shawkat Ali , "Smart Grids; Opportunities, Developments and Trends"

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR436 | Power Distribution Systems | 2 CH |
|---|---|---|
| Prerequisites | Electrical Distribution Systems Installations - EPR432 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 1 | 0 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

Distribution systems- load characteristics- Power distribution planning- carrying capacity and short circuit calculations- Distribution Systems control- monitoring- Distribution systems economics - Distribution panels and feeding systems design.

**References**

- Mishra, M. K. (2023). Power Quality in Power Distribution Systems: Concepts and Application. CRC Press.
- Sallam, A. A., & Malik, O. P. (2020). Electric Distribution Systems. IEEE Press.
- Resener, M., Rebennack, S., Pardalos, P. M., & Haffner, S. (Eds.). (2020). Handbook of Optimization in Electric Power Distribution Systems. Springer International Publishing.

- Sivanagaraju, S., & Satish, G. (2015). Electric Power Transmission and Distribution. Pearson Education India.
- Pansini, A. J. (2005). Guide to Electrical Power Distribution Systems. CRC Press.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR241 | Fundamentals of Electronic Circuits | | 3 CH |
|---|---|---|---|
| Prerequisites | Electrical Circuits (1) - CCE211 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

PN Junctions, Bipolar Junction Transistor (BJT), and Metal Oxide Semiconductor Field Effect Transistors (MOSFETs): construction and operation, I-V equation, biasing, circuit applications. Logic gates using CMOS. Operational Amplifiers (OP-AMPs): difference amplifier, OP-AMP specifications, frequency characteristics. OP- AMP applications: adder, subtractor, integrator, differentiator, electronic analogue computation, I to V and V to I converters, comparators, Schmitt trigger, OP-AMP oscillators. Sensors and transducers. Digital to Analog Converters (DACs) and Analog to Digital Converters (ADCs).

**Laboratory**

- Characterization of PN junction diodes and Zener diodes.
- Half wave and full wave rectifier circuits and peak detectors.
- AC and dc characterization of bipolar junction transistors.
- AC and dc characterization of Junction field effect transistors.
- AC and dc characterization of Metal oxide semiconductor field effect transistors.
- Characterization of logic gates.

**References**


- Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits, Oxford University Press, 7th Edition, 2014. (or 8th Edition, 2019).
- M. Morris Mano and Michael D. Ciletti, Digital Design, Pearson, 5th Ed., 2013.
- Donald A. Neamen., Microelectronics Circuit Analysis and Design, McGraw Hill, 2009.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR341 | Power Electronics (1) | 3 CH |
|---|---|---|
| Prerequisites | Fundamentals of Electronic Circuits -EPR241, Electric Circuits (2) -EPR213 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Introduction to power electronics, Power electronics devices: power diodes, thyristors, power transistors, Characteristics, Parallel and series operations, protection circuits, rectifier circuits, Line frequency converters: single-phase and three-phase circuits, Effect of source inductance, Dual converters, and introduction to HVDC transmission system. AC voltage controllers: single-phase AC thyristor controller, three-phase controller, static switches, and static tap changer.

**Laboratory**

- Characteristics of Thyristors and Triacs.
- Experimentation on Single - Phase Semi converters and Full Converters Feeding Resistive Loads.
- Experimentation on Three - Phase Semi converters and Full Converters Feeding Resistive Loads.
- Power Factor Improvement Using Extinction Angle, Symmetrical Angle and Pulse - Width - Modulation Control.
- Experimentation on Single - Phase and Three - Phase AC Switches.
- Phase and Integral - Cycle Control of Single-Phase Resistive Loads.
- Single Phase Controllers with Resistive and Inductive Loads.
- Three - Phase Half - Wave and Full - Wave Controllers with Resistive Loads.
- Experimentation on Step - Down and Step - Up Choppers with RL Loads.
- Experimentation on Single - Phase and Three - Phase Inverters.
- Characteristics of a DC Motor Fed by Phase - Controlled Rectifier Using SCR's.
- Characteristics and Speed Control of a DC Motor Fed by Bridge Rectifier.

**References**

- N. Mohan, T. M. Undeland, and W.P. Robbins Power Electronics: Converters, Applications and Design, John Wiley, 3rd edition, 2015.
- M. H. Rashid, Power electronics: circuits, devices, and applications, Pearson Prentice Hall, 4th edition, 2014.
- D. W. Hart, Power Electronics, McGraw-Hill International Edition, 2011

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR342 | Power Electronics (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | Power Electronics (1) - EPR341 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Dc to Dc Converters: buck, boost, buck-boost, Cuk DC/DC converters. Quadrants of operation of DC to DC converters. Inverters: half-bridge, full-bridge, single-phase and three- phase bridge inverters, PWM modulation techniques. Applications: uninterruptible power supply (UPS), induction heating. Interfacing of Solar energy, Wind energy with utility grid. Voltage Source Converters "VSC", Applications in AC and DC systems.

**Laboratory**

- Full wave-controlled rectifier circuits
- Half controlled three-phase controlled rectifiers
- Fully controlled three-phase controlled rectifiers
- D.C. choppers.

**References**


- N. Mohan, T. M. Undeland, and W.P. Robbins Power Electronics: Converters, Applications and Design, John Wiley, 3rd edition, 2015.
- M. H. Rashid, Power electronics: circuits, devices, and applications, Pearson Prentice Hall, 4th edition, 2014.
- D. W. Hart, Power Electronics, McGraw-Hill International Edition, 2011


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR351 | Modelling and Simulation of Engineering Systems | | ٣ CH |
|---|---|---|---|
| Prerequisites | Mathematics (4) - BAS213 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Introduction to control systems: open loop systems, closed loop systems, concepts and examples. block diagram algebra, transfer functions. modeling in state space; State - space representation of

scalar differential equation systems, State - space representation of transfer function systems. Mathematical modeling of linear dynamic systems; Modeling of Mechanical system, electrical system, Electromechanical system, Fluid system and Thermal system.

Laboratory

- Introduction to Matlab.
- Plotting response curves using Matlab.
- Transformation of mathematical models of dynamic systems using Matlab.
- Matlab representation of systems in block diagram form.
- Impulse response analysis of dynamic systems using Matlab.

References

- B. Kuo, F. Golnaraghi, Automatic Control Systems McGraw-Hill Education, 10th edition, 2017.
- K. Ogata, Modern Control Engineering Prentice Hall, 6th edition,2010.
- MATLAB control toolbox guide.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 20% | 40% |

| EPR352 | Automatic Control Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Modelling and Simulation of Engineering Systems - EPR351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Transient and steady state response analysis of continuous time feedback control systems; Routh's stability criterion; Error analysis of stable control systems; Effects of integral and derivative control actions; Control systems analysis and design by root locus method, Control systems analysis and design by frequency response method, Bode Diagrams, PID controllers, Lead, Lag, Lag - Lead compensation.

Laboratory

- Transient response analysis using Matlab.
- Root locus analysis and design using Matlab.
- Frequency response analysis and design using Matlab.
  - Position control system.
  - Speed control system.
  - Thermal control system.
  - Level control system.

- Pressure control system.

References


- B. Kuo, F. Golnaraghi, Automatic Control Systems McGraw-Hill Education, 10th edition, 2017.
- K. Ogata, Modern Control Engineering Prentice Hall, 6th edition,2010.
- MATLAB control toolbox guide.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR353 | Microprocessor-Based Automated Systems | | 2 CH |
|---|---|---|---|
| Prerequisites | Computer Programming - CCE161 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ٠ | 1 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Numbering systems and Data representations. Basic principles of microprocessors and microcontrollers. Instruction set and microcontroller programming. Microcontroller peripherals: Digital I/O ports, Interrupts, Timer, EEPROM, Analogue ports. Signal conditioning circuits and Interfacing circuits with external devices such as seven segments, switches, and relays. Applications such as look up tables, alarming system, Pulse Width Modulation (PWM), speed control, temperature control.

Laboratory

- Peripheral Interface Adapter (PIA)
- Microprocessor/DAC interfacing and applications

References


- Ming-Bo Lin, “Principles and Applications of Microcomputers: 8051 Microcontroller Vol. I Assembly-Language Programming, CreateSpace Independent Publishing Platform,2016.
- Julio Sanchez, Maria P. Canton, “Microcontrollers: High performance systems and programming,” CRC press, Taylor & Francis group, NW, 2014.
- Tim Wilmshurst, “Designing Embedded Systems with PIC Microcontrollers, principles and applications,” Newnes, 2nd edition, 2009.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| ٣٠% | ٢٠% | ١٠% | ٤٠% |

| EPR451 | Digital Control Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Automatic Control systems-EPR352 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | ٠ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Z-Transform and pulse transfer function. Representation of a digital system using difference equations. The stability of a digital system. Designing a digital controller from a continuous controller. Implementation a digital filter. Representation of a system in digital state space. Design and tuning of a digital PID controller. Designing a digital controller using pole placement and polynomial equations. Simulation of a digital system. Robustness of a control design-Digital optimal control.

References


- Hemchandra M. S., Digital Control Applications Illustrated with MATLAB, 1st Edition, CRC Press, 2015
- M. Sami Fadali and Antonio Visioli, “Digital Control Engineering: Analysis and Design”, Academic Press (Elsevier) 2nd edition, 2013.
- Norman S. Nise, “Control Systems Engineering”, Chapter 13, John Wiley & Sons, 6th edition, 2011.
- Edited by William S. Levine, Control Systems Fundamentals, CRC Press Taylor & Francis Group, Section IV – Digital Control, 2011.
- Ioan D. Landau and Gianluca Zito, “Digital Control Systems: Design, identification, and Implementation”, Springer-Verlag 2006.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| EPR452 | Microcontroller Applications in Power Engineering | | 3 CH |
|---|---|---|---|
| Prerequisites | Computer Programming-CCE161 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Review of number systems. Introduction to microcontroller. Microcontroller architecture. Instruction set and microcontroller programming. Microcontroller peripherals: Digital I/O ports, Interrupts, Timers, Counters, Analogue ports, PWM channels, and comparators. I/O device interfacing with external devices. Some practical applications: speed control of a dc motor, light control, …. etc.

Laboratory

PART –A (At least 6 experiments are mandatory) Assembly Language Programming experiments using 8051 Trainer kit and Arduino.

- Data transfer/exchange between specified memory locations.
- Largest/smallest from a series.
- Sorting (Ascending/Descending) of data.
- Addition / subtraction / multiplication / division of 8/16 bit data.
- Sum of a series of 8 bit data and Multiplication by shift and add method.
- Square / cube / square root of 8 bit data.
- Matrix addition and LCM and HCF of two 8 bit numbers.
- Code conversion – Hex to Decimal/ASCII to Decimal and vice versa.

PART –B (At least 4 experiments are mandatory) Interfacing experiments using 8051 Trainer kit and interfacing modules.

- Time delay generation and relay interface.
- Display (LED/Seven segments/LCD) and keyboard interface.
- ADC interface and DAC interface with wave form generation.
- Stepper motor and DC motor interface.
- Realization of Boolean expression through port.

PART –C (At least 2 experiments are mandatory) Programming / interfacing experiments with IDE for 8051/PIC/MSP/Arduino/Raspberry Pi based interfacing boards/sensor modules (Direct downloading of the pre-written ALP/‘C’/Python programs can be used).

- Relay control
- Distance measurement.
- Temperature measurement / Digital Thermometer
- Txr-Rxr interface.
- Alphanumeric LCD display interface.
- Simple project work including multiple interfaces.

References

- Julio Sanchez, Maria P. Canton,” Microcontrollers: High performance systems and programming,” CRC press, Taylor & Francis group, NW, 2014.
- Tim Wilmshurst, “Designing Embedded Systems with PIC Microcontrollers, principles and applications, “Newnes, 2nd edition, 2009.
- Milan Verle, “PIC microcontrollers programming in C,”MikroElektronika, 2009.
- Nebojsa Matic, “PIC microcontrollers for beginners too,” on-line free:

http://www.mikroelektronika.co.yu/english/product/books/picbasicbook/00.htm.

- Microchip technology Inc. PIC16F8X data sheet.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR453 | Computer Applications in Power Engineering | | 3 CH |
|---|---|---|---|
| Prerequisites | Power System Analysis-EPR431 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 0 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction: Power system matrices, Input and transfer matrices, Admittance matrices of the bus bars, Impedance matrices, Circuits representation, Programming, Large system simulation and programming, Short circuit calculations, Power flow studies concepts and methods, Approximate and fast methods, Separation methods, Distribution factors, Transfer methods, Optimal performance, Generation control, Error analysis, simulation of power system components and stability analysis, Application of some computer packages.

Laboratory

The laboratory is well equipped to meet the requirements of undergraduate as well as graduate studies and research work. Practical demonstrations by lab experiments for power system generation, transmission, and distribution concepts. Students are familiarized with the use of digital computers in the different aspects of power system analysis by using different software programs such as ETAP, PTI, and PSCAD.

**List of Software used in the Lab**

- PTI Software
- PC network
- ETAP Software
- PTI Software
- PSCAD Software

References

- P.S.R. Murty Power Systems Analysis Elsevier Science Technology ISBN 9780081012345 2nd Edition June 9 2017.
- John J. Grainger William D. Stevenson Power Systems Analysis McGraw Hill Education ISBN 9781259008351 2016.

- Nazementz, John W.; Hammer Jr. William E. and Sadowski, Randa P., Computer Integrated Manufacturing Systems: Selected Readings, Industrial Engineering and Management Press, 1985.
- Eric Teicholz, CAD/CAM Handbook, McGraw Hill Book Co., 1985.
- Groover, Mikell P.; Emory, W. and Zimmers, Jr., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall Inc., 1984.
- Gross, C. A., Power Systems Analysis, John Wiley, 1979.
- Stagg, G. W. and El-Abiad, A. H., Computer Methods in Power Systems, McGraw Hill, 1968.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR454 | Selected Topics in Control Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Determined according to course contents | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Selected Topics in Control Systems |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR455 | Industrial Control and SCADA Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Automatic Control Systems-EPR352 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Industrial control, Detecting sensors and actuating elements, Relay logic and their applications, Programmable logic controllers (PLCs) and their types, Construction and hardware configuration and descriptions of PLCs, Programming and testing basic/advanced functions, Industrial applications using PLC, SCADA, Types of SCADA, Application of SCADA software, Different packages available with I/O structure, Features of SCADA software, Creating SCADA |

application, Database of Tags and Editing graphic display with animation, Data Entry / Start Stop command, Analog entry.

Laboratory

- Lab (1): Identify detecting sensors and actuating elements using available elements in the Lab.
- Lab (2): Simulation of relay logic and their applications using SIEMENS software Package.
- Lab (3): Discussion with the student about PLCs and their types.
- Lab (4): Recognize the main components of PLC using SIEMENS students' kits inside the lab.
- Lab (5): Identify the construction and hardware configuration of PLC using SIEMENS students' kits inside the lab.
- Lab (6): Simulation of basic PLC functions and their applications using SIEMENS software Package.
- Lab (7): Simulation of PLC Timers functions and their applications using SIEMENS software Package and SIEMENS student kit.
- Lab (8): Simulation of PLC Counters functions and their applications using SIEMENS software Package and SIEMENS student kit.
- Lab (9): Simulation of PLC math operations functions and their applications using SIEMENS software Package.
- Lab (10): Simulation of PLC industrial project using SIEMENS software Package and Practical implementation of PLC industrial project using SIEMENS student kit.
- Lab (11): Creating database of tags for a new SCADA application.
- Lab (12): Creating and Editing graphic display with animation.
- Lab (13): Data entry and start stop command.

References

- Thomas, M.S. and McDonald, J.D., "Power system SCADA and smart grids", CRC press, 2017.
- Bolton W., "Programmable logic controllers", Newnes, 2015.
- McCrady, S.G., "Designing SCADA application software: a practical approach", Elsevier, 2013.
- Jack H., "Automating manufacturing systems with PLCs", Lulu. Com, 2010.
- Collins K., "PLC programming for industrial automation", Exposure, 2007.
- Boyer, S.A., "Supervisory control and data acquisition", Isa, 1999.
- Reis, R.A. and Webb John, W., "Programmable logic controllers: principles and applications", Prentice Hall, 1998.

Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| EPR161 | Energy Resources and Renewable Energy | | 2 CH |
|---|---|---|---|
| Prerequisites | - | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Overview of energy use and related issues, Identifying all energy resources: thermal, chemical, nuclear, kinetic, gravitational field, magnetic field, electric field. Rank and classification of different energies. Regenerative energy resources: solar, wind, biomass, wave energy, geothermal. Energy transfer, conversion, transmission, and storage. Climate change and sustainability issues. Cautionary and safety measures.

**References**


- Chapman. Stephen J. 'Electric machinery fundamentals' © The McGraw-Hill Companies, 7th ed, ISBN 0--07246523, 2020.
- Rolf E. Hummel Understanding material science Springer 2016.
- Charles K. Alexander, Matthew N. O. Sadiku., 'Fundamentals of electric circuits', The McGraw-Hill Companies, 5th ed, TK454.A452, 2013.
- William H. Hayt and John A. Buck Engineering Electromagnetic 8th Edition McGraw Hill 2010.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR361 | Fundamentals of Photovoltaics | | 3 CH |
|---|---|---|---|
| Prerequisites | Fundamentals of Electronic Circuits - EPR241 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ١ | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Sunlight energy and radiation measurement, Principles of solar cell operation, structure, electrical and optical characteristics, equivalent circuit, Types of PV, Energy balance in stand-alone PV systems, the estimated cost and payback times for the various technologies, feed-in tariffs and other incentives, Standards, calibration and testing of PV modules, PV system monitoring. Safety

considerations in PV. Site assessment. System design. Maximizing efficiency. Social and environmental aspects of PV systems. Maintenance of PV systems.

References


- McMordie, R.K. ed., 2021. Solar Energy Fundamentals. Routledge.
- Reinders, A., Verlinden, P., Van Sark, W. and Freundlich, A., 2017. Photovoltaic solar energy: from fundamentals to applications. John Wiley & Sons.
- Mackay, M.E., 2015. Solar energy: An introduction. Oxford University Press, USA.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR362 | Renewable Energy (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | Energy Resources and Renewable Energy - EPR161, Fluid and Aerodynamics- BME261, Heat Transfer - BME351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 1 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Introduction to solar, wind, biodiesel, Biomass, Geothermal and, Hydrogen Energy. Power in the wind, Power extracted by turbine blades, Wind turbine power curve, Estimation of annual energy, Types of grid-connected wind turbines, Environmental impacts of wind turbines. Photovoltaic Systems: The solar resource, Estimation of irradiance and radiation, The Electric characteristics of solar cells, Types of solar cells, Modules and arrays, Mismatch in connected cells, islanded and Grid connected PV systems, Estimation of annual energy.

Laboratory

- Sun beam tracking.
- Partial shading of solar panels.
- Wind speed measuring and its statistical analysis.
- Characteristic curve of a wind turbine.
- Different features of a wind generator.

References


- Kalogirou, S.A., 2023. Solar energy engineering: processes and systems. Elsevier.
- Letcher, T. ed., 2023. Wind energy engineering: a handbook for onshore and offshore wind turbines. Elsevier.
- Goswami, D.Y., 2022. Principles of solar engineering. CRC press.
- Wald, L., 2021. Fundamentals of solar radiation. CRC Press.
- Burton, T.L., Jenkins, N., Bossanyi, E., Sharpe, D. and Graham, M., 2021. Wind energy

handbook. John Wiley & Sons.
- Okedu, K.E., Tahour, A. and Aissaoui, A.G. eds., 2020. Wind Solar Hybrid Renewable Energy System. BoD–Books on Demand.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR363 | Renewable Energy (2) | 3 CH |
|---|---|---|
| Prerequisites | Fundamentals of Photovoltaics-EPR361, Renewable Energy (1) - EPR362 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 2 | 1 |
| Required SWL | | Equivalent ECTS |
| 125 | | 5 |

**Course Content**

Definition of hydrogen energy, uses, recent applications. Definition of fuel cells and their types, electrical circuit. The working principle of electric vehicles: - Design - Analysis - Control - Calibration - Operating characteristics - Electric Vehicle charging - Smart charging - Engine basics - Types of electric motors - Engine operation - Four-wheel drive. Classification of geothermal resources, Basics of geothermal wells and drilling, resource capacity estimation and measurement. Applications of geothermal energy.

**Laboratory**

- Testing of Fuel cells
- Electrical characteristics and equivalent circuit of Fuel cells
- Testing of Batteries used for electric Vehicles.
- Testing of electric motors used for electric Vehicles.
- Control circuits for electric Vehicles.

**References**

- Renewable Energy, Combined Edition (Volumes 1, 2, and 3), Richard A. Dunlap, Dalhousie University, 2020.
- Renewable Energy Devices and Systems with Simulations in MATLAB® and ANSYS, Frede Blaabjerg and Dan M. Ionel, 2017

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR461 | Storage Energy Technologies | | 3 CH |
|---|---|---|---|
| Prerequisites | Power Electronics (2) - EPR342, Renewable Energy (1) - EPR362 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Energy Storage Systems, Comparative Ratings and Properties, Electrochemical Energy Storage, Energy Storage by Means of Super-capacitors, Conventional Batteries and Flow Batteries, Superconducting Magnetic Energy Storage, Energy Storage Systems Based on Compressed Air, Hydropower and Pumped Storage Facilities, Flywheel Systems, Energy Storage Based on Hydrogen, System Arrangements and Applications (The Battery Management System (BMS)). Applications of Energy Storage Technology in the Power Generation. Introduction to Modeling of Several Types of Energy Storage Systems.

**Laboratory**

- Checking the battery voltage.
- Charging and discharging of batteries while detecting state of charge (SoC) and depth of discharge (DoD).
- Detecting the End of Charge (EoC).

**References**

- John Twidell and Tony Weir, Renewable Energy Resources, third edition, from Routledge, 2015.
- Zafirakis D., "Overview of energy storage technologies for renewable energy systems. In: Stand-alone and hybrid wind energy systems technology, energy storage and applications", Kaldellis JK, editor. Woodhead Publishing; 2010.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR462 | Ocean Energy | | 3 CH |
|---|---|---|---|
| Prerequisites | Fluid and Aerodynamics - BME261 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

Water Renewable Energy Resources, Tidal Energy Principles and Relation to Wind, Classification of Tidal Energy Resources, Tidal Energy Utilization, Installation of Turbines for Tidal Energy, Turbines Performance Analysis with Tidal Energy, Energy Storage Techniques with Tidal Energy, Wave Energy Principles, and Utilization, Wave Energy Classification, Wave Energy Turbines, Water and Air Columns, Operation of Wave Energy Turbines, Performance of Wave Energy Turbines, Column Separation, Energy Storage Techniques, Wave Energy Utilization in Egypt, Case Studies.

References


- Renewable Energy by Godfrey Boyle, Oxford University Press, 2004
- John Twidell and Tony Weir, Renewable Energy Resources, third edition, from Routledge, 2015.
- Twidell, John & Weir, Tony (2006): «Renewable energy resources». Taylor & Francis. •Tushar K. Ghosh & Mark A. Prelas (2011): «Energy resources and systems. Volume 2: Renewable resources». Springer.
- Paul Breeze & Aldo Vieira (et all.) (2009): «Renewable energy focus handbook». Elsevier


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR463 | Biomass and Waste Conversion Technology | | 3 CH |
|---|---|---|---|
| Prerequisites | Heat Transfer - BME351 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Characterization of Waste, Types of Biomass, Biomass Properties, Pre-Treatment of Biomass, Thermo-Chemical Processes, Fast and Slow Pyrolysis, Gasification, Transesterification, Design of Gasifiers, Drying and Devolatilization, Heat and Mass Transfer across Small and Large Biomass Particles, Combustion, Chemical Kinetics, Types of Reactors, Incinerators, Bio-Chemical Conversion, Anaerobic Digestion and Fermentation, Operation of Biomass Boilers and Stoves, Use of Bio-Fuels in Internal Combustion Engines and Gas Turbines, Emissions, Cost Considerations.

Laboratory

- Mass and Energy balance of gasification process
- Mass and Energy balance of transesterification process
- Mass and Energy balance of fermentation process
- Conversion from feedstock vegetable oils to biodiesel

- Properties of biogas, bioethanol and biodiesel.

References


- Rajeef Singh, Vishal Prasad, Barkha Vaish, Advances in Waste-to- Energy Technologies, CRC press, 2019.
- John Twidell and Tony Weir, Renewable Energy Resources, third edition, from Routledge, 2015.
- Grady, J.L., and Chen, G.J. Bioconversion of waste biomass to useful products. United States: N. p., 1998. Web.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR464 | Renewable Energy Resources Interfacing | | 3CH |
|---|---|---|---|
| Prerequisites | Power Electronics (2) - EPR342, Renewable Energy (1) - EPR362 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Storage technologies: Supper Capacitors: structure, ratings, characteristics, use with the wind power plant, fuel cells, Superconducting magnetic energy storage (SMES): structure, operation, Batteries: types, characteristics and operation, charge and discharge, Flywheels energy storage. Interface technologies: Concept of Distributed Generation, Type of interface, Interconnection standards, static synchronous generators, control of active power and voltage regulation, Wind turbines and photovoltaic interface topologies.

References


- Roland Wengenmayr and Thomas Bührke, Renewable Energy: Sustainable Energy Concepts for the Future, Wiley-VCH, 2015.
- John Twidell and Tony Weir, Renewable Energy Resources, third edition, from Routledge, 2015.
- Gilbert M. Masters, Renewable and efficient electric power systems, John Wiley & sons Pub., USA, 2014. Thomas Ackermann, Wind Power in Power Systems, 2nd Edition, CRC Press Taylor & Francis Group, 2012.
- Zafirakis D., “Overview of energy storage technologies for renewable energy systems. In: Stand-alone and hybrid wind energy systems technology, energy storage and applications”, Kaldellis JK, editor. Woodhead Publishing; 2010.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR465 | Artificial Intelligence Applications in Renewable Energy Systems | | 3 CH |
|---|---|---|---|
| Prerequisites | Automatic Control Systems - EPR352, Renewable Energy (2) - EPR363 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ١ | ٢ | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

**Course Content**

This course presents the application of machine learning and deep learning techniques for renewable energy system modeling, forecasting, and optimization for efficient system design. Also highlighted are intelligent data, renewable energy informatics systems based on supervisory control and data acquisition, and intelligent condition monitoring of Renewable systems. Provides both experimental and real datasets with great potential in the Renewable energy sector, which apply AI algorithms to obtain economic and environmental forecasting of the renewable energy.

**Laboratory**

- Build a digital twin model,
- Hindcast validation
- Reinforcement learning
- Agent Exploration in Action

**References**


- Advances in Artificial Intelligence for Renewable Energy Systems and Energy Autonomy, Valeriy Kharchenko, 2023.
- Artificial Intelligence for Renewable Energy Systems, S. Balamurugan, 2022.
- Artificial Intelligence in Renewable Energetic Systems: Smart Sustainable Energy Systems, Mustapha Hatti, 2018.
- Renewable Energy Devices and Systems with Simulations in MATLAB® and ANSYS, Frede Blaabjerg and Dan M. Ionel, 2017.


**Assessment Criteria**

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 30% | 20% | 10% | 40% |

| EPR466 | Selected Topics in Renewable Energy | | 3 CH |
|---|---|---|---|
| Prerequisites | Determined according to course contents | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 2 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content |
|---|
| Selected topics in Renewable Energy. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR471 | Energy Management Essentials | | 2 CH |
|---|---|---|---|
| Prerequisites | Electrical and Electronic Measurements-EPR214 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content |
|---|
| Energy efficiency and electricity, Energy Efficiency standards and practical considerations Diagnostics through electrical measurement, Selecting relevant measuring instruments, Energy saving opportunities, Motor-related savings opportunities, Lighting, Power factor correction and harmonic filtering, Load management and smart panels, Introduction to building management systems, Evaluating energy savings, Achieving sustainable performance. |
| References |
| • A. P. Rositter, Energy Management and Efficiency for the Process Industry, 10th Edition, John Wiley & Sons, New Jersy, 2015. ISBN: 978-1118838259.<br>• Stevin Fawkes, Energy Efficiency: he Definitive Guide to the Cheapest, Cleanest, Fastest Source of Energy, 1st Edition, Routledge, New-York, 2013. ISBN: 978-1409453598.<br>• Energy Conservation Center Japan, TOTAL ENERGY MANAGEMENT HANDBOOK, NOVEMBER 2005. |

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR472 | Renewable Energy and Buildings | | 2 CH |
|---|---|---|---|
| Prerequisites | Renewable Energy (1)-EPR362 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

This course introduces renewable energy systems. It covers the fundamental concepts of energy and radiation with specific solar energy applications and photovoltaic, electrical energy storage systems, and thermal energy and storage. The second part covers the basic science of wind energy systems and their electrical system designs. The third part covers the bioenergy systems from resources to final products and conversion technologies. It finally introduces other promising energy sources.

References


- Kanoğlu, M., Çengel, Y.A. and Cimbala, J.M., 2020. Fundamentals and applications of renewable energy. McGraw-Hill Education.
- Krarti, M., 2020. Energy audit of building systems: an engineering approach. CRC press.
- Duffie, J.A., Beckman, W.A. and Blair, N., 2020. Solar engineering of thermal processes, photovoltaics and wind. John Wiley & Sons.


Assessment Criteria

| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
|---|---|---|---|
| 40% | 20% | 0% | 40% |

| EPR473 | Renewable Energy Management | | 3 CH |
|---|---|---|---|
| Prerequisites | Renewable Energy (2)-EPR363 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Renewable Energy Management course focuses on renewable energy systems and energy efficiency and their potential for societies. Students get acquainted with renewable energy management related topics such as bioenergy and geothermal, solar energy, wind energy and hydropower, energy management, and others.

References

- Beggs, Clive "Energy: Management, Supply and Conservation" Butterworth-Heinemann, 2009.
- Vilnis Vesma "Energy Management Principles and Practice. A Companion to BS EN 16001", 2009.
- Capehart B.L., Turner W.C. and Kennedy W.J., "Guide to Energy Management" The Fairmont Press Inc., 2006.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR474 | Thermal Power Plants | | 2 CH |
|---|---|---|---|
| Prerequisites | Heat Transfer-BME351, Fluid and Aerodynamics-BME261 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | ١ | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Rankine Cycle Processes Calculations, and Methods. Thermal Efficiency, Superheat, Reheat, Regenerative Rankine Cycles, Regeneration with an Open Type Feed Water Heater, Regeneration with a Closed Type Feed Water Heater, Fire Tube Boilers, Construction and Operation, Water Tube Boilers, Superheaters, Economizers, Air Heaters, Steam Generator Losses and Efficiency, Impulse Turbines, Reaction Turbines, Types of Condensers, Deaerators, Ejectors, Construction of Feed Water Heaters, Steam Pipes and Steam Traps, Cooling Towers, Natural Draft and Forced Draft, Water Pumps.

References


- Er.R.K. Rajput, A Text Book of Power Plant Engineering, Laxmi publications (P) LTD, 2016.
- Rasul, Mohammad, ed. Thermal power plants. BoD–Books on Demand.
- De Souza, Gilberto Francisco Martha. Thermal power plant performance analysis. London: Springer.
- Madejski, Paweł, ed. "Thermal power plants: new trends and recent developments.".
- Cole, H., Thermal Power Cycles, Edward Arnold, 1991.
- El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.
- Domkundwor, S., Power Plant Engineering, Hanpat Ruixson, 1981.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR475 | Selected Topics in Energy Management | | 2 CH |
|---|---|---|---|
| Prerequisites | Determined according to course contents | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content | | | |
|---|---|---|---|
| Selected Topics in Energy Management | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR481 | EPR Graduation Project (1) | | 3 CH |
|---|---|---|---|
| Prerequisites | After Completing 101 CH | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 1 | 0 | 5 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

| Course Content | | | |
|---|---|---|---|
| The project is to explore a chosen topic and define the problem. After introductory lectures, students will perform research to explore different approaches to the problem at hand to perform system level analysis to explore project feasibility and reach an initial system architecture and specifications. The output of Project 1 is a report outlining the project feasibility results and laying the ground for the detailed design and implementation phase to be conducted in Project 2. | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| EPR482 | EPR Graduation Project (2) | | 3 CH |
|---|---|---|---|
| Prerequisites | EPR Graduation Project (1) - EPR481 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| ٠ | 0 | 6 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

The aim of Project 2 is to conduct detailed design and verification based on the preliminary system design specifications reached in Project 1. Once the design and verification are complete, this should be followed by prototype implementation and testing. The outcome of Project 2 is a complete design, fully verified using standard verification tools and presented in the form of professional design documents, design drawings accompanied with bill of materials, dissertation, and an oral examination.

| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 50% | 0% | 0% | 50% |

| EPR491 | Utilization and Management of Electrical Energy | | 3 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 2 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 125 | | 5 | |

Course Content

Electric meter types and Tariffs, Electric lighting technology – Electric heating and welding, Electrical traction, and electrical transportation systems (elevators, electrical stairs, electric cars, trains, etc.), Energy efficiency technologies: efficient energy management, energy conservation, energy management in industrial systems.

References


- Cretì, A., & Fontini, F. (2019). Economics of Electricity: Markets, Competition and Rules. Cambridge University Press
- Kothari, D. P., & Nagrath, I. J. (2018). Modern Power System Analysis. McGraw Hill Education.
- Gupta, J. B. (2009). Utilization of electric power & electric traction. S. K. Kataria & Sons
- Laithwaite, E.R. and Freris, L. L., Electric Energy: Its Generation Transmission and User, McGraw Hill Co., 1984.

- Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley, 1984.

Hancock, N.N., Electric Power Utilization, Pitman Publishers, 1967.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR492 | Power Quality for Energy Applications | | 2 CH |
|---|---|---|---|
| Prerequisites | Electrical Power Engineering - EPR331, Power Electronics (2) - EPR342 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

**Course Content**

Analysis and characterization of electric Power Quality: Power Outage, Harmonics, Unbalance, Distortion, Voltage Sag, and Flicker. Standards of power quality and grid interconnection. Shunt and series compensation of various power quality events. Design of passive power filters. Instantaneous real and imaginary power theory and its application into custom power devices. Active filters: types, operation and control. Instantaneous real & imaginary power theory and applications on conditioning. PQ analyzers, parameters analyzed. PQ monitoring and management.

**References**


- Paulo Robioro, Time-Varying Power Quality Issues, Florida State University, 2016.
- C. Sankaran, 'Power Quality ' CRC Press, Washington dc, 2012.
- Arindam Ghosh and Gerard Ledwich, "Power quality enhancement using custom power devices", Springer Science & Business Media, 2012.
- Mahesh Kumar, NPTEL Course on Power Quality in Power Distribution Systems, web link http://nptel.ac.in/courses/108106025.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR493 | Environmental Impact of Projects | | 2 CH |
|---|---|---|---|
| Prerequisites | | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |

| | |
|---|---|
| 100 | 4 |

Course Content

Conflicts between developments, economics and environments. Defining emissions sources, Impacts, standards and precautions. Water, air and soil pollution and measurements. Assessing the impacts on health, social, cultural and economic activities. Procedures of the environmental impact assessment: Screening, Scoping, defining impacts, comparing alternatives, Plans for mitigation and alleviation, Environmental auditing. Public participation. Environmental impact statement and reporting, Contents and forms. Solar site assessment, wind assessment, and bioenergy with required exercises using current industry tools to assess the viability of the resource. Examples for assessing the impacts of Solar, wind,…. etc. resources projects on the environment and impacts of different activities.

References


- Environmental Impact assessments methodology, second edition, Y. Anjaneyulu, 2018.
- John Glasson, Riki Therivel and Andrew Chadwick, Introduction to environmental impact assessment, Routledge, 2005.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR494 | Quality Systems and Assurance | | 2 CH |
|---|---|---|---|
| Prerequisites | Probability and Statistics-BAS113 | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

Course Content

Quality evolution, Quality assurance, Cost of quality, Quality systems for: design, development, purchasing, and Planning, Quality organization, Training, Quality Management Systems, ISO 9000 and ISO 14000 principles, other certification (CE mark, OSHA, … etc.), Employee participation programs.

References


- Nessren Mohamed Zamzam, quality systems and assurance, Course Notes, 2022.
- Indroniceanu, A. (2017). The three-dimensional approach of Total Quality Management, an essential strategic option for business excellence. Amfiteatru Economic, 19(44), 61-78.
- Sower, V. E. (2010). Essentials of quality with cases and experiential exercises. John Wiley & Sons.

- Gryna, Frank M., Quality Planning and Analysis, McGraw Hill Book Co., 2001.
- Juran, Joseph M. and Blanton, Godfery A., Juran's Quality Control Handbook, McGraw Hill Book Co., 2000.


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

| EPR495 | Applications of Nanotechnology in Renewable Energy Systems | 2 CH |
|---|---|---|
| Prerequisites | Fundamentals of Photovoltaics-EPR361, Renewable Energy (1)-EPR362, and Renewable Energy (2)-EPR363 | |

| Number of Weekly Contact Hours | | |
|---|---|---|
| Lecture | Tutorial | Laboratory |
| 2 | 0 | 1 |
| Required SWL | | Equivalent ECTS |
| 100 | | 4 |

**Course Content**

This course includes the definition of nanotechnology, advantages and disadvantages and its main applications. Applications of nanotechnology in renewable energy devices such as photovoltaic cells, fuel cells, biomass generators, batteries, and wind turbines blades. How nanotechnology makes a huge revolution in the size and design of renewable energy devices utilized for energy conversion and storage, environmental monitoring, as well as green engineering of environmentally friendly materials.

**Laboratory**

- Nanotechnology in Solar Energy
- Nanotechnology in Wind Energy
- Nanotechnology in Hydrogen Energy
- Nanotechnology in Bioenergy
- Nanotechnology in Batteries and Supercapacitors

**References**


- Nanotechnology Applications for Solar Energy Systems, Mohsen Sheikholeslami, 2023.
- Applications of Nanomaterials in Energy Systems, Eleftheria C Pyrgioti, Ioannis F Gonos, Diaa-Eldin A Mansour, 2023.
- Advanced Nanomaterials and Their Applications in Renewable Energy, Jingbo Louise Liu, Sajid Bashir, 2015


| Assessment Criteria | | | |
|---|---|---|---|
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 30% | 20% | 10% | 40% |

| EPR496 | Selected Topics in Quality Control | | 2 CH |
|---|---|---|---|
| Prerequisites | Determined according to course contents | | |
| Number of Weekly Contact Hours | | | |
| Lecture | Tutorial | Laboratory | |
| 2 | 1 | 0 | |
| Required SWL | | Equivalent ECTS | |
| 100 | | 4 | |

| Course Content | | | |
|---|---|---|---|
| Selected Topics in Quality Control | | | |
| Assessment Criteria | | | |
| Student Activities | Mid-Term Exam | Practical Exam | Final Exam |
| 40% | 20% | 0% | 40% |

## Courses offered by Basic Sciences Department in Electrical Power and Renewable Energy Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | BAS211 | Mathematics (3) |
| 2 | BAS213 | Mathematics (4) |
| 3 | BME251 | Thermodynamics (1) |
| 4 | BME351 | Heat Transfer |
| 5 | BME261 | Fluid and Aerodynamics |

## Courses offered by Communications and Computers in Electrical Power and Renewable Energy Engineering

| No. | Code | Course Name |
|---|---|---|
| 1 | CCE161 | Computer Programming |
| 2 | CCE211 | Electrical Circuits (1) |
| 3 | CCE482 | Embedded Systems |

- **Competencies VS Courses Matrices for Electrical Power and Renewable Energy Engineering Program**

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | D1 | D2 | D3 | D4 | D5 | D6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (2) | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (3) | | | | | | | | | | | | | | | | | | | | | |
| - | University Elective (4) | | | | | | | | | | | | | | | | | | | | | |
| NUB111 | History of Engineering | | | | | ■ | | ■ | | | | | | | | | | | | | | |
| NUB112 | Modern history of Egypt | | | | | ■ | | ■ | | | | | | | | | | | | | | |
| NUB113 | History of Civilizations | | | | | ■ | | ■ | | | | | | | | | | | | | | |
| NUB114 | Fundamentals of Engineering | ■ | | ■ | | | | | | | | | | | | | | | | | | |
| NUB121 | Report Writing and Communication Skills | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | |
| NUB122 | Climate Change, Energy and Water Issues | | | ■ | ■ | | | | | | | | | | | | | | | | | |
| NUB123 | Scientific Thinking | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | |
| NUB131 | Professional Legislations and Engineering Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | |
| NUB132 | Literature and Arts | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| NUB133 | Human Rights | | | | | | | ■ | ■ | | ■ | | | | | | | | | | | |
| NUB134 | Professional Ethics | | | | ■ | | | | ■ | | ■ | | | | | | | | | | | |
| NUB141 | Building Safety and Fire Protection | ■ | | | ■ | | | | | | | | | | | | | | | | | |
| NUB142 | Entrepreneurship and Startups | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | |
| NUB143 | Business Administration | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | |
| NUB144 | Principle of General Management | | | | | | | ■ | | ■ | ■ | | | | | | | | | | | |
| BAS111 | Mathematics (1) | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS112 | Mathematics (2) | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS113 | Probability and Statistics | | ■ | | | | | | | | | | | | | | | | | | | |
| BAS121 | Vibration and Waves | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS122 | Electricity and Magnetism | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS131 | Engineering Chemistry | ■ | | | | | | | | | | | | | | | | | | | | |
| BAS141 | Statics | | ■ | | | | | | | | | | | | | | | | | | | |
| BAS142 | Dynamics | | ■ | | | | | | | | | | | | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | | | | | ■ | ■ | | | | | | | | | | | | |
| TRN2x1 | Field training (1) | | | | ■ | | ■ | ■ | | | | | | | | ■ | | | | | | ■ |
| TRN3x1 | Field Training (2) | | | | ■ | | ■ | ■ | | | | | | | | ■ | | | | | | ■ |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | | | | | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | D1 | D2 | D3 | D4 | D5 | D6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | | | | | |
| EPR391 | Project Management and Economics for Electrical Engineering | ■ | | | ■ | | | | | | ■ | | | | ■ | ■ | | | | | | |
| EPR111 | Materials of Electrical Science | | ■ | | ■ | | | | | | ■ | | ■ | | ■ | | | | | | | |
| GME141 | Production Engineering | ■ | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | | | |
| EPR333 | AutoCAD Electrical Drawing | | | | ■ | | | | ■ | | ■ | | ■ | ■ | | | | | | | | |
| BAS211 | Mathematics (3) | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| BAS213 | Mathematics (4) | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| BME251 | Thermodynamics (1) | ■ | ■ | | | | | | | | | | | ■ | | ■ | | | | | | |
| BME261 | Fluid and Aerodynamics | | | | | | | | | | | | | | | ■ | ■ | | | ■ | | |
| BME351 | Heat Transfer | | ■ | | | | | | | | | ■ | | | ■ | | | | | | | |
| CCE161 | Computer Programming | | ■ | | | | | | | | | | | ■ | | ■ | | | | | | |
| EPR161 | Energy Resources and Renewable Energy | | | | | | | | | | | ■ | | | ■ | ■ | | | | | | |
| CCE211 | Electrical Circuits (1) | ■ | | | | | | | | | | | ■ | | ■ | | | | | | | |
| EPR211 | Electric and Magnetic Fields | | | | | | | | | | | | | | ■ | ■ | ■ | | | | | |
| EPR212 | Energy Conversion | | | | | | | | | | | ■ | | | ■ | ■ | | | | | | |
| EPR213 | Electric Circuits (2) | | | | | | | | | | | ■ | | ■ | | ■ | | | | | | |
| EPR214 | Electrical and Electronic Measurements | | | | | | | | | | | | | | ■ | ■ | ■ | | ■ | | ■ | |
| EPR221 | Direct Current Machines and Transformers | | | | | | | | | | | ■ | ■ | | | | | ■ | | | | |
| EPR241 | Fundamentals of Electronic Circuits | | | | | | | | | | | ■ | ■ | | ■ | | | | | | | |
| EPR321 | Alternating Current Machines | | | | | | | | | | | ■ | ■ | | | | | ■ | | | | |
| EPR331 | Electrical Power Engineering | | | | | | | | | | | ■ | ■ | | | | | | | | | |
| EPR341 | Power Electronics (1) | | | | | | | | | | | ■ | ■ | | | | | | | | | |
| EPR351 | Modelling and Simulation of Engineering Systems | | | | | | | | | | | | | | | ■ | ■ | | | | ■ | |
| EPR332 | Economics of Generation, Transmission, and Operation | | | | | | | | | | | ■ | ■ | | | ■ | ■ | ■ | | | | |
| EPR342 | Power Electronics (2) | | | | | | | | | | | ■ | ■ | | ■ | | | | | | | |
| EPR352 | Automatic Control Systems | | | | | | | | | | | | ■ | | ■ | | | ■ | | | | |
| CCE482 | Embedded Systems | | | | | | | | | | | | | ■ | | ■ | | | | | | |
| EPR431 | Power System Analysis | | | | | | | | | | | | ■ | | ■ | | | ■ | | | | |
| EPR361 | Fundamentals of Photovoltaics | | | | | | | | | | | ■ | ■ | | | | | ■ | | ■ | | |
| EPR362 | Renewable Energy (1) | | | | | | | | | | | | | | ■ | | | ■ | | ■ | | |
| EPR363 | Renewable Energy (2) | | | | | | | | | | | | | | ■ | | | ■ | | ■ | | |
| EPR433 | High Voltage Engineering | | | | | | | | | | | | | | | | ■ | | ■ | ■ | | |
| EPR434 | Power System Protection | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | |

| Code | Course Title | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | B1 | B2 | B3 | B4 | B5 | D1 | D2 | D3 | D4 | D5 | D6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPR455 | Industrial Control and SCADA Systems | | | | | | | | | | | | | ■ | | ■ | | | | | | |
| EPR491 | Utilization and Management of Electrical Energy | | | | | | | | | | | | | | | | ■ | | | | ■ | ■ |
| EPR481 | EPR Graduation Project (1) | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EPR482 | EPR Graduation Project (2) | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | EPR Elective (1) | | | | | | | | | | | | | | | | | | | | | |
| | EPR Elective (2) | | | | | | | | | | | | | | | | | | | | | |
| | EPR Elective (3) | | | | | | | | | | | | | | | | | | | | | |
| | EPR Elective (4) | | | | | | | | | | | | | | | | | | | | | |
| EPR461 | Storage Energy Technologies | | | | | | | | | | | ■ | | | | | | | | | | |
| EPR462 | Ocean Energy | | | | | | | | | | | | ■ | ■ | | | | ■ | | | | |
| EPR463 | Biomass and waste Conversion Technology | | | | | | | | | | | | | ■ | | ■ | ■ | ■ | | | | |
| EPR464 | Renewable Energy Resources Interfacing | | | | | | | | ■ | | | | | | | | | | | | | |
| EPR465 | Artificial Intelligence Applications in Renewable Energy Systems | | | | | | | | | | | | | | | | | | ■ | | ■ | ■ |
| EPR466 | Selected Topics in Renewable Energy | | | | | | | | | | | | | ■ | ■ | | | | | ■ | | |
| EPR421 | Electric Drives | | | | | | | | | | | | | | | | | ■ | ■ | ■ | | |
| EPR432 | Electrical Distribution Systems Installations | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | | |
| EPR451 | Digital Control Systems | | | | | | | | | | | | ■ | | ■ | | | ■ | | | | |
| EPR452 | Microcontroller Applications in Power Engineering | | | | | | | | | | | | | | | ■ | ■ | ■ | | | | |
| EPR453 | Computer Applications in Power Engineering | | | | | | | | | | | | | | | | | ■ | | | ■ | ■ |
| EPR454 | Selected Topics in Control Systems | | | | | | | | | | | ■ | ■ | | ■ | | | ■ | | | | |
| EPR435 | Smart Grid | | | | | | | | | | | | | | ■ | | ■ | | ■ | ■ | | |
| EPR471 | Energy Management Essentials | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | | |
| EPR472 | Renewable Energy and Buildings | | | | | | | | | | | | | | | | | | | | ■ | ■ |
| EPR473 | Renewable Energy Management | | | | | | | | | | | | | | | | | ■ | | | ■ | ■ |
| EPR474 | Thermal Power Plants | | | | | | | | | | | | | ■ | | ■ | ■ | ■ | | | | |
| EPR475 | Selected Topics in Energy Management | | | | | | | | | | | | | | | ■ | | ■ | | | | |
| EPR353 | Microprocessor-Based Automated Systems | | | | | | | | | | | | | ■ | | ■ | | | | | | |
| EPR436 | Power Distribution Systems | | | | | | | | | | | | ■ | | | | ■ | ■ | ■ | | | |
| EPR492 | Power Quality for Energy Applications | | | | | | | | | | | | | | | | ■ | ■ | ■ | | | |
| EPR493 | Environmental Impact of Projects | | | | | | | | | | | ■ | | | | | | | | | | |
| EPR494 | Quality Systems and Assurance | | | | | | | | | | | | | | | ■ | | | | | | |
| EPR495 | Applications of Nanotechnology in Renewable Energy Systems | | | | | | | | | | | | | | | | | | | | | ■ |
| EPR496 | Selected Topics in Quality Control | | | | | | | | | | | | | | | | ■ | ■ | | ■ | | |

- **Targeted Sustainable Development Goals**

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | University Elective (1) | ■ | | | | | | | | | | | | | | | | |
| - | University Elective (2) | ■ | | | | | | | | | | | | | | | | |
| - | University Elective (3) | ■ | | | | | | | | | | | | | | | | |
| - | University Elective (4) | ■ | | | | | | | | | | | | | | | | |
| BAS111 | Mathematics (1) | | ■ | | | | | | | | | | | | | | | |
| BAS112 | Mathematics (2) | | ■ | | | | | | | | | | | | | | | |
| BAS113 | Probability and Statistics | | | ■ | | | | | | | | | | | | | | |
| BAS121 | Vibration and Waves | | ■ | | | | | | | | | | | | | | | |
| BAS122 | Electricity and Magnetism | | ■ | | | | | | | | | | | | | | | |
| BAS131 | Engineering Chemistry | | ■ | | | | | | | | | | | | | | | |
| BAS141 | Statics | | | ■ | | | | | | | | | | | | | | |
| BAS142 | Dynamics | | | ■ | | | | | | | | | | | | | | |
| BAS143 | Engineering Drawing (1) | | | | | | | | | ■ | ■ | | | | | | | |
| TRN2x1 | Field training (1) | | | | | ■ | | ■ | ■ | | | | ■ | ■ | | | | |
| TRN3x1 | Field Training (2) | | | | | ■ | | ■ | ■ | | | | ■ | ■ | | | | |
| - | Engineering Economy and Project Management Elective | | | | | | | | | | | | | | | | | |
| - | Structures and Properties of Materials Elective Courses | | | | | | | | | | | | | | | | | |
| - | Engineering Technology Elective Courses | | | | | | | | | | | | | | | | | |
| - | Spatial Perception and Design Elective Courses | | | | | | | | | | | | | | | | | |
| BAS211 | Mathematics (3) | | | | ■ | | | | | | | | | | | | | |
| BAS213 | Mathematics (4) | | | | ■ | | | | | | | | | | | | | |
| BME251 | Thermodynamics (1) | | | | ■ | | ■ | ■ | | ■ | | | ■ | | | | | |
| BME261 | Fluid and Aerodynamics | | | | | | | | | ■ | | | | ■ | | | | |
| BME351 | Heat Transfer | | | | ■ | | ■ | ■ | | ■ | | | | ■ | | | | |
| CCE161 | Computer Programming | | | | | | | | ■ | ■ | | ■ | | | | | | |
| EPR161 | Energy Resources and Renewable Energy | | | | ■ | | | ■ | | | | | | ■ | | | | |
| CCE211 | Electrical Circuits (1) | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR211 | Electric and Magnetic Fields | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR212 | Energy Conversion | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR213 | Electric Circuits (2) | | | | ■ | | | ■ | | | | | | ■ | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPR214 | Electrical and Electronic Measurements | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR221 | Direct Current Machines and Transformers | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR241 | Fundamentals of Electronic Circuits | | | | ■ | | | | | ■ | | | | | | | | |
| EPR321 | Alternating Current Machines | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR331 | Electrical Power Engineering | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR341 | Power Electronics (1) | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR351 | Modelling and Simulation of Engineering Systems | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR332 | Economics of Generation, Transmission, and Operation | | | | ■ | | | ■ | ■ | | | | | ■ | | | | |
| EPR342 | Power Electronics (2) | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR352 | Automatic Control Systems | | | | ■ | | | ■ | | ■ | | | | ■ | | | | |
| CCE482 | Embedded Systems | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR431 | Power System Analysis | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR361 | Fundamentals of Photovoltaics | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR362 | Renewable Energy (1) | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR363 | Renewable Energy (2) | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR433 | High Voltage Engineering | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR434 | Power System Protection | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR455 | Industrial Control and SCADA Systems | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR491 | Utilization and Management of Electrical Energy | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR481 | EPR Graduation Project (1) | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR482 | EPR Graduation Project (2) | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| | EPR Elective (1) | | | | | | | | | | | | | | | | | |
| | EPR Elective (2) | | | | | | | | | | | | | | | | | |
| | EPR Elective (3) | | | | | | | | | | | | | | | | | |
| | EPR Elective (4) | | | | | | | | | | | | | | | | | |
| EPR461 | Storage Energy Technologies | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR462 | Ocean Energy | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR463 | Biomass and waste Conversion Technology | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR464 | Renewable Energy Resources Interfacing | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |

| Code | Course Title | G.1 | G.2 | G.3 | G.4 | G.5 | G.6 | G.7 | G.8 | G.9 | G.10 | G.11 | G.12 | G.13 | G.14 | G.15 | G.16 | G.17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPR465 | Artificial Intelligence Applications in Renewable Energy Systems | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR466 | Selected Topics in Renewable Energy | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR421 | Electric Drives | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR432 | Electrical Distribution Systems Installations | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR451 | Digital Control Systems | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR452 | Microcontroller Applications in Power Engineering | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR453 | Computer Applications in Power Engineering | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR454 | Selected Topics in Control Systems | | | | ■ | | | ■ | | ■ | | ■ | | | | | | |
| EPR435 | Smart Grid | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR471 | Energy Management Essentials | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR472 | Renewable Energy and Buildings | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR473 | Renewable Energy Management | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR474 | Thermal Power Plants | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR475 | Selected Topics in Energy Management | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR٣٥٣ | Microprocessor-Based Automated Systems | | | | ■ | | | ■ | | | | ■ | | ■ | | | | |
| EPR436 | Power Distribution Systems | | | | ■ | | | ■ | | | | | | | | | | |
| EPR492 | Power Quality for Energy Applications | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR493 | Environmental Impact of Projects | | | | ■ | | | ■ | | | | | | ■ | | | | |
| EPR494 | Quality Systems and Assurance | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR495 | Applications of Nanotechnology in Renewable Energy Systems | | | | ■ | | | ■ | | ■ | | ■ | | ■ | | | | |
| EPR496 | Selected Topics in Quality Control | | | | ■ | | | ■ | | | | | | ■ | | | | |

# مرفقات باللغة العربية

## قسم الهندسة المعمارية

## مقررات القسم باللغة العربية

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| DAE111 | أسس التصميم | 3 | 5 | 125 | 1 | 5 | 0 | 5 | |
| DAE211 | استوديو التصميم الإبداعي | 3 | 5 | 125 | 1 | 5 | 0 | 5 | DAE111 |
| DAE212 | استوديو تصميم العمارة والمسكن | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE211 |
| DAE311 | استوديو تصميم أنماط المباني والتشريعات | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE212 |
| DAE312 | استوديو التصميم التقني المعماري | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE311 |
| DAE411 | استوديو تصميم التأهيل المعماري المستدام | 3 | 5 | 125 | 1 | 5 | 0 | 6 | DAE312 |
| DAE412 | التصميم الداخلي بتقنية الواقع الافتراضي | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE413 | العمارة الرقمية وتقنيات التصميم - المستوى الأول | 2 | 4 | 100 | 2 | 0 | 0 | 2 | DAE312<br>10١CH |
| DAE414 | العمارة الرقمية وتقنيات التصميم - المستوى الثاني | 6 | 11 | 275 | 2 | 10 | 0 | 12 | DAE411<br>DAE413 |
| DAE221 | الإنشاء المعماري (١): نظم الإنشاء التقليدية | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE222 | الإنشاء المعماري (٢): أعمال التشطيبات والإنشاءات الخشبية | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE221 |
| DAE321 | الإنشاء المعماري (٣): نظم الإنشاء والتشطيبات المتقدمة | 3 | 5 | 125 | 1 | 4 | 0 | 5 | DAE222 |
| DAE322 | التصميم التنفيذي (١): تنسيق وترميز الرسومات التنفيذية | 3 | 5 | 125 | 1 | 4 | 0 | 6 | DAE321 |
| DAE421 | التصميم التنفيذي (٢): التفاصيل وجداول الكميات | 3 | 5 | 125 | 1 | 4 | 0 | 6 | DAE322 |
| DAE422 | الرسومات التنفيذية المتقدمة/نظم نمذجة معلومات البناء والمستندات التنفيذية | 3 | 5 | 125 | 1 | 0 | 3 | 4 | DAE421<br>DAE351 |
| DAE142 | تاريخ الفنون والعمارة (١): الحضارات القديمة | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE241 | تاريخ الفنون والعمارة (٢): العمارة الإسلامية والعمارة الغربية | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE142 |
| DAE242 | نظريات العمارة المعاصرة وأساليب | 2 | 3 | 75 | 2 | 0 | 0 | 2 | DAE241 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | التصميم | | | | | | | | |
| DAE151 | الاتصال البصري في العمارة | 3 | 5 | 125 | 1 | 4 | 0 | 5 | |
| DAE251 | تقنيات العمارة الرقمية (١) وتاريخ العمارة والتصميم الرقمي | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE151 |
| DAE252 | تقنيات العمارة الرقمية (٢) وتاريخ العمارة والتصميم الرقمي | 3 | 5 | 125 | 1 | 0 | 4 | 5 | DAE251 |
| DAE253 | البرمجة في العمارة | 2 | 4 | 100 | 2 | 0 | 2 | 4 | |
| DAE353 | الذكاء الاصطناعي في التصميم المعماري | 2 | 4 | 100 | 1 | 0 | 3 | 4 | |
| DAE461 | استوديو الوسائط الرقمية | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Total | | 68 | 115 | 2875 | 30 | 70 | 16 | 116 | |

## المتطلبات الثانوية لبرنامج هندسة العمارة الرقمية

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| DAE141 | السلوك الإنساني والبيئة المبنية | 1 | 2 | 50 | 1 | 0 | 0 | 1 | |
| DAE231 | العمارة المستدامة | 3 | 5 | 125 | 2 | 2 | 0 | 4 | |
| DAE331 | تنسيق المواقع | 3 | 5 | 125 | 1 | 3 | 0 | 4 | |
| DAE332 | مقدمة في التخطيط العمراني والتصميم والإسكان | 3 | 5 | 125 | 2 | 2 | 0 | 4 | DAE331 |
| DAE351 | نمذجة معلومات البناء | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE252 |
| DAE352 | التصميم المعماري الحاسوبي | 2 | 3 | 75 | 2 | 0 | 0 | 2 | |
| DAE354 | استوديو التصميم البارامتري | 3 | 6 | 150 | 2 | 0 | 2 | 4 | DAE252 |
| DAE451 | التصميم والتصنيع الرقمي | 3 | 5 | 125 | 2 | 0 | 2 | 4 | DAE353 |
| DAE361 | التركيبات الفنية في المباني | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CCE372 | أنظمة الصوت والإضاءة في المباني | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| CVE213 | تحليل البنية التحتية للهندسة المعمارية | 2 | 4 | 100 | 2 | 1 | 0 | 3 | |
| CVE346 | الخرسانة المسلحة والأساسات للهندسة المعمارية | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| CVE453 | الهياكل الفولاذية للهندسة المعمارية | 2 | 3 | 75 | 2 | 1 | 0 | 3 | |
| | المتطلبات الثانوية (اختياري أ) | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| | المتطلبات الثانوية (اختياري ب) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| | المتطلبات الثانوية (اختياري ج) | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Total | | 37 | 61 | 1525 | 25 | 18 | 8 | 51 | |

## يتم توزيع المقررات الاختيارية لبرنامج هندسة العمارة الرقمية على ثلاث مقررات اختيارية

| Code | Course Title | Weight | | | Contact Hours | | | | Prerequisites |
|---|---|---|---|---|---|---|---|---|---|
| | | CH | ECTS | SWL | Lec | Tut | Lab | TT | |
| Architecture Elective (A) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE323 | الأنظمة القائمة على المعرفة الرقمية | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE324 | نظم معلومات المباني الذكية | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE325 | نظم تكامل المباني المتقدمة/نمذجة معلومات البناء والمستندات التنفيذية | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| Architecture Elective (B) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE431 | العمارة والثقافة والتراث | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE432 | الإسكان | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE433 | تاريخ ونظريات التخطيط | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE434 | مقدمة في التخطيط العمراني الإقليمي | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| Architecture Elective (C) Select 2 Credit hrs. (one course) | | | | | | | | | |
| DAE462 | التشريعات المعمارية والعمرانية والاستدامة | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE463 | التسويق الرقمي | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE464 | التحكم الحراري | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |
| DAE465 | العمارة الرقمية المستدامة | 2 | 3 | 75 | 1 | 0 | 2 | 3 | |
| DAE466 | دراسات الجدوى للمشروعات المعمارية والعمرانية | 2 | 3 | 75 | 1 | 2 | 0 | 3 | |