



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Modelling and Simulation of Engineering Systems - ERE316

Academic Year	2025/2026	Semester	Fall
---------------	-----------	----------	------

1. Basic Information

Course Title (according to the bylaw)	Modelling and Simulation of Engineering Systems				
Course Code (according to the bylaw)	ERE316				
Prerequisite:	Mathematics (4) - BAS121				
Department/s participating in delivery of the course	Electrical and Renewable Energy Engineering				
Number of credit hours/points of the course (according to the bylaw)	Credit	Contact Hours			
	Hours	Lecture	Tutorial	Practical	Total
	3	2	0	2	4
Course Type	Compulsory - Major Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fourth Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Dr. Mohamed Kourany Saad				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview (Brief summary of scientific content)

Mathematical modeling of linear dynamic systems; transfer function and impulse response function; Modeling of mechanical, electrical, fluid and thermal systems; Modeling in state space; State - space representation of scalar differential equation systems; State - space representation of transfer function systems.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	CLO1	Recognize the basic concepts of process control, the transfer function, block diagram and State - space representation of complex engineering problems
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.	CLO2	Develop simulation to analyze the different control systems using MATLAB software packages.
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.	CLO3	Model of electrical and mechanical systems
		CLO4	Model of electromechanical, fluid and thermal systems
B4	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.	CLO5	Present the project course in the form of drawings and report to illustrate the design to the other group members and the supervisor.



4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-Learning
3. Experimental Learning
4. Projects
5. Field Visits
6. Report and Research
7. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours				
			Lecture Hours	Tutorial Hours	Practical Hours	Self-learning (Ass/ Project)	Other
1	Introduction	6	2	0	2	2	-
2	Transfer Function and stability	6	2	0	2	2	-
3	Block Diagram Representation	6	2	0	2	Assignments 1 (2 Hr)	-
4	Block Diagram Representation	6	2	0	2	Assignments 2 (2 Hr)	-
5	Modeling in state space; State - space representation of scalar differential equation systems	8	2	0	2	Assignments 3 (2 Hr)	Quiz 1 (2 Hr)
6	Modeling in state space; State - space representation of scalar differential equation systems	6	2	0	2	Assignments 4 (2 Hr)	-
7	Mid Term Exam						
8	Modeling of electrical systems	8	2	0	2	Assignments 5/ Project (4 Hr)	-
9	Modeling of electrical systems	8	2	0	2	Assignments 6/ Project (4 Hr)	-
10	Modeling of mechanical systems	8	2	0	2	Project (2 Hr)	Quiz 2 (2 Hr)
11	Modeling of mechanical systems	8	2	0	2	Assignments 7/ Project (4 Hr)	-
12	Mathematical Modelling of Electromechanical System	6	2	0	2	Project (2 Hr)	-
13	Mathematical Modelling of Electromechanical System	8	2	0	2	Assignments 8/ Project (4 Hr)	-
14	Modeling of fluid and thermal systems	8	2	0	2	Assignments 9/ Project (4 Hr)	-
15	Revision and Practical Exam	4	2	0	2	Discussion Project Course	-
16	Final Exam						



1. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term written Exam	7	20	20%
2	Final Written Exam	16	40	40%
3	Assignments	2 - 14	10	10%
4	Quizzes	5, 10	10	10%
5	Final Practical Exam	15	10	10%
6	Report / Project	15	10	10%

2. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	K. Ogata, Modern Control Engineering, Pearson, 6th. Ed., 2010.
	Other References	B. Kuo, F. Golnaraghi, Automatic Control Systems McGraw-Hill Education, 10th edition, 2017.
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data Show System
	Supplies	White Board
	Electronic Programs	MATLAB - PSPICE
	Skill Labs/ Simulators	Lab Facilities
	Virtual Labs	-
	Other (to be mentioned)	Library

Dr. Mohamed Kourany Saad
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator