



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Electric Drives – ERE374

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Electric Drives				
Course Code (according to the bylaw)	ERE374				
Prerequisite:	Electrical Machines (2) – ERE317, Power Electronics (2)– ERE312				
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 Hours	Contact Hours			
		Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Elective - Minor Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fifth Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Assoc. Prof. Dr. Mohamed Mokhtar				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Elements of drive systems, requirements of drive systems, Criteria for selecting drive components, DC motor drives, regenerative braking and quadrant operation, Induction motor drives and their drive performance analysis, slip power recovery, Doubly Fed Induction Machine drive (DFIM), performance analysis of induction motor drives with variable voltage or current source and variable frequency supply and field oriented (or vector) control, synchronous motor drives, Permanent Magnet Synchronous Machine drive (PMSM): motor and generator applications, Stepper motor drives. Basics of testing and maintaining major components of a drive system.

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
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	CLO1	Recognize the fundamentals characteristics of different types of electric drive systems and the required drive characteristics.
		CLO3	Design control systems for electric drives and compute performance parameters of electric drive systems
		CLO4	Select the type and proper ratings of the power converter and the motor for certain drive system.
		CLO5	Gain access to data and information from libraries and internet related to course subjects.
		CLO6	Participate in team work to achieve the professional and practical skills
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	CLO1	Recognize the fundamentals characteristics of different types of electric drive systems and the required drive characteristics.
		CLO2	Explain the commonly employed power electronics circuits and the control techniques used for both DC and AC electric drive systems.
		CLO5	Gain access to data and information from libraries and internet related to course subjects.
		CLO6	Participate in team work to achieve the professional and practical skills



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
D3	Model, analyze, design, implement, test and operate renewable energy systems such as solar photovoltaics, solar thermal, wind, biomass and waste, hydro-tidal and wave, and other renewable energy applications	CLO1	Recognize the fundamentals characteristics of different types of electric drive systems and the required drive characteristics.
		CLO2	Explain the commonly employed power electronics circuits and the control techniques used for both DC and AC electric drive systems.
		CLO3	Design control systems for electric drives and compute performance parameters of electric drive systems
		CLO4	Select the type and proper ratings of the power converter and the motor for certain drive system.
		CLO5	Gain access to data and information from libraries and internet related to course subjects.
		CLO6	Participate in team work to achieve the professional and practical skills
D4	Select, analyze and control appropriate driving systems for different energy applications	CLO1	Recognize the fundamentals characteristics of different types of electric drive systems and the required drive characteristics.
		CLO2	Explain the commonly employed power electronics circuits and the control techniques used for both DC and AC electric drive systems.
		CLO3	Design control systems for electric drives and compute performance parameters of electric drive systems
		CLO4	Select the type and proper ratings of the power converter and the motor for certain drive system.
		CLO5	Gain access to data and information from libraries and internet related to course subjects.
		CLO6	Participate in team work to achieve the professional and practical skills

4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-learning
3. Tutorials
4. Discussion
5. Case study
6. Report and Research



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	Elements of drive systems	6	2	2	0	2	-
2	Requirements of drive systems	6	2	2	0	2	-
3	Criteria for selecting drive components,	6	2	2	0	2	-
4	DC motor drives	6	2	2	0	2	-
5	regenerative braking and quadrant operation	8	2	2	0	2	Quiz 1 (2 Hr)
6	Induction motor drives and their drive performance PART 1	6	2	2	0	2	-
7	Mid Term Exam						
8	Induction motor drives and their drive performance PART 2	6	2	2	0	2	-
9	slip power recovery, Doubly Fed Induction Machine drive (DFIM)	6	2	2	0	2	-
10	performance analysis of induction motor drives with variable voltage or current source and variable frequency supply and field oriented (or vector) control PART 1	8	2	2	0	2	Quiz 2 (2 Hr)
11	performance analysis of induction motor drives with variable voltage or current source and variable frequency supply and field oriented (or vector) control PART 2	6	2	2	0	2	-
12	synchronous motor drives	6	2	2	0	2	-
13	Permanent Magnet Synchronous Machine drive (PMSM)	6	2	2	0	2	-
14	Stepper motor drives	6	2	2	0	2	-
15	Basics of testing and maintaining major components of a drive system	6	2	2	0	2	-
16	Final Term Exam						

5. 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	4, 11	15	15 %
4	Quizzes	5, 10	15	15 %
5	Report	12	10	10 %



6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	Bose, P. K., Modern Power Electronics and AC Drives, Pearson, 2022
	Other References	Rashid, M. H., <i>Power Electronics Handbook</i> , Butterworth-Heinemann, 2023
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Lecture hall equipped with Data-Show/Laser Pointer/PC/Laptop/Smart Interactive Screen/White Board.
	Supplies	Printer / Copier/ Library
	Electronic Programs	Management Information System (MIS)
	Skill Labs/ Simulators	Software Packages
	Virtual Labs	Internet Access
	Other (to be mentioned)	

Assoc. Prof. Dr. Mohamed Mokhtar
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator