

Palestine Polytechnic University
College of Engineering
Department of Mechanical Engineering
Electrical Machines and Drive

- Course name:** • Electrical Machines and Drive.
- Course number** • ECE 403 (Registration Code: 4633)
- E-Class** • Google classroom code: uwsepd
- Credits and contact hours** • 3 Credit Hours

<i>Lecture</i>	<i>Lab.</i>	<i>Project</i>	<i>HW</i>	<i>Exam</i>	<i>Tutorial</i>	<i>Other</i>	<i>Total</i>
38	0	10	60	10	10	10	138

- Class meetings** • Monday and Wednesday 12:30-13:45. Wad Elharye B211.
- Office hours** • Sunday and Thursday 13:30-15:00
- Monday and Wednesday 11:00-12:30
- Tuesday 12:00-14:00

Instructor details	<i>Name</i>	<i>Contact</i>	<i>Office</i>
	Dr. Jasem Tamimi	jtamimi@ppu.edu	B209

Textbook information

- Course main references** • El-Sharkawi, Mohamed A. Fundamentals of electric drives. Cl-Engineering, 2000.
- Wildi, T., Electrical Machines, Drives and Power Systems, 5th/6th ed., 2002/2010, Prentice Hall.
- Trzynadlowski, Andrzej M. Control of Induction Motors. Academic press, 2000.
- Course supplemental materials** • Wildi, T., Electrical Machines, Drives and Power Systems, 5th/6th ed., 2002/2010, Prentice Hall.
- G. Mcpherson and R. Laramore, An Introduction to electrical machines and transformers, 2th ed., John Wiley and Sons, 1990.
- A. E. Fitzgerald, C. Kingsley and S.D. Umans, Electrical machinery, 6th ed., McGraw-Hill, 2003.
- S. Chapman, Electrical machinery fundamentals, 4th ed., McGraw-Hill, 2005.

Course specific information

- Catalog description 2016-2017** • Electrical drive system, Solid state device and switching circuits. Different mechanical characteristics and loads. A 3-phase induction motor (construction, working principle, speed-torque characteristic, speed control and breaking methods), Conventional motor control, Dynamic modeling and field orientation of the 3-phase induction motor.
- Prerequisites** • Introduction to Electrical Machines, ECE 331 (Registration code: 4355)
- Co-requisites** • None.

Specific goals and assessment
Specific outcomes of instruction

No.	Course ILOs	SOs	100%
1	Define and apply electrical drive systems by solid state devices and circuits. Topics 1 and 2.	a	10%
2	Define and analyze the solid state circuits, Topic 2.	e	10%
3	Define the speed torque characteristic of the different electrical machines. Topic 3.	a	5%
4	State the construction and the working principle of the 3-phase induction motor. Topic 4.	e	5%
5	Analyse the speed-torque characteristic of the 3-phase induction motor. Topic 5.	e	5%
6	Control the speed of the 3-phase induction motor under different conditions. Topic 6.	c	25%
7	Apply different breaking methods to 3-phase induction motor. Topics 7 and 8.	c	10%
8	Deal with traditional ON/OFF control method in electrical applications which involve 3-phase electrical machine. Topic 9.	k	10%
9	Differentiate and apply the dynamic model of the 3-phase induction motor. Topic 10.	e	10%
10	Apply the field orientation technique to 3-phase induction motor. Topic 11.	e	10%

Course outcomes assessment methods

No.	Assessment method	100%
1	First exam, 7 th Week, Provisional	20%
2	Second exam, 12 th Week, Provisional	20%.
3	Quizzes, HWs and project	10%.
4	Final Exam	50%.

List of covered topics

No.	Topics	Hours
1	Text 1, Chapters 1 and 2: Elements of electrical drive systems and solid state devices: Sections 1.2 and 2.1 to 2.5	3
2	Text 1, Chapter 3: Solid state switching circuit (ac/dc, dc/dc,ac/ac): Sections 3.1 to 3.9	6
3	Text 1, Chapter 4: Mechanical characteristic and loads. Sections 4.1 and 4.2	3
4	Text 2, Chapter 13: 3-phase induction motor (construction and working principle) : Sections 13.1 to 13.10	6
5	Text 1, Chapter 5: Speed-torque characteristic of IM: Section 5.2 and 5.4.	3
6	Text 1, Chapter 7: Speed control of induction motors. Sections 7.1 to 7.9	6
7	Text 1, Chapter 8: Breaking of electrical motor. Sections 8.1 to 8.3.	1
8	Text 1, Chapter 10: Breaking of induction motor. Sections 10.1 to 10.3	1
9	Text 2, Chapter 20: Basics of industrial motor control: Sections 20.1 to 20.12.	2
10	Text 3, Chapter 6: Dynamic model of the induction motor: Section 6.1 to 6.3	3
11	Text 3, Chapter 7: Field orientation. Sections 7.1 to 7.5.	2

Additional Information

Contribution to professional component	No.	Component	Credits
	1	Mathematics and science	0
	2	Engineering and science	3
	3	General education requirements	0
	4	Major design experience	0
Data used to show student proficiency in the course outcomes	No.	Data	
	1	Samples of Student work	
	2	Grade sheet showing student performance and class average in ILOs	
	3	Final exam	
Policies	No.	Policy	
	1	Attendance check will be done through attendance check-list, so please sign it with your original signature each class and do not sign instead of any other colleague. All students who use fake signatures will be penalized.	
	2	Please do not attend the class if you are late with more than 15 minutes.	
	3	Students with more than 6 missed hours will have "WF" grade in the course.	
	4	No makeup exam (first or second), quizzes or homework will be hold.	
	5	Only a persuading excuse can be accepted for a missed exam.	
	6	The grade of the missed exam with accepted excuse will be the the average of the other non-missed exams as well as the mean of the students' grades in the missed exam.	
	7	Using or playing with mobile phones during the classes are not allowed.	
Teaching methods	No.	Method	
	1	Lectures: The concepts, theorem with their proofs and interpretation, circuit-solving techniques,... will be explained using simple class materials, e.g., blackboard and pen. Then problems and case studies will be solved using blackboard and pin in the class by the teacher, these problems are entitled with "Examples", other problem will be solved by the student in the class these problems are entitled with "Exercise". The in Class quizzes can be also solved within groups in the lecture.	
	2	Single Assignments: Student must solve and hand out some selected problems in the textbook in a specified deadline.	
	3	Groups' Assignments: The class will be divided into groups (each group 2-3 students), each group will have several tasks concerning the electrical circuit network.	