ESOGU ELECTRICAL - ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM

Course Title	Course Code
Introduction to Power Electronics	151228550

Semester in Program	Number of Course Hours per Week		ECTS
	Theory	Practice	
7	3	2	7

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
	5	2		

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

Prerequisite	-
Objectives of the Course	Having taken this course, students will learn the need for electrical conversion, and learn the goal and methods of electrical conversion. At the end of the course, students become effective designers of useful power electronics converters.
Brief Course Content	Background information about power electronics technology, organizing and analyzing semiconductor switches, uncontrolled diode rectifiers, phase-controlled rectifiers, AC voltage controllers, and DC-DC converters.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Learn about the basics of the power semiconductor devices.	1, 2, 3, 5b	1, 5, 6, 10, 11, 12	A, E, I
2 Learn about the topology and the operating principles of uncontrolled and controlled rectifiers.	1, 2, 3, 5b	1, 5, 6, 10, 11, 12	A, E, I
3 Learn about the topology and the operating principles of AC voltage controllers.	1, 2, 3, 5b	1, 5, 6, 10, 11, 12	A, E, I
4 Learn about the topology and the operating principles of DC/DC converters.	1, 2, 3, 5b	1, 5, 6, 10, 11, 12	A, E, I
5			
6			
7			
8			
9			
10			

***Teaching Methods** **1:**Lecture, **2:**Discussion, **3:**Experiment, **4:**Simulation, **5:**Question-Answer, **6:**Tutorial, **7:**Observation, **8:**Case Study, **9:**Technical Visit, **10:**Problem Solving, **11:**Induvidual Work, **12:**Team/Group Work, **13:**Brain Storm, **14:**Project Design / Management, **15:**Report Preparation and/or Presentation

****Assessment Methods** **A:**Exam, **B:**Quiz, **C:**Oral Exam, **D:**Homework, **E:**Report, **F:**Article Examination, **G:**Presentation, **I:**Experimental Skill, **J:**Project Observation, **K:**Class Attendance; **L:**Jury Exam

Main Textbook	D. W. Hart, Power Electronics. New York, NY: McGraw-Hill Professional, ISBN 978-0-07-338067-4, 2010.
Supplementary Resources	N. Mohan, W. Robbins, and T. Undeland, Power electronics: Converters, applications and design, 2nd ed. Brisbane, QLD, Australia: John Wiley and Sons (WIE), ISBN: 0471584088, 1995. P. T. Krein, Elements of Power Electronics. New York, NY: Oxford University Press, ISBN: 0195117018, 1997.

	J. G. Kassakian, M. F. Schlecht, and G. C. Verghese, Principles of power electronics. Upper Saddle River, NJ: Pearson, ISBN: 0201096897, 1991.
Necessary Course Material	-

Course Weekly Schedule	
1	Introduction to power electronics and power electronics concepts
2	Semiconductor switching devices used in power electronics: diodes and thyristors
3	Semiconductor switching devices used in power electronics: BJTs, MOSFETs, GTOs and IGBTs
4	Power computations
5	Uncontrolled half wave rectifier
6	Uncontrolled half wave rectifier
7	Controlled half wave rectifier
8	Mid-Term Exams
9	Single phase uncontrolled full wave rectifiers
10	Single phase controlled full wave rectifiers
11	Uncontrolled and controlled three phase rectifiers
12	AC voltage controllers
13	DC-DC converters – buck converter
14	DC-DC converters – boost converter
15	DC-DC converters – buck-boost converter
16,17	Final Exams

Calculation of Course Workload			
Activities	**Count**	**Time (Hour)**	**Total Workload (Hour)**
Weekly classroom time	14	5	70
Weekly study time (review, reinforcing, preparation)	14	5	70
Homework	8	2	16
Taking a quiz			
Studying for a quiz			
Oral exam			
Studying for an oral exam			
Report writing (Preparation and presentation time included)	8	3	24
Project (Preparation and presentation time included)			
Presentation (Preparation time included)			
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	6	6
Final Exam	1	2	2
Studying for Final Exam	1	6	6
		Total workload	**196**
		Total workload / 30	**6.53**
		Course ECTS Credit	**7**

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
NO	**PROGRAM OUTCOMES**	**Contribution**
1	a. Sufficient knowledge of mathematics	5
	b. Sufficient knowledge of basic sciences	5
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	5
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	5
2	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	5
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	4
4	To analyze and solve the complicated engineering problems: a. skill of developing, selecting and applying the required techniques and devices	
	b. skill of using information technologies effectively	
5	To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects: a. skill of experimental design	
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	5
6	a. Skill of performing individual studies	
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
7	a. Skill of effective oral and writing communication in Turkish	
	b. Skill of improving and using foreign language knowledge	
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	
8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	
9	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	
	b. Knowledge about legal regulations and standards of engineering	
10	a. Knowledge about project management, risk management and change management	
	b. Awareness of the significance of entrepreneurship and innovation	
	c. Knowledge about sustainable development	
11	Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions	
12	Knowledge about modern problems in local and universal scale	

Assessment	
Activity Type	**%**
Mid-term	25
Experimental Skill	25
Final Exam	50
Total	100

LECTURER(S)				
Prepared by	Dr. İpek ÇETİNBAŞ			
Signature(s)				

Date: 18.07.2024