



# ESOGÜ Electrical-Electronics Engineering Department

**COURSE CODE:** 151228550-151248550 **COURSE TITLE:** Introduction to Power Electronics

Semester	Weekly Hours		COURSE				
	Theoretical	Practical	Credits	ECTS	Type	Language	
7	3	2	4	7	Compulsory ( ) Elective (x)	Turkish ( ) English (x)	
Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).							
<b>Math and Basic Science</b>		<b>Electrical Engineering</b> [mark (√) if there is high design content]		<b>General Education</b>	<b>Humanities</b>		
		( )					
<b>Assessment</b>		<b>THEORETICAL-PRACTICAL COURSES</b>			<b>LABORATORY COURSES</b>		
		<b>Type</b>	<b>Number</b>	<b>%</b>	<b>Activity Type</b>	<b>Number</b>	<b>%</b>
<b>Midterm</b>		Midterm	1	45	Quiz		
		Quiz			Lab performance		
		Homework			Report		
		Project			Oral exam		
		Other (.....)			Other (.....)		
<b>Final</b>			1	55			
<b>Makeup exam (Oral/Written)</b>		Written					
<b>Prerequisites</b>		None					
<b>Brief content of the course</b>		Background information about power electronics technology, organizing and analyzing semiconductor switches, uncontrolled diode rectifiers, phase controlled rectifiers, ac controllers, dc/dc converters, inverters, and discontinuous operating modes.					
<b>Objectives of the course</b>		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 converters.					
<b>Contribution of the course towards professional education</b>		Work and take part in power electronic design projects. Provide important background for graduate level studies.					
<b>Outcomes of the course</b>		1) Learn about the basics of the power semiconductor devices 2) Learn about the topology and the operating principles of various ac/dc rectifier circuits 3) Learn about the topology and the operating principles of various dc/dc converters. 4) Learn about the topology and the operating principles of various dc/ac converters.					
<b>Textbook of the course</b>		Mohan, N., T. Undeland, ve W. Robbins, "Power Electronics: Converters, Applications, and Design," John Wiley, ISBN: 0471584088.					
<b>Other reference books</b>		1) Krein, P. T., "Elements of Power Electronics," Oxford University Press, 1998, ISBN: 0195117018. 2) Erickson, R. W., "Fundamentals of Power Electronics," Chapman & Hall, 1997, ISBN: 0412085410. 3) Rashid, M. H., "SPICE for Power Electronics and Electric Power. Upper Saddle River," Prentice-Hall, 1993, ISBN: 0130304204. 4) J. G. Kassakian, M. F. Schlecht, ve G. C. Verghese, "Principles of Power Electronics. Reading, Addison-Wesley, 1991, ISBN: 0201096897.					
<b>Required material for the course</b>							

WEEKLY PLAN OF THE COURSE	
Week	Topics
1	Semiconductor switching devices used in power electronics: diodes and thyristors
2	Semiconductor switching devices used in power electronics: BJT, MOSFET, GTO and IGBT
3	Single-phase half-wave uncontrolled rectifier Single-phase full-wave uncontrolled rectifier
4	Three-phase half-wave uncontrolled rectifier Three-phase bridge rectifier
5	Single-phase half-wave controlled rectifier Single phase full wave half-controlled rectifier Single phase full wave full controlled rectifier
6	Three-phase half-wave controlled rectifier Three-phase controlled rectifier
7	AC voltage control
8,9	Midterm
10	DC/DC step down converter
11	DC/DC step up converter
12	DC/DC step down/up converter
13	Half bridge DC/DC converter Full bridge DC/DC converter
14	Half bridge DC/AC inverter Full bridge DC/AC inverter
15,16	Final

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronic Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronic Engineering	X			
2	Ability to identify complex engineering problems in Electrical and Electronic Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.	X			
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronic Engineering.		X		
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronic Engineering, skills to use information technology effectively.				
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronic Engineering				
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.				
7	Communicating effectively in oral and written form both in Turkish and English. Effective report writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.				
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing				
9	Understanding of professional and ethical responsibility				
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				

**Scale for assessing the contribution of the course to the program outcomes:**

**4: High                      3: Medium                      2: Low                      1: None**

**Name of Instructor(s):** Assoc. Prof. Bünyamin Tamyürek

**Signature(s):**

**Date:** 07/05/2018