



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT  
COURSE INFORMATION FORM**

Course Title	Course Code
SEMICONDUCTOR DEVICES	151227451

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
7	3	0	5

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

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

<b>Prerequisite</b>	
<b>Objectives of the Course</b>	Better knowledge on semiconductor materials and devices Introduction of nanotechnology Introduction of semiconductor device fabrication and characterization
<b>Brief Course Content</b>	The primary emphasis of this class will be understanding of how modern electronic devices work. Specific topics to be covered including electrical and optical properties of materials,, Diodes, Transistors, Optoelectronic devices, Novel materials and devices, Semiconductor device fabrication and characterization techniques will be addressed briefly.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Students who successfully complete this course will understand the principles and limitations of the semiconductor materials and devices	1-2	1, 2, 4	A, B
2 Students who successfully complete this course will have a knowledge on novel electronic materials and devices	6-7-8	2, 11, 12, 15	A, B, G
3 Students who successfully complete this course will have a knowledge on nanotechnology	6-7-8	1, 2, 7	A, B, G
4 Students who successfully complete this course will have a knowledge on electronic device fabrication and characterization techniques.	1-2	1, 2, 7	A, B
5			

\***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:Individual 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

<b>Main Textbook</b>	B. G. Streetman and S. K. Banerjee, Solid State Electronic Devices, 7th ed. Pearson, 2016.
<b>Supplementary Resources</b>	R. F. Pierret, Semiconductor Device Fundamentals, Addison Wesley, 1996. S. M. Sze, K. Ng, Physics of Semiconductor Devices, Wiley, 2007. D. K. Schroder, Semiconductor Material and Device Characterization, Wiley, 1998.
<b>Necessary Course Material</b>	Electronic calculator

Course Weekly Schedule	
1	Introduction to Semiconductors
2	Electrical, optical properties of materials
3	Junctions, Diodes
4	BJTs
5	FETs, *Quiz#1 (*Quiz dates are subject to change)
6	Optoelectronic devices
7	Novel materials and devices
8	Mid-Term Exams
9	Novel materials and devices
10	Novel materials and devices
11	Basics of device fabrication
12	Basics of device fabrication*Quiz#2 (*Quiz dates are subject to change)
13	Device characterization techniques
14	Device characterization techniques
15	Course review
16,17	Final Exams

Calculation of Course Workload			
Activities	Count	Time (Hour)	Total Workload (Hour)
Weekly classroom time	14	3	42
Weekly study time (review, reinforcing, preparation)	14	3	42
Homework			
Taking a quiz	2	1	2
Studying for a quiz	2	5	10
Oral exam			
Studying for an oral exam			
Report writing (Preparation and presentation time included)			
Project (Preparation and presentation time included)			
Presentation (Preparation time included)	2	10	20
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	10	10
Final Exam	1	2	2
Studying for Final Exam	1	15	15
		<b>Total workload</b>	<b>145</b>
		<b>Total workload / 30</b>	<b>4.83</b>
		<b>Course ECTS Credit</b>	<b>5</b>

Assessment	
Activity Type	%
Mid-term	20
Quiz	20
Presentation	20
<b>Final Exam</b>	40
<b>Total</b>	100

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	3
	b. Sufficient knowledge of basic sciences	3
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	3
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	3
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.	3
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	3
4	To analyze and solve the complicated engineering problems: a. skill of developing, selecting and applying the required techniques and devices	3
	b. skill of using information technologies effectively	3
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	
6	a. Skill of performing individual studies	4
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	4
7	a. Skill of effective oral and written communication in Turkish and English	4
	b. Skill of improving and using foreign language knowledge	4
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	4
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	4
8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	3
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	

INSTRUCTORS				
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