ABDULLAH GÜL UNIVERSITY GRADUATE SCHOOL OF ENGINEERING & SCIENCE ELECTRICAL AND COMPUTER ENGINEERING PROGRAM COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
SEMICONDUCTOR DEVICE FUNDAMENTALS	ECE-585	FALL-SPRING	3 + 0	3	10

Prerequisite Courses General Physics-Materials Science and Electrical Engineering Background

Туре	Selective			
Language	English			
Coordinator	Assist. Prof. Evren Mutlugun			
Instructor	Assist. Prof. Evren Mutlugun			
	3			
Adjunt	none			
Aim	 Understanding the basic physical processes that are involved in the semiconductor devices. Using the conceptual understanding of the semiconductor physics, providing students the fundamental physical and electronic properties of semiconductor materials and devices 			
discussing the fundamental semiconductor physics phenomena explaining the operation principles of semiconductor devices using the conceptual understanding of the semiconductor physics, designing semi devices to address the desired parameters				
Course Content	 Crystal structure-atoms and electrons Energy bands and charge carriers in semiconductors Optical absorption, luminescence, carrier lifetime and diffusion Junctions Field effect transistors Bipolar junction transistors Photodiodes Solar cells Light emitting diodes Lasers 			

WEEKLY TOPICS AND PRELIMINARY STUDY						
Week	Topic	Preliminary Study				
1	Crystal structure-atoms and electrons	The relevant articles from the literature				
2	Crystal structure-atoms and electrons	The relevant articles from the literature				
3	Energy bands and charge carriers in semiconductors	The relevant articles from the literature				
4	Energy bands and charge carriers in semiconductors	The relevant articles from the literature				
5	Optical absorption, luminescence, carrier lifetime and diffusion	The relevant articles from the literature				
6	Optical absorption, luminescence, carrier lifetime and diffusion	The relevant articles from the literature				
7	Junctions	The relevant articles from the literature				
8	Midterm	The relevant articles from the literature				
9	Field effect transistors- Bipolar junction transistors	The relevant articles from the literature				
10	Photodiodes	The relevant articles from the literature				
11	Solar cells	The relevant articles from the literature				

12	Light Emitting Diodes	The relevant articles from the literature
13	Light Emitting Diodes	The relevant articles from the literature
14	Solar Cells	The relevant articles from the literature
15	Lasers	The relevant articles from the literature
16	Final Exam	

SOURCES	SOURCES					
Lecture Notes	Lecture slides					
	Course Textbook: See additional materials					
	Additional Materials:					
Other Sources	 Solid State Electronic Devices, Streetman, 7th Edition, PEARSON Semiconductor Devices: Physics and Technology, Sze, 3rd Edition, WILEY Semiconductor Devices: An introduction, Singh, Mc Graw Hill 					

COURSE MATERIALS SHARING					
Documents Lecture notes, slides					
Homeworks Students will be given one homework biweekly					
Exams	1 Midterm and 1 Final Exam				

EVALUATION SYSTEM						
SEMESTER STUDY	NUMBER	CONTRIBUTION				
Midterm	1	20				
Homework	7	35				
Quiz	7	15				
SUB-TOTAL		70				
Contribution of Semester Study		70				
Contribution of Final Exam	1	30				
TOTAL		100				

Course Category	
Sciences and Mathematics	60%
Engineering	40%
Social Sciences	0%

RE	RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS					
		Contribution Level				
INO	Program Qualifications		2	3	4	5
1	Accessing knowledge, evaluating and interpreting information by doing scientific research in the field of Electrical and Computer Engineering					x
2	Ability to use science and engineering knowledge for development of new methods in Electrical and Computer Engineering					x
3	To be able to understand and analyze materials by using basic knowledge on Electrical and Computer Engineering					x
4	Design and implement analytical, modeling and experimental research					X
5	Solve and interpret the problems encountered in experimental research					x
6	Considering scientific and ethical values during the collection and interpretation of data			X		
7	Integrating knowledge of different disciplines with the help of scientific methods, and completion and implementation of scientific knowledge using data				x	
8	To gain leadership ability and responsibility in disciplinary and interdisciplinary team works				x	
9	To be able to contribute to the solution of social, scientific and ethical problems				x	

	encountered in the field of Electrical and Computer Engineering		
10	To be able to define, interpret and create new information about the interactions between various discipline of Electrical and Computer Engineering	x	

^{*}Increasing from 1 to 5.

ECTS / WORK LOAD TABLE						
Activities	Number	Duration (Hours)	Total Work Load			
Course Length (includes exam weeks: 16x total course hours)	16	3	48			
Out-of-class Study Time (Pre-study, practice)	16	4	64			
Internet search, library work, literature search	16	4	64			
Presentation	7	3	21			
Homework	16	4	64			
Midterm	1	20	20			
Final Exam	1	25	25			
Total Work Load			306			
Total Work Load / 30			306/30			
Course ECTS Credit			10			