ABDULLAH GUL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
BIOENGINEERING DEPARTMENT
COURSE DESCRIPTION AND SYLLABUS

Course Name	CODE	SEMESTER	T+L Hour	CREDIT	ECST
Biomedical Electronics	BENG 521	Fall-Spring	3+0	3	10

Prerequisite Courses	N/A

Course Type	Selective
Course Language	English
Course Coordinator	Assistant Prof. Kutay İçöz
Lecturers	Assistant Prof. Kutay İçöz
Course Assistants	N/A
Course Objectives	Learning the fundamentals of circulation, neural and muscle systems and the origin of biological signals. Learning the transducers, and instrumentation circuitry.
Learning Outcomes	• Learning the fundamental anatomy and physiology. • Learning the fundamentals of biomedical instrumentation. • Learning the types of electronics measurement setups. • Detailed study of the frequency and time domain features of bio-signals • Gaining the ability to proses the bio signals and extracting data.
Course Content	• Origin of bio-signals. • Circulation, neural and muscle systems • Transducers, and instrumentation circuitry • Classification of bio-signals and fundamental features • Bio-signal processing • Frequency Domain characterization.

WEEKLY SUBJECTS AND RELATED PRELIMINARY PAGES

Week	Subjects	Preliminary
1	Bioelectricity, Cell membrane potential, Ionic currents ve resting potential	The relevant articles from the literature
2	Fundamentals of Electrophysiology : Action Potential	The relevant articles from the literature
3	Electrical Stimulation	The relevant articles from the literature
4	Fundamentals of circulation, neural and muscle systems	The relevant articles from the literature
5	Fundamentals of Instrumentation: Transducers	The relevant articles from the literature
6	Various Transducers	The relevant articles from the literature
7	Midterm	
8	Amplifiers	The relevant articles from the literature
9	Filters	The relevant articles from the literature
10	Fundamentals of Bio-signals: ECG, EEG, EMG, ENG, EGG	The relevant articles from the literature
11	Bio-signal Processing	The relevant articles from the literature
12	Time and Frequency domain analysis of bio-signals	The relevant articles from the literature
13	Midterm	
14	Frequency domain anaylsis: FFT, filtering, artifact removal	The relevant articles from the literature
15	Data extraction	The relevant articles from the literature

16	Final Exam	

RESOURCES	
Course Notes	Lecture Slides
Other Resources	**Course Textbook:** "Bioinstrumentation", John G. Webster 1st Edition, 2003, Wiley

MATERIAL SHARING	
Documents	Lecture notes, slides
Homework	Students will be given one homework each week
Exams	2 Midterms and 1 Final Exam

RATING SYSTEM		
SEMESTER WORKS	**NUMBER**	**CONTRIBUTION**
Midterm	2	40
Homework	10	20
TOTAL	10	10
Success Rate of Semester		70
Success Rate of Final		70
TOTAL	1	30

Course Category	
Basic Sciences and Mathematics	%50
Engineering Sciences	%50
Social Sciences	%0

THE RELATIONSHIP BETWEEN THE LEARNING OUTCOMES AND PROGRAM COMPETENCE

No	Program Outcomes	Contribution Level				
		1	2	3	4	5
1	Understanding of Life Sciences, Mathematics and Engineering at the post-graduate level, and being able to implement of this knowledge into bioengineering problems					X
2	Having the ability of developing a new scientific method or a technological product or process, and, designing experiments, implementing, collecting data and evaluating regarding these issues					X
3	Choosing technical equipment used in the applications related to bioengineering, having sufficient knowledge in adopting and using new technological equipment					X
4	Having the ability of reaching the information, using resources, contributing to the literature by transferring the process and results of scientific studies as written or verbally in the national and international environments					X
5	Having the ability of working as an individual or a team, in the teams composed of discipline or different disciplines, gaining awareness of leadership and taking responsibility			X		
6	Having advanced level of foreign language knowledge to manage efficient verbal, written and visual communication in the major field					X
7	Having the understanding of ethics in science and the responsibility in profession with the awareness of lifelong learning, being beneficial to society and sensitiveness to global issues					X
8	Being aware of the social impacts of the solutions and applications of the challenges regarding Bioengineering				X	

*From 1 to 5, it increasingly goes.

ECTS / WORK-LOAD TABLE

Activities	Activities	Duration (Hour)	Total (Work-Load)
Course Duration (Including exam week: 16x total course hour)	16	3	48
Out of Class Exercise Time (Pre-study, reinforcement)	16	8	128
Searching on Internet, library study	16	3	48
Presentation	5	3	15
Homework	10	3	30
Midterms	2	15	30
Final	1	15	15

Total Work-Load			314
Total Work-Load / 30			314/30
Course ECTS Credit			10