

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
Medical Instrument Design	BME516		(3+0+0)	3	10

Prerequisites	-
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Language of Instruction	English
Course Level	Master's Degree
Course Type	Technical Elective
Course Coordinator	Prof. Ali Ümit Keskin
Instructors	Assist. Prof. Gokhan Ertas
Assistants	
Goals	To provide knowledge on medical instrument design.
Content	General principles of signal acquisition, amplification, processing, recording and display in medical instruments. Design, construction and performance evaluation techniques.

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1) Knowledge of general principles of signal acquisition, amplification, processing, recording and display in medical instruments.	2,4,5,6,7,11	1,2,4	A,C,D
2) Knowledge of general principles of design, construction and performance evaluation techniques.	2,4,5,6,7,11	1,2,4	A,C,D

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT		
Week	Topics	Study Materials

1	Introduction to signal acquisition, amplification, processing, recording and display in medical instruments.	Lecture Notes, Articles
2	Introduction to signal acquisition, amplification, processing, recording and display in medical instruments.	Lecture Notes, Articles
3	Signal acquisition techniques	Lecture Notes, Articles
4	Signal acquisition techniques	Lecture Notes, Articles
5	Signal amplification techniques	Lecture Notes, Articles
6	Signal amplification techniques	Lecture Notes, Articles
7	MID-TERM	Lecture Notes, Articles
8	Signal processing methods	Lecture Notes, Articles
9	Signal processing methods	Lecture Notes, Articles
10	Signal recording and display methods	Lecture Notes, Articles
11	Recording and Display methods	Lecture Notes, Articles
12	Student presentations	Lecture Notes, Articles
13	Student presentations	Lecture Notes, Articles
14	Student presentations	Lecture Notes, Articles

RECOMMENDED SOURCES	
Textbook	Peter Ogradnik. Medical Device Design. Elsevier Ltd, 2013. Claudio Becchetti and Alessandro Neri. Medical Instrument Design and Development: From Requirements to Market Placements. Wiley, 2013.
Additional Resources	-

MATERIAL SHARING	
Documents	-
Assignments	-
Exams	-

ASSESSMENT		
	IN-TERM STUDIES	
	NUMBER	PERCENTAGE
Mid-terms	1	50
Homework	10	20

Presentation	1	30
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		0	1	2	3	4
1	Ability to reach wide and deep knowledge through scientific research in the field of Biomedical Engineering, evaluate, interpret and apply.				X	
2	Ability to use scientific methods to cover and apply limited or missing knowledge, and to integrate the knowledge of different disciplines to identify, define, formulate solutions to complex engineering problems.				X	
3	Ability to construct Biomedical Engineering problems, develop methods to solve the problems and use innovative methods in the solution.				X	
4	Ability to develop new and/or original ideas, tools and algorithms; develop innovative solutions in the design of system, component or process.					X
5	Ability to have extensive knowledge about current techniques and methods applied in Biomedical Engineering and their constraints.				X	
6	Ability to design and implement analytical modeling and experimental research, solve and interpret complex situations encountered in the process.					X
7	Ability to use a foreign language (English) at least at the level of European Language Portfolio B2 in verbal and written communication.					X
8	Ability to lead in multidisciplinary teams, develop solutions to complex situations and take responsibility.				X	
9	Ability to pass process and the results in Biomedical Engineering field, in national and international area in or outside of the field, systematically and clearly in written or oral form.					X
10	Awareness of the social, legal, ethical and moral values and environmental dimensions. The ability to conduct research and implementation work within the framework of these values.					X
11	Awareness of the new and emerging applications in Biomedical Engineering field, and the ability to examine them and learn if necessary.					X
12	Ability to read, understand, present, criticise research work and conduct original theoretical or applied research.				X	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 12x Total course hours)	12	3	36
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Midterm examination	2	3	6
Homework	5	6	30
Presentation	1	20	20
Final examination	1	3	3
Total Work Load			240
Total Work Load / 25 (h)			9.6
ECTS Credit of the Course			10