COURSE INFORMATON					
Course Title	***Code***	***Semester***	***L+P Hour***	***Credits***	***ECTS***
Advanced Laboratory Analysis Techniques and Devices	**BME532**		(3+0+0)	3	10

Prerequisites	

Language of Instruction	English
Course Level	Master's Degree
Course Type	Technical Elective
Course Coordinator	Prof. Dr. Ali Ümit Keskin
Instructors	Assist. Prof. Feride Şermin UTKU
Assistants	
Goals	To provide students knowledge on biochemical analysis methods, instruments and biosensors for the detection of metabolites.
Content	Quality control and quality assurance in biochemical analysis, accuracy and precision of biochemical methods, basics of nanomaterials, biomaterials used in immunological and radioisotope techniques and imaging, fluorimetry, spectrophotometry, chromatography (TLC, GC and HPLC), electrophoresis, coulometry, osmometry, refractometry, atomic emission and absorption, ion selective, oxygen and carbon dioxide electrodes, as well as a general understanding of the interdisciplinary field of lab-on-chip devices.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Basics of instruments and biosensors used in biochemical analysis	2,4,5,6,7,11	1,2,3	A,C,D
2) Quality control and quality assurance in biochemical analysis, accuracy and precision of biochemical methods	2,4,5,6,7,11	1,2,3	A,C,D
3) Instruments used characterization of materials and biochemical processes	2,4,5,6,7,11	1,2,3	A,C,D
4) Lab-on-a-chip devices	2,4,5,6,7,11	1,2,3	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 presentation

COURSE CONTENT

Week	Topics	Study Materials
1	Diseases and biochemical markers	Lecture notes, articles
2	Analytical clinical methods	Lecture notes, articles
3	Conventional biochemical methods	Lecture notes, articles
4	Conventional biochemical instruments	Lecture notes, articles
5	Immunological and radioisotope techniques and imaging	Lecture notes, articles
6	Ion selective, oxygen and carbon dioxide electrodes	Lecture notes, articles
7	MID-TERM	Lecture notes, articles
8	Biosensors	Lecture notes, articles
9	Fluorimetry	Lecture notes, articles
10	Spectrophotometry	Lecture notes, articles
11	Chromatography (TLC, GC and HPLC)	Lecture notes, articles
12	Electrophoresis, coulometry, osmometry, refractometry	Lecture notes, articles
13	Atomic emission and absorption spectroscopy	Lecture notes, articles
14	Lab-on-a-chip devices	Lecture notes, articles

RECOMMENDED SOURCES

Textbook	
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

	COURSE'S CONTRIBUTION TO PROGRAM						
No	**Program Learning Outcomes**	**Contribution**					
		0	**1**	**2**	**3**	**4**	**5**
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, critise 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**