BMED2401 BIOMECHANICS COURSE CATALOG INFO

Course Code : BMED2401				**Course Name :** Biomechanics			
Semester	**Lecture**	**Local Credit**	**ECTS**	**Language**	**Category**	**Instructional Methods**	**Prerequisites**
4	(3+0+0)	3	6	English	Core	Course	-
Course Content	Application techniques of engineering mechanics to human muscle-skeletal systems. Mechanical properties of tissues. Structural properties and mechanical analysis of bones, muscles and joints. Dynamics of mechanical systems. Investigation of orthopedic materials through mechanical procedures, stress and strain applications of implantation materials. Statics and dynamics of solids and fluids; material behavior including elasticity, viscoelasticity, fatigue, and failure.						
Course Outcomes	**CO1.** An ability to apply knowledge of mathematics, science, and engineering to problems in electronics engineering. **CO2.** Students will get an ability to recognize the needs and challenges of our age, and to assess the global and social impacts of engineering solutions. **CO3.** Students will get an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. **CO4.** Students will get an ability to formulate a real-world problem, develop its requirements and a design solution for the set of requirements. **CO5.** Students will get an ability to test and validate the conformance of the developed prototype against the original requirements of the problem. **CO6.** Students will get an ability to work as a responsible member, and possibly a leader, of a team in developing software/hardware solutions and participate in, and possibly moderate, discussions that lead to making decisions. **CO7.** Students will get an ability to express technical ideas, strategies and methodologies in oral and written form. **CO8.** Students will get an ability to recognize the need for, and be motivated to engage in life-long learning. **CO9.** Students will get an ability to learn new tools, devices, algorithms, and/or techniques that contribute to the software/hardware solution of the project.						
	Program Outcomes						
PO1	Adequate knowledge in fundamentals of mathematics (algebra, differential equations, integrals, probability etc), science (physics, chemistry, biology etc.), health science (anatomy and physiology) and computer science (programming and simulation); ability to use theoretical and applied knowledge in these areas in complex engineering problems.						
PO2	Ability to identify, define, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.						
PO3	Ability to design and integrate components of a complex system or process, as they relate to Biomedical Engineering discipline, under realistic constraints and conditions, in such a way as to meet desired requirements; ability to apply modern design methods.						
PO4	Ability to devise, select, and use techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.						

PO5	Ability to design and conduct experiments, gather, analyze and interpret data.
PO6	Ability to work in intra-disciplinary and multi-disciplinary teams; ability to take individual responsibilities.
PO7	Ability to effectively communicate in Turkish, ability to express his/her knowledge, ideas and work in English via oral, written and visual means; ability to write effective reports and comprehend written reports; ability to give and follow instructions.
PO8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself
PO9	Consciousness to behave according to ethical principles, and about professional and ethical responsibility; knowledge on standards used in engineering practice.
PO10	Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development.
PO11	Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.

CONTRIBUTION OF COURSE OUTCOMES
ON
BIOMEDICAL ENGINEERING PROGRAM OUTCOMES

Course\Program	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
PO1	☐	☐	☑	☐	☐	☐
PO2	☐	☐	☑	☐	☐	☐
PO3	☐	☐	☐	☐	☐	☐
PO4	☐	☐	☐	☐	☐	☐
PO5	☐	☐	☐	☐	☐	☐
PO6	☐	☐	☐	☐	☐	☐
PO7	☐	☐	☐	☐	☐	☐
PO8	☐	☐	☐	☐	☐	☐

PO9	☐	☐	☐	☐	☐	☐
PO10	☐	☐	☐	☐	☐	☐
PO11	☐	☐	☐	☐	☐	☐

COURSE ASSESMENT AND ECTS WORK LOAD			
Type of Work	**Count**	**ECTS WORK LOAD**	
		Time (Hour)(Including prep. time)	**Work Load**
Attendance			
Final Exam	1	30	30
Quizzes			
Term project			
Reports			
Final Project			
Seminar			
Assignments	4	7	28
Presentation			
Midterms	1	22	22
Project			
Laboratory			
Tutorial	14	3	42
Other(Self study, Paper reviews)	14	2	28
		Total work load	150
		Total work load/25	150/25=6
		ECTS Credit	6

COURSE ASSESSMENT

	Activities	Quantity	Contribution (%)
Semester Activities	**Quizzes**		
	Reports		
	Seminars		
	Homework	4	20
	Presentations		
	Midterm Exams	1	30
	Project		
	Laboratory		
	Other		
FINAL EXAM		1	50
Total			100

Course Plan:

W1	Introduction to Biomechanics. Anatomical terminology.
W2	Statics analysis of biomechanical models.
W3	Statics analysis of biomechanical models.
W4	Kinematic analysis of biomechanical models.
W5	Kinetic analysis of biomechanical models.
W6	Equation of motions by Lagrangian method.
W7	Equation of motions of biomechanical models by Lagrangian and Newton methods.
W8	Anthropometry. Introduction to viscoelasticity.
W9	Viscoelasticity.
W10	Rheological models of biomechanical models.
W11	Mechanical properties of tendon, muscle, bone and ligament.
W12	Muscle mechanics: Theories on muscle contraction.
W13	Muscle mechanics: physiological properties of muscles, instantaneous contractile conditions of muscles.
W14	Kinesiological electromyography (EMG).