Course Title	**Introduction to Biomedical Engineering**				
Course Code	**MME 435**				
Course Type	**Technical Elective Course**				
Level	Undergraduate				
Year / Semester	4th year / 7th semester				
Teacher's Name	Dimitrios Tzeranis				
ECTS	6	Lectures / week	3+1	Laboratories / week	
Course Purpose and Objectives	Provide biological background to engineers with limited prior background in biology. Apply core engineering principles in the analysis of biological systems. Familiarize students with unique challenges faced in biological research, medical device design and their market translation. Present state-of-the-art research in diverse fields of biomedical engineering.				
Learning Outcomes	After this course students 1. Will understand fundamental principles of cell biology and tissue physiology. 2. View cells and organs as biological machines whose function (physiology, pathology) can be described by core engineering principles. 3. Will be familiar with key computational and experimental methods utilized in biomedical engineering. 4. Will be aware of the unique features and challenges faced in medical device design. 5. Will be exposed to interdisciplinary state-of-the-art research from diverse fields of biomedical engineering. 6. Will be aware of regulatory procedures during the clinical translation of biomedical engineering results.				
Prerequisites	--	Required			
Course Content	Basic cell biology: Cell structure, biopolymers, transcription and translation, signal transduction. Examples of organ structure and physiology. Experimental methods (genomics, proteomics, imaging). The molecular basis of disease. Cells and organs as biological machines: Biomechanics and extracellular matrix remodeling. Blood flow in vessels. Transport phenomena in drug delivery. Biological oscillators. Analysis of signal transduction networks. Research case studies: Biomaterials and stem cells in regenerative medicine. Biomarkers in disease diagnosis and treatment. Devices for 3D *in vitro* cell culture. Gene network design. Bioinformatic analysis in genomics and proteomics. Medical device design and commercialization. Ethical issues.				
Teaching Methodology	• Book readings. • Lectures with powerpoint presentations. • Research journal paper readings. • Design case studies.				

Bibliography	Course notes. Κ. Σταματόπουλος. Βασικές Αρχές Κυτταρικής Βιολογίας Alberts, 4η Έκδοση, Αθήνα: Πασχαλίδης, Broken Hill, c2018. (in Greek) Χ. Νικολάου, Π. Χουβαρδάς. Υπολογιστική βιολογία. Εκδόσεις Κάλλιπος. 2015 (in Greek)
Assessment	One midterm (30%), a class presentation of a group project (30%) and a final exam (40%).
Language	Greek