

**School of Engineering and Natural Sciences / Biomedical Engineering (English)**

**2024 - 2025 Academic Year**

**NANOBIOTECHNOLOGY**

**Syllabus**

<b>Course Description</b>					
<b>Name</b>	<b>Code</b>	<b>Semester</b>	<b>T+A Hour</b>	<b>Credit</b>	<b>ECTS</b>
NANOBIOTECHNOLOGY	BME4249550	Spring Semester	3+0	3	6
<b>Prerequisites Courses</b>					
<b>Recommended Elective Courses</b>					
<b>Language of Instruction</b>	English				
<b>Course Level</b>	First Cycle (Bachelor's Degree)				
<b>Course Type</b>	Elective				
<b>Course Coordinator</b>	Assist.Prof. Mehmet Hikmet ÜÇİŞİK				
<b>Name of Lecturer(s)</b>	Assist.Prof. Mehmet Hikmet ÜÇİŞİK				
<b>Assistant(s)</b>					
<b>Aim</b>	This course is designed to develop critical thinking, logic and planning skills in the context of Biotechnology and 21st century practices. Within the scope, the place of biotechnology and its applications will be examined, especially in the fields of genetic engineering, medicine, agriculture, industry, bioenergy and biomedical engineering. The aim of the course content is to instill in students broader assessment, analysis and application skills in conducting biotechnology research in the field of biomedical engineering; as well as to provide graduate students with the ability to use applied methods in biotechnology in their current or future studies.				
<b>Course Content</b>	This course contains; Biotechnology: Definition, Concept, Present and Future Place, Genes and Gene Manipulation: Recombinant DNA Technology, Cell Culture: 2D and 3D Methods, Use of Microfluidics in 3-Dimensional Cell Culture Applications: Lab-On-A-Chip and Body-On-A-Chip Technologies, Tissue Engineering Applications, Nanobiotechnology: Introduction, The Use of Nanotechnology in Therapeutic Field: Drug Delivery Systems / Nanomedicine, Characterization and Imaging Techniques: TEM, SEM, AFM, Molecule-Molecule Interactions: SPR and QCM Techniques, Cell Membrane Proteins: Phage Display Technique, Gene Therapy and Gene Silencing: Alternative Techniques, Industrial Biotechnology Overview: Fermentation / Bioprocess Techniques, Student Presentations and Analysis of Research Examples in the Literature, Student Presentations and Analysis of Research Examples in the Literature.				
<b>Course Learning Outcomes</b>			<b>Teaching Methods</b>	<b>Assessment Methods</b>	
Recognize the terms bionanotechnology and nanobiotechnology			10, 14, 16, 9	A	
Recognizes recombinant DNA technologies			14, 16, 9	A	
Recognizes 2D and 3D Cell Culture methods			10, 14, 16, 9	A	
Illustrates the use of nanomedicines			10, 14, 16, 9	A, F	
Evaluates the use of nanomaterials in diagnosis and treatment			10, 14, 16, 9	A, F	
Recognize tissue engineering applications			10, 14, 16, 9	A	
<b>Teaching Methods</b>	10: Discussion Method, 14: Self Study Method, 16: Question - Answer Technique, 9: Lecture Method				
<b>Assessment Methods</b>	A: Traditional Written Exam, F: Project Task				
<b>Lecture Schedule</b>					
<b>Sequence</b>	<b>Topics</b>	<b>Preliminary Preparation</b>			
1	Biotechnology: Definition, Concept, Present and Future Place	Going through course materials			
2	Genes and Gene Manipulation: Recombinant DNA Technology	Going through course materials			
3	Cell Culture: 2D and 3D Methods	Going through course materials			
4	Use of Microfluidics in 3-Dimensional Cell Culture Applications: Lab-On-A-Chip and Body-On-A-Chip Technologies	Going through course materials			
5	Tissue Engineering Applications	Going through course materials			
6	Nanobiotechnology: Introduction	Going through course materials			
7	The Use of Nanotechnology in Therapeutic Field: Drug Delivery Systems / Nanomedicine	Going through course materials			
8	Characterization and Imaging Techniques: TEM, SEM, AFM	Going through course materials			
9	Molecule-Molecule Interactions: SPR and QCM Techniques	Going through course materials			
10	Cell Membrane Proteins: Phage Display Technique	Going through course materials			
11	Gene Therapy and Gene Silencing: Alternative Techniques	Going through course materials			
12	Industrial Biotechnology Overview: Fermentation / Bioprocess Techniques	Going through course materials			
13	Student Presentations and Analysis of Research Examples in the Literature	Going through course materials			
14	Student Presentations and Analysis of Research Examples in the Literature	Going through course materials			
<b>Evaluation Methods</b>		<b>Weight(%)</b>			
Midterm Exam		30			
General Exam		70			

<b>Resources</b>
Godbey W.T., An Introduction to Biotechnology: The Science, Technology and Medical Applications, Woodhead Publishing Series in Biomedicine, Academic Press, Elsevier 2014
Gary Walsh, Pharmaceutical Biotechnology: Concepts and Applications, John Willey and Sons, 2007
Oliver Kayser, Heribert Warzecha. Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, Wiley-VCH, 2012 Ghasem Najafpour. Biochemical Engineering and Biotechnology, Elsevier, 2015
Lee Yuan Kun, Microbial Biotechnology: Principles and Applications, World Scientific, 2006