

<b>INFORMATION ON THE BIOMEDICAL ENGINEERING BACHELOR DEGREE PROGRAM</b>	
<b>General Information</b>	<p>The Department of Biomedical Engineering was established in 2011 to educate creative and enterprising biomedical engineers, who can define the human body as a comprehensive system using engineering methods and take part in the development of more effective diagnosis and treatment strategies. As of 2017, 2 professors, 2 associate professors, 2 assistant professors, and 1 research assistant are working full-time in the department.</p> <p>Our undergraduate program is carefully crafted and updated periodically according to international standards to meet the requirements of graduate work environments.</p> <p>We aim to educate students with a spirit of entrepreneurship and theoretical knowledge balanced with practical experience. Thus, under the cooperative (co-op) education system students are required to complete three cooperative education terms successfully working in industry or a research institution, in the third and fourth academic year. Consequently, Biomedical Engineering students acquire approximately one year of work experience when they graduate.</p>
<b>Program Purpose</b>	<p>The aim of TOBB ETÜ Biomedical Engineering Department is to graduate Biomedical Engineers who have strong scientific and technical knowledge and are able to work successfully in design, production, application and AR-GE studies both at industry and research institutions. The biomedical engineering curriculum is designed to educate biomedical engineers to be creative, to have systematic problem-solving abilities, to be liable for social, economic and professional ethics, to have responsibility and leadership, to contribute to the scientific knowledge by making scientific research, and to produce solutions to the problems of the national industry.</p>
<b>Degree Earned</b>	<p>The students who successfully complete the program are awarded the degree of Bachelor of Science in Biomedical Engineering.</p>
<b>Level of Degree Earned</b>	<p>Biomedical Engineering is a Bachelors Degree (EQF 6) program.</p>
<b>Requirements and Rules of the Degree Earned</b>	<p>To graduate from the Biomedical Engineering Undergraduate Program, students have to achieve a minimum of 2.00 out of 4.00 Grade Point Average and has to pass all of the courses in the curriculum with a minimum of DD/G grade (TOBB ETU Undergraduate Education Rules And Regulations, Article 45). A minimum of 280 ECTS credits have to be earned for graduation. In addition, the students have to complete the mandatory cooperative education practices and graduation projects within a specified period, following certain specifications.</p>

<b>Registration Admission Requirements</b>	<p>Department of Biomedical Engineering accepts/enrolls students based on the results of the Undergraduate Placement Exam held by Student Selection and Placement Center (ÖSYM) within the framework of the regulations determined by the Higher Education Council (YÖK). Every year department will announce the number of students, to be enrolled, through ÖSYM. The acceptance of students via horizontal / vertical transition is also carried out in accordance with the regulations of the YÖK and the number of students, to be accepted, is announced at the start of each term.</p>
<b>Recognition of Prior Learning</b>	<p>Acceptance of the students, from other departments or universities, to the biomedical engineering program is carried out by taking into consideration the provisions of the relevant legislations of the YÖK and within the framework of the principles and quotas determined by the TOBB ETÜ Senate (TOBB ETU Undergraduate Education - Examination Regulation, Article 37). English Preparatory Program is applied in this program and those who have adequate scores of the English proficiency examination, that the university conduct at the beginning of the academic year, are exempted from the preparation program.</p>
<b>Examinations, Assessment and Grading</b>	<p>Examinations and evaluations are carried out according to article 22 and article 27 of TOBB ETÜ Undergraduate Education - Examination Regulation. At the beginning of each semester, teaching staff announce the type of exams (e.g. quizzes, midterms, final exam), homeworks, practice and other studies in which the students are responsible and their weightings in the semester grades. The dates of the final examinations and the places where the exams are to be held are determined by the Rectorate. At the end students are graded based on the partial grades from those listed above.</p>
<b>Teaching Style</b>	<p>Full time education</p>
<b>Graduation Requirements</b>	<p>To graduate from the Biomedical Engineering Undergraduate Program, students have to achieve a minimum of 2.00 out of 4.00 Grade Point Average and has to pass all of the courses in the curriculum with a minimum of DD/G grade (TOBB ETU Undergraduate Education Rules And Regulations, Article 45). A minimum of 280 ECTS credits have to be earned for graduation. In addition, the students have to complete the mandatory cooperative education practices (3 times) and graduation projects within a specified period, following certain specifications.</p>
<b>Occupational Profiles of Graduated- Employment Opportunities</b>	<p>Graduates of the Biomedical Engineering Undergraduate Program can work in the medical sector including design, production, maintenance and repair of medical devices, medical imaging, signal processing, medical informatics, prosthetic, orthosis and implant manufacturing, tissue engineering, genetic engineering and drug development areas.</p>

**Transition to a Upper Degree**

Graduates of the Biomedical Engineering Program can enroll in postgraduate programs fulfilling the minimum requirements set by the Graduate School of Natural & Applied Sciences (ALES for the MS with/without thesis and proficiency in English language).

<b>Program Qualifications</b>	
<b>1</b>	Having adequate knowledge in mathematics, science and medicine related engineering; the ability to apply theoretical and practical knowledge in these fields to model and solve complex engineering problems.
<b>2</b>	Ability to identify, formulate and solve mathematics, science and engineering related problems by associating them with biology.
<b>3</b>	Ability to design a complex system, process, biomedical device, product or material under realistic constraints and conditions to meet specific requirements; ability to apply modern design methods for this purpose.
<b>4</b>	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in biomedical engineering practice; ability to use information technologies effectively..
<b>5</b>	Ability to design and carry out experiments, to collect data, to analyze and interpret results; ability to make measurements on living systems and collect and interpret data from these measurements; ability to solve problems related with interaction between materials and living systems.
<b>6</b>	Ability to work individually and in disciplinary/interdisciplinary teams effectively.
<b>7</b>	Ability to communicate effectively in Turkish and English through oral, written and visual methods.
<b>8</b>	Ability to reach out scientific information resources and access knowledge with consciousness, to monitor developments in science and technology and continuous self-improvement.
<b>9</b>	Having knowledge about business life such as risk and change management, have consciousness of entrepreneurship, innovation and sustainable development.
<b>10</b>	Having conformity with biomedical ethical principles, professional and ethical responsibility; information on standards used in engineering applications.
<b>11</b>	Have knowledge about the effects of biomedical engineering applications on health, environment and safety in universal and societal dimensions; awareness of the legal consequences of engineering solutions.

NQF-HETR PROGRAM QUALIFICATION MATRIX				PROGRAM QUALIFICATIONS											
Program : Biomedical Engineering				1	2	3	4	5	6	7	8	9	10	11	
Related NQF-HETR Core Field: Engineering (Akademic) - Bachelor Degree															
CORE AREA QUALIFICATIONS	INFORMATION	Theoretical - Factual	Has the infrastructure in mathematics, science and engineering related to their branches.	X	X	X	X	X							
	SKILLS	Cognitive - Applied	Uses mathematics, science and their theoretical and practical knowledge in their fields for engineering solutions.	X	X	X	X	X							
			Identifies, defines, formulates and solves engineering problems, selects and applies appropriate analytical and modal techniques for this purpose.	X	X	X	X	X							
			Graduate analyzes a system, system component or process and designs it under realistic constraints to meet the required requirements;he/she implements modern design methods in this direction.		X	X	X	X							
			Selects and uses the modern techniques and tools necessary for engineering applications.		X	X	X	X							
			Designs experiments, conducts experiments, analyzes and interprets data collection results.		X	X	X	X							
	COMPETENCIES	Ability to work independently and to take responsibility	Works effectively on individual and multidisciplinary teams.						X			X			
			Gains access to information and research resources for this purpose, using databases and other sources of information.								X	X			
		Learning Competence	Gains access to information and research resources for this purpose, using databases and other sources of information.									X	X		
			Is aware of the necessity of lifelong learning; monitors developments in science and technology, and constantly innovates itself.									X	X		
			Uses mathematics, science and their theoretical and applied knowledge in their fields for engineering solutions.	X	X	X	X	X							
			Identifies, defines, formulates and solves engineering problems, selects and applies appropriate analytical and modal techniques for this purpose.		X	X	X	X							
			Analyzes a system, system component or process and designs it under realistic constraints to meet the required requirements; he/she implements modern design methods in this direction.		X	X	X	X							
		Communication and Social Competence	Selects and uses the modern techniques and tools necessary for engineering applications.		X	X	X	X					X		
			Works effectively on individual and multidisciplinary teams.									X	X		
			Uses computer and communication technology at least in the European Computer Use License Advanced level required by his / her field.				X						X		
		Field Specific Competence	Communicates verbally and in writing, using at least one foreign language at least at European Language Portfolio B1 General Level.								X				
			Communicates using technical drawing.			X							X		
			Gains access to information and research resources for this purpose, using databases and other sources of information.				X	X							
		Field Specific Competence	Is aware of the universal and social effects of engineering solutions and practices; be aware of the issues of entrepreneurship and innovation, and has knowledge of contemporary problems.										X	X	X
			Has a professional and ethical responsibility.											X	X
Has awareness on project management, workplace practices, employee health, environmental and occupational safety; has an awareness of the legal consequences of their engineering applications.											X	X	X		
Field Specific Competence	Demonstrates awareness of the universal and social implications of engineering solutions and practices; is aware of the issues of entrepreneurship and innovation and has knowledge of the problems of the times.										X	X	X		

Programda Yer Alan Tüm Dersler		Program Yeterlilikleri										
Kodu	Ders Adı	1	2	3	4	5	6	7	8	9	10	11
BMM 101	Introduction to Biomedical Engineering	1	1	1	3	3	3	3	3	3	3	3
MAT 101	Mathematics I	5	4	3	2	3	2	2	2	1	1	1
FİZ 101	Physics I	5	4	3	2	3	2	2	2	1	1	1
FİZ 101L	Physics Laboratory I	5	4	3	2	5	3	3	2	1	1	1
KİM 101	General Chemistry	5	4	3	2	3	2	2	2	1	1	1
KİM 101L	General Chemistry Laboratory	5	4	3	2	5	3	3	2	1	1	1
TÜR 101	Turkish I	1	1	1	1	2	2	5	2	2	1	1
ING 001*	English I	1	1	1	1	2	2	5	2	2	1	1
OEG 101	Introduction to Cooperative Education	1	1	1	1	1	2	1	3	5	1	1
BMM 102	Biochemistry	5	3	3	3	3	2	2	2	1	1	1
MAT 102	Mathematics II	5	4	3	2	3	2	2	2	1	1	1
BİL 141	Computer Programming	4	4	4	3	3	2	2	2	1	1	1
FİZ 102	Physics II	5	4	3	2	4	2	2	2	1	1	1
FİZ 102L	Physics II Laboratory	5	4	3	2	5	3	3	2	1	1	1
TÜR 102	Turkish II	1	1	1	1	2	2	5	2	2	1	1
ING 002*	English II	1	1	1	1	2	2	5	2	2	1	1
BMM 203	Medical Biology	3	3	3	3	4	2	2	2	2	2	2
BMM 205	Fundamentals of Materials Science	4	5	4	5	4	2	2	2	2	2	2
BMM 205L	Fundamentals of Materials Science Laboratory	4	5	4	5	5	3	3	2	2	2	2
ELE 201	Circuit Analysis I	4	4	4	5	2	2	2	2	2	2	2
ELE 201L*	Circuit Analysis I Laboratory	4	4	4	5	5	3	3	2	2	2	2
MAT 201	Linear Algebra	5	4	3	2	2	2	2	2	2	2	2
AIT 201	Principles of Atatürk and History of Revolution I	1	1	1	1	1	2	2	2	2	2	2
ING 003*	English Writing Skills	1	1	1	1	2	3	5	2	2	1	1
BMM 202	Cell and Molecular Biology	3	3	4	5	2	2	2	2	2	2	2
BMM 202L	Cell and Molecular Biology Laboratory	2	3	4	5	5	3	3	2	2	2	2
BMM 206	Physiology for Engineers	3	3	3	3	2	2	2	2	2	2	2
END 224	Probability and Statistics for Engineers	4	4	3	3	2	2	2	2	2	2	2
MAT 202	Differential Equations	5	5	4	3	3	2	2	2	2	2	2
AIT 202	Principles of Atatürk and History of Revolution II	1	1	1	1	1	1	2	2	2	4	4
ING 004*	English Presentation Skills	1	1	1	1	2	3	5	2	2	1	1
BMM 305*	Biomaterials	4	4	5	5	4	2	4	3	3	4	4
BMM 307	Biomedical Signals and Systems	4	4	5	5	4	2	2	3	3	2	2
BMM 309*	Tissue Engineering	3	4	5	5	4	2	2	3	3	4	4
BMM 309L*	Tissue Engineering Laboratory	3	4	5	5	5	3	3	3	3	4	4
BMM 311*	Biomechanics	4	4	5	5	4	2	2	3	3	4	4
BMM 311L*	Biomaterials and Biomechanics Laboratory	4	4	5	5	5	3	3	3	3	4	4
UGİ 315	Entrepreneurship and Innovation	1	1	1	1	1	2	2	2	5	1	1
İYD 001	Second Foreign Language I	1	1	1	1	2	3	5	2	2	1	1
BMM 302	Biomedical Instrumentation	4	4	5	5	4	2	2	3	3	4	4
BMM 302L	Biomedical Instrumentation Laboratory	4	4	5	5	5	3	3	3	3	4	4
BMM 310*	Numerical Methods in Biomedical Engineering	5	5	5	5	4	2	4	3	3	3	3
BMM 316*	Biomedical Sensors and Transducers	4	4	5	5	4	2	2	3	3	4	4
BMM 316L*	Biomedical Sensors and Transducers Laboratory	4	4	5	5	5	3	3	3	3	4	4
END 320	Engineering Economics	2	3	3	3	2	2	2	2	2	1	1
İYD 002	Second Foreign Language II	1	1	1	1	2	3	5	2	2	1	1
BMM 491	Medical Imaging Systems	5	4	5	5	4	2	2	3	3	4	4
İYD 003	Second Foreign Language III	1	1	1	1	2	3	5	2	2	1	1
İYD 004	Second Foreign Language IV	1	1	1	1	2	3	5	2	2	1	1
BMM 498*	Senior Design Project	4	5	5	5	5	5	5	4	4	5	5
BSD - 1	Departmental Elective											
BSD - 2	Departmental Elective											
BSD - 3	Departmental Elective											
BSD - 4	Departmental Elective											
FSD - 1	Faculty Technical Elective											
ÜSD - 1	Non-technical Elective											
BMM 410*	Biomedical Electronics	4	4	4	4	5	2	2	3	3	2	2
BMM 411*	Biomedical Image Processing	4	4	4	4	5	2	2	3	3	2	2
BMM 412*	Biomedical Signal Processing	5	5	5	4	5	2	3	3	3	2	2
BMM 413*	Noise Reduction Techniques in BME	4	4	4	4	5	2	2	3	3	2	2
BMM 414*	Microprocessors and Microcontrollers in BME	3	3	4	4	5	2	3	3	3	2	2
BMM 415*	Magnetic Resonance Imaging	5	5	5	5	5	2	2	3	3	2	2
BMM 416*	Microscopic Imaging	3	3	3	4	5	2	2	3	3	2	2
BMM 420*	Computational Methods in BME	5	5	5	4	5	2	3	3	3	2	2
BMM 421*	Bioinformatics	5	5	5	4	4	2	3	3	3	3	3
BMM 422*	Biostatistics	5	5	5	3	4	2	2	3	3	3	3

BMM 423*	Biomimetic and Biodesign	4	4	4	3	4	2	2	3	3	2	2
BMM 424*	Computational Drug Design	5	5	5	4	4	2	3	3	3	2	2
BMM 425*	Computational Cell Biology	5	5	5	3	4	2	2	3	3	2	2
BMM 426*	Biometry	5	5	5	3	3	2	3	3	3	2	2
BMM 430*	Biotechnology	3	3	3	4	3	2	2	3	3	3	3
BMM 431*	Biyonanoteknoloji	3	3	3	4	3	2	3	3	3	3	3
BMM 432*	Biocompatibility	3	3	3	4	4	2	3	3	3	3	3
BMM 433*	Biological Surfaces and Interfaces	2	2	2	3	4	2	3	3	3	2	2
BMM 434*	Biomedical and Dental Implant Materials	2	2	4	4	4	2	2	3	3	2	2
BMM 435*	Orthopedic Cements and Hard Tissue Repair	2	2	4	4	4	2	3	3	3	2	2
BMM 436*	Neural Tissue Engineering	2	2	4	4	4	2	2	3	3	2	2
BMM 440*	Ceramic-based Biomaterials	2	2	4	4	4	2	2	3	3	2	2
BMM 441*	Metal-based Biomaterials	2	2	4	4	4	2	3	3	3	2	2
BMM 442*	Polymer-based Biomaterials	2	2	4	4	4	2	2	3	3	2	2
BMM 443*	Nanomedicine	2	2	3	4	3	2	3	3	3	2	2
BMM 444*	Drug Design and Delivery	3	3	4	4	4	2	2	3	3	3	3
BMM 445*	Mass and Energy Transfer in Biosystems	4	4	4	4	3	2	2	3	3	2	2
BMM 446*	Thermodynamics of Biomolecular Systems	4	4	4	3	3	2	2	3	3	2	2
BMM 450*	Biofluid Mechanics	5	5	4	3	3	2	2	3	3	2	2
BMM 451*	Neural Control and Motion Mechanics	5	5	4	4	4	2	2	3	3	2	2
BMM 452*	Biomedical Robotics	5	5	4	4	4	2	3	3	3	3	3
BMM 453*	Medical Technical Design	3	3	4	3	3	2	2	3	3	2	2
BMM 460*	Physiological Control Systems	4	4	4	4	3	2	3	3	3	2	2
BMM 461*	Cardiovascular Instrumentation	3	3	4	3	3	2	2	3	3	2	2
BMM 462*	Clinical Engineering	3	3	3	4	2	2	3	3	3	3	3
BMM 463*	Medical Informatics	2	2	3	3	2	2	3	3	3	3	3
BMM 464*	Medical Technology Administration	2	2	2	3	3	2	3	3	3	3	3
BMM 465*	Medical Device Regulation	2	2	4	3	2	2	3	3	3	3	3
BMM 470*	Electromagnetic Theory	5	5	5	3	2	2	2	3	3	2	2
BMM 471*	Bioelectromagnetism	5	5	5	3	2	2	2	3	3	2	2
BMM 472*	Biomedical Optics	4	4	4	3	2	2	2	3	3	2	2
BMM 473*	Radiation Physics	4	4	4	3	2	2	2	3	3	2	2
BMM 480*	Enzyme Science	3	3	3	3	2	2	3	3	3	2	2
BMM 481*	Genetic Engineering	2	2	3	3	3	2	3	3	3	2	2
BMM 482*	Toxicology	2	2	2	3	3	2	2	3	3	2	2
BMM 483*	Bioaffinity Chromatography	3	3	3	3	2	2	2	3	3	2	2
BMM 484*	Bioseparation	2	2	2	3	2	2	2	3	3	2	2
BMM 485*	Proteins in Biochemistry and Biotechnology	2	2	3	3	2	2	3	3	3	2	2
BMM 486*	Membrane Technology and Separation Techniques	3	3	3	3	2	2	2	3	3	2	2