

BMM 305 Biomaterials		Department of Biomedical Engineering	
Semester	Credit		
	Theory	Practice	Laboratory
2013/2014 Spring	3	0	0
Compulsory / Elective	Compulsory		
Prerequisites	-		
Instructors	Assist. Prof. Dr. Ersin Emre Ören		
Course Description	BMM 305 will provide the basic principles of biomaterials in general and help students to adapt into this rapidly developing area. The course will focus mainly on the field of biomaterials used in the design of medical devices, and to augment or replace soft and hard tissues. Discussion of bulk properties, applications, and in vivo behavior of different classes of natural and synthetic biomaterials. Analysis of biological response and biocompatibility, degradation and failure processes of implantable biomaterials/devices. Brief outline of regulatory compliance and performance requirements for commercialization of biomaterials and medical devices.		
Course Objectives	<p>Students who complete this course will be able to:</p> <ul style="list-style-type: none"> - have a general knowledge about the biomaterials; - understand biology and physiology, and apply math, science and engineering to solve the problems at the interface of engineering and biology; - have knowledge about the contemporary issues and application areas of biomaterials; - apply engineering and mathematical methods for analysis and design of biomaterials; - understand professional and ethical responsibility; - use techniques, skills and tools necessary for engineering practice. 		
Course Outcomes	Key areas of achievements will be obtaining necessary information about the basic principles of biomaterials in medicine, and applying this know-how for the solution of engineering problems: in specific implant designs focusing on material and implant requirements, structure-property relationships for synthetic and biological materials, and static and dynamics properties of biomaterials.		
Textbook	<ul style="list-style-type: none"> • B. D. Ratner, A. S. Hoffman, F. J. Schoen, J. E. Lemons. <i>Biomaterials Science: An Introduction to Materials in Medicine</i>, 3rd Ed., Elsevier/Academic Press, Oxford, 2013. 		
Other Resources	<ul style="list-style-type: none"> • J. D. Enderle, J. D. Bronzino. <i>Introduction to Biomedical Engineering</i>, 3rd Ed., Elsevier/Academic Press, Amsterdam, 2013. • W. D. Callister, D. G. Rethwisch. <i>Materials Science and Engineering: An Introduction</i>, 7th / 8th Ed., John Wiley and Sons, New York, 2011. • Articles 		
Evaluation Criteria		Number	Impact (%)
	Midterm Exams	1	25
	Quiz	5	20
	Homework	-	-
	Projects	1	15
	Term Paper	-	-
	Laboratory	-	-
	Others	-	-
Final	1	40	

Distribution of Course Content into Basic Fields (%)	Mathematics and Basic Sciences	20
	Engineering Sciences	50
	Engineering Design	30
	Social Sciences	-

COURSE OUTLINE

Week	Subject
1	Introduction to Biomaterials: An Evolving, Multidisciplinary Endeavour
2	Properties of Materials
3	Classes of Materials used in Medicine
4	Classes of Materials used in Medicine
5	Biological Recognition
6	Host Reaction to Biomaterials and their Evaluation
7	Biological Testing of Biomaterials
8	Degradation of Materials in the Biological Environment
9	Application of Biomaterials
10	Application of Biomaterials
11	Application of Biomaterials in Functional Tissue Engineering
12	Special Considerations for Implants, Devices and Biomaterials

RELATIONSHIP BETWEEN THE COURSE AND THE DEPARTMENT PROGRAM

	Program Outcomes	1	2	3
1	Ability to apply mathematical, scientific and engineering knowledge			√
2	Ability to design and conduct experiments, analyze and interpret the experimental results		√	
3	Ability to design systems, components or process as desired/required			√
4	Ability to work in interdisciplinary teams			√
5	Ability to identify, formulate and solve engineering problems			√
6	Ability to communicate effectively in English and Turkish		√	
7	Comprehensive training necessary to understand the impact of the engineering solutions on globe and society			√
8	Knowledge of contemporary issues			√
9	Ability to use modern tools, techniques and skills necessary for engineering practice			√
Course Contribution: 1: None 2: Partial 3: Full				