



COURSE INFORMATION				
<b>Course Code</b>	<b>MSN516</b>	<b>Course Title</b>	<b>Biomaterials and Biocompatibility</b>	
<i>Semester</i>	<i>Credits</i>	<i>ECTS</i>	<i>C +P + L Hour</i>	<i>Prerequisites</i>
Spring	3	10	3+0+0	-

<b>Language of Instruction</b>	<b>Course Level</b>	<b>Course Type</b>
English	Graduate	Elective
<b>Course Coordinator</b>	Asst. Prof. Zeliha Cansu Canbek Özdil	
<b>Instructors</b>	Asst. Prof. Zeliha Cansu Canbek Özdil	
<b>Assistants</b>	-	
<b>Goals</b>	To give a deep understanding on structure and properties of hard biomaterials (ceramics and metals) as well as soft biomaterials (polymers, hydrogels) and their applications in various areas such as dentistry and in medical use.	
<b>Content</b>	Biological materials, biomaterials or implants from metals, ceramics, glasses, polymers and composites. Biocompatibility.	
<b>Contribution of the Course to the Professional Education</b>	Course will provide students with a knowledge of biological materials, biomaterials, implants, and biocompatibility, as well as biomaterials application in dentistry, orthopedy, cardiovascular system, in hearing so on.	

<b>Course Learning Outcomes</b>	<b>Detailed Program Outcomes</b>	<b>Teaching Methods</b>	<b>Assessment Methods</b>
1) General information on biomaterials, structural aspects, applications, historical background,	1b	1,2	A,E,G
2) The use and applications of Ceramics, Glasses, Metals, Polymers and Composite Materials as Biomaterials.	4b, 6a,6b,6c	1,2	A,E,G
3) Outlook of Turkey; production processes and applications of Biomaterials.	7c,7d,11a	1,2	A,E,G



<b>Teaching Methods:</b>	1: Lecture by instructor, 2: Lecture by instructor with class discussion, 3: Problem solving by instructor, 4: Use of simulations, 5: Problem solving assignment, 6: Reading assignment, 7: Laboratory work, 8: Term research paper, 9: Presentation by guest speaker, 10: Sample Project Review, 11: Interdisciplinary group working, 12: ...
<b>Assessment Methods:</b>	A: Written exam, B: Multiple-choice exam C: Take-home quiz, D: Experiment report, E: Homework, F: Project, G: Presentation by student, H: ...

**COURSE CONTENT**

<b>Week</b>	<b>Topics</b>	<b>Study Materials</b>
1	Introduction to Biomaterials Science	Textbook and Lecture Notes
2	Introduction to natural biological materials (Tissues, biological polymers, etc.)	Textbook and Lecture Notes
3	Polymers, ceramics, metals, composites as biomaterials	Textbook and Lecture Notes
4	Biological responses to physiochemical properties of biomaterials	Textbook and Lecture Notes
5	Characterization and performance evaluation of biomaterials	Textbook and Lecture Notes
6	Mechanical properties of biomaterials	Textbook and Lecture Notes
7	Sensors and diagnostic devices	Textbook and Lecture Notes
8	Biomaterials for tissue engineering	Textbook and Lecture Notes
9	Biomaterials for drug delivery	Textbook and Lecture Notes
10	Surface modification of biomaterials for cell adhesion	Textbook and Lecture Notes
11	Biomaterials for immune engineering	Textbook and Lecture Notes
12	Prospective and possibilities in biomaterials future	Textbook and Lecture Notes
13	Homework Presentations	
14	Homework Presentations	



<b>RECOMMENDED SOURCES</b>	
<b>Textbook</b>	Lecture notes and suggested books -Biomedical Materials, Ed by Roger Narayan, Springer, 2009. -Biomaterials Science and Biocompatibility, Frederick H. Silver, D.L. Christiansen, Springer-Verlag, 1999 -Biological Performance of Materials, Marcel Dekker Inc., 2003.
<b>Additional Resources</b>	

<b>MATERIAL SHARING</b>	
<b>Documents</b>	Textbook and lecture notes
<b>Assignments</b>	Homeworks and Presentations
<b>Exams</b>	Exams and solutions (excluding the Final Exam)

<b>ASSESSMENT</b>		
<b>IN-TERM STUDIES</b>	<b>NUMBER</b>	<b>PERCENTAGE</b>
MidTerm Exam	1	30
Homeworks and Presentations	1	30
Final	1	40
<b>Total</b>		<b>100</b>
<b>CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE</b>		40
<b>CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE</b>		60
<b>Total</b>		<b>100</b>

<b>COURSE CATEGORY</b>	Field Course
------------------------	--------------

<b>COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES</b>		
No	Program Learning Outcomes	check √
1a	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline,	
1b	Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	√



2a	Ability to identify, formulate, and solve complex engineering problems,	
2b	Ability to select and apply proper analysis and modeling methods for this purpose.	
3a	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result,	
3b	Ability to apply modern design methods for this purpose.	
4a	Ability to devise, select and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice.	
4b	Ability to employ information technologies effectively.	√
5a	Ability to design experiments for investigating complex engineering problems or discipline specific research questions,	
5b	Ability to conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.	
6a	Ability to work efficiently in intra-disciplinary teams,	√
6b	Ability to work efficiently in multi-disciplinary teams,	√
6c	Ability to work individually.	√
7a	Ability to communicate effectively in Turkish, both orally and in writing,	
7b	Knowledge of a minimum of one foreign language,	
7c	Ability to write effective reports and comprehend written reports, prepare design and production reports,	√
7d	Ability to make effective presentations,	√
7e	Ability to give and receive clear and intelligible instructions.	
<b>8a</b>	Recognition of the need for lifelong learning, ability to access information, ability to follow developments in science and technology,	
<b>8b</b>	Ability to continue to educate him/herself.	
<b>9a</b>	Consciousness to behave according to ethical principles and professional and ethical responsibility.	
<b>9b</b>	Knowledge on standards used in engineering practice.	
<b>10a</b>	Knowledge about business life practices such as project management, risk management, change management.	
<b>10b</b>	Awareness in entrepreneurship and innovation.	
<b>10c</b>	Knowledge about sustainable development.	
<b>11a</b>	Knowledge about the global and social effects of engineering practices on health, environment, and safety,	√



<b>11b</b>	Knowledge about contemporary issues of the century reflected into the field of engineering.	
<b>11c</b>	Awareness of the legal consequences of engineering solutions.	

<b>ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION</b>			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	14.4	202
Midterm exam	1	3	3
Final	1	3	3
<b>Total Work Load</b>			250
<b>Total Work Load / 25 (h)</b>			10
<b>ECTS Credit of the Course</b>			10

Prepared by: Volkan Günay	Preparation date:15.01.2021
Updated: Zeliha Cansu Canbek Özdil	Date: 31.03.2022