YEDİTEPE UNIVERSITY
FACULTY OF ENGINEERING

COURSE DESCRIPTION FORM
2019/2020-1

COURSE INFORMATON				
Course Code	**MSN 540**	**Course Title**	**Advanced Polymer Science and Technology**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
Spring	3	10	3+0+0	-

Language of Instruction	**Course Level**	**Course Type**
English	Graduate	Elective

Course Coordinator	Asst. Prof. Dr. Nebahat ARAL
Instructors	Asst. Prof. Dr. Nebahat ARAL
Assistants	-
Goals	The aim of this course is to provide students with an advanced knowledge of polymer chemistry, polymerization reactions, polymer types, polymer structure - property relationships, polymer characterization techniques and polymer applications
Content	Basic principles of polymer chemistry, polymer classifications, polymerization reactions, mechanisms and kinetics, polymer structure – property relationships, polymerization techniques, techniques for molecular and morphological and physical property characterization, applications of polymers.
Contribution of the Course to the Professional Education	To advance the knowledge of polymers to be used in the polymer industry and research studies and to follow up-to-date research.

Course Learning Outcomes	**Detailed Program Outcomes**	**Teaching Methods**	**Assessment Methods**
Expanded and in-depth information of the basic principles of polymer chemistry, polymer classifications, polymerization reactions, mechanisms and kinetics, polymer structure – property relationships and ability to use theoretical and applied information in these areas to solve polymer engineering problems	1a, 1b, 2a, 4a	1, 2	A
Expanded knowledge of advanced polymeric materials used in current applications (polymer nano-composites, conductive polymers, biodegradable polymers, biocompatible polymers for medical applications etc.) and ability to access information and to follow developments in these areas.	1a, 1b, 11b	1, 2	A

Polymerization techniques, techniques for polymer molecular, morphological and physical property characterization and their respective constraints.	1a, 1b	1	A
Ability to communicate effectively both orally and in writing in English (and ability to communicate stages and results of his/her studies in a systematic and clear manner orally and in writing in intradisciplinary national and international settings) via preparation of project reports and presentations on novel and developing applications of polymeric materials.	6c, 7b	6	F, G

Teaching Methods:	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: …
Assessment Methods:	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

Week	Topics	Study Materials
1	Introduction to Polymer Science	Textbook-Lecture Notes
2	Polymer structure, molecular weight	Textbook-Lecture Notes
3	Polymerization Reactions	Textbook-Lecture Notes
4	Polymer structure and physical properties I *(Morphology and Order in Crystalline Polymers)*	Textbook-Lecture Notes
5	Polymer structure and physical properties II *(Rheology, viscous flow, viscoelasticity)*	Textbook-Lecture Notes
6	Polymers Processing and Applications	Textbook-Lecture Notes
7	MIDTERM EXAM I	Textbook-Lecture Notes
8	Polymer characterization techniques I	Textbook-Lecture Notes
9	Polymer characterization techniques I	Textbook-Lecture Notes
10	Selected Topics in Polymer Science I: Smart Polymers, Conductive Polymers	Textbook-Lecture Notes

11	Selected Topics in Polymer Science II: Fiber Science, Polymer composites	Textbook-Lecture Notes
12	Selected Topics in Polymer Science III: Biodegradable Polymers, Recycling of Polymer Materials	Textbook-Lecture Notes
13	Project presentations	
14	Project presentations	
15	Final	

RECOMMENDED SOURCES	
Textbook	Ebewele, Robert O. Polymer science and technology. CRC press, 2000 J.R. Fried, Polymer Science and Technology , 2nd Edition, Prentice Hall, NJ, 2008
Additional Resources	Kumar, Anil, and Rakesh K. Gupta. Fundamentals of polymer engineering. CRC Press, 2018. Harper, Charles A. Handbook of plastic processes. John Wiley & Sons, 2006.

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm Exam	1	30
Term Project	1	30
Total		**60**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Field Course

COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES		
No	Program Learning Outcomes	check √
1a	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline,	x
1b	Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	x
2a	Ability to identify, formulate, and solve complex engineering problems,	x
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.	x
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.	x
7a	Ability to communicate effectively in Turkish, both orally and in writing,	
7b	Knowledge of a minimum of one foreign language,	x
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.	
8a	Recognition of the need for lifelong learning, ability to access information, ability to follow developments in science and technology,	
8b	Ability to continue to educate him/herself.	
9a	Consciousness to behave according to ethical principles and professional and ethical responsibility.	
9b	Knowledge on standards used in engineering practice.	
10a	Knowledge about business life practices such as project management, risk management, change management.	

10b	Awareness in entrepreneurship and innovation.	
10c	Knowledge about sustainable development.	
11a	Knowledge about the global and social effects of engineering practices on health, environment, and safety,	
11b	Knowledge about contemporary issues of the century reflected into the field of engineering.	**x**
11c	Awareness of the legal consequences of engineering solutions.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	9	126
Midterm examination	1	(10+2)	12
Project	1	50	50
Final examination	1	15+2	17
Total Work Load			247
Total Work Load / 25 (h)			9.88
ECTS Credit of the Course			10

Prepared by: Asst. Prof. Dr. Nebahat ARAL	Preparation date: 15/12/2020