YEDİTEPE UNIVERSITY

COURSE DESCRIPTION FORM

2020/2021

COURSE INFORMATON				
Course Code	**MSN 660**	**Course Title**	Advanced Manufacturing Techniques in Materials Engineering	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
-	3	10	3+0+0	-

Language of Instruction	**Course Level**	**Course Type**
English	Graduate	Core
Course Coordinator	Prof. Dr. Taner Akbay	
Instructors	Assoc. Dr. Ahmet TURAN Asst. Prof. Dr. Z. Cansu CANBEK ÖZDİL Asst. Prof. Dr. Nebahat ARAL	
Assistants	-	
Goals	To give deep understanding on the manufacturing techniques of various engineering materials and systems used in materials engineering	
Content	Production technologies in Metals, Ceramics, Glass and Polymers, urban mining and sustainable metallurgy, Ausmelt TSL process, Iron and Steel: Direct reduction technologies, hydrogen reduction and molten oxide electrolysis, Nanofiber Production Techniques, Modern techniques for the production of various types of nanoparticles, Thin and functional films.	
Contribution of the Course to the Professional Education	Course will give deeper understanding in the production and manufacturing technologies to graduate students from various backgrounds. Course will help students to learn and compare various manufacturing technologies in the production and materials selection. Students will learn how to choose the right production and manufacturing technologies in the required applications.	

Course Learning Outcomes	**Detailed Program Outcomes**	**Teaching Methods**	**Assessment Methods**
Ability to describe processes applied in both material science and nanotechnology	8b	1	A
Ability to compare production processes.	1a,1b,2a	1, 3	A, E
Ability to recognize production machines and tools	8b	1	A
Ability to write effective reports and, make presentation	6a, 6b,7c,7d	8,11	F, G

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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	Textbook, Lecture notes
2	Advances in extractive metallurgy and recycling: iron and steel	Textbook, Lecture notes
3	Advances in extractive metallurgy and recycling: non-ferrous metals	Textbook, Lecture notes
4	Energetic materials and their applications	Textbook, Lecture notes
5	Advanced ceramics: carbides, borides and nitrides	Textbook, Lecture notes
6	General introduction to Nanoparticles	Textbook, Lecture notes
7	Methods of Nanoparticle Synthesis	Textbook, Lecture notes
8	Functional Thin Films Based on Nanoparticles	Textbook, Lecture notes
9	Applications of Nanoparticles	Textbook, Lecture notes
10	Introduction to Nanofibers and Nanofibrous Materials	Textbook, Lecture notes
11	Different Methods for Nanofiber Design and Fabrication	Textbook, Lecture notes
12	Emerging Applications and Manufacturing Methods of Nanofibers	Textbook, Lecture notes
13	Technical Visit/Laboratory - Electrospinning	
14	Invited Speaker	

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RECOMMENDED SOURCES	
Textbook	- Mikell P Groover, Fundamentals of Modern Manufacturing, Wiley, 4th. Edition. - Barhoum, Ahmed, Mikhael Bechelany, and Abdel Salam Hamdy Makhlouf, eds. Handbook of nanofibers. Cham, Switzerland: Springer International Publishing, 2019. - D.A.Brandt, J.C.Warner, 2005, Metallurgy Fundamentals, Goodheart-Willcox. - Seshadri Seetharaman, Fundamentals of Metallurgy, 2005, CRC Press. - Fathi Habashi, Hanbook of Extractive Metallurgy, Vol: I-IV, 1997, Wiley.
Additional Resources	Lecture Notes

MATERIAL SHARING	
Documents	Lecture notes, articles
Assignments	Homework, Presentations

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Homework and Presentations	4	60
Final	1	40
Total		**100**
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,	√
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.	
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.	
11c	Awareness of the legal consequences of engineering solutions.	

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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	8	112
Homework and Presentation	4	15	60
Final	1	30	30
Total Work Load			244
Total Work Load / 25 (h)			9.76
ECTS Credit of the Course			10

Prepared by:

Assoc. Dr. Ahmet TURAN
Asst. Prof. Dr. Z. Cansu CANBEK ÖZDİL
Asst. Prof. Dr. Nebahat ARAL

Preparation date:

16.02.2022