YEDİTEPE UNIVERSITY

FACULTY OF ENGINEERING

COURSE DESCRIPTION FORM2019/2020-2

COURSE INFORMATON				
Course Code	**MSN 500**	**Course Title**	**Fundamentals of Materials Science**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
Fall	**3**	**10**	**3 + 0 + 0**	**-**

Language of Instruction	**Course Level**	**Course Type**
English	Graduate	Core
Course Coordinator	Assoc Prof Dr Ahmet TURAN	
Instructors	Assoc Prof Dr Ahmet TURAN	
Assistants		
Goals	This course will guide graduate students to learn the basic materials science by studying the structure atoms, atomic structure of solids, crystal chemistry, phases and phase diagrams, and to learn and solve practical problems in physical, chemical, mechanical, thermal, optical, electrical and magnetic behaviours of materials. Prepare an individual report and presentation in a specific subject.	
Content	Theory, principles, conceptual understanding and application of basic materials science in engineering applications.	
Contribution of the Course to the Professional Education	Ability to understand and apply the basic materials science to determine the properties and efficiencies of materials and processes respectively.	

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	1b	1,2	A,E,G
Ability to write effective reports and comprehend written reports, prepare design and production reports,	7c	1,2	A,E,G
Ability to make effective presentations,	7d	1,2	A,E,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 Materials Science	Books and Lecture notes
2	Atomic Structure and Interatomic Bonding	Books and Lecture notes
3	Crystalline and Non-Crystalline structures	Books and Lecture notes
4	Defects in Materials	Books and Lecture notes
5	Diffusion	Books and Lecture notes
6	Phase diagrams and applications	Books and Lecture notes
7	Midterm Exam	Books and Lecture notes
8	Phase transformation and kinetics	Books and Lecture notes
9	Mechanical Behaviours of Materials	Books and Lecture notes
10	Advances in metals and metal processing	Books and Lecture notes
11	Advances in ceramics and ceramic processing	Books and Lecture notes
12	Advances in polymers and composites	Books and Lecture notes
13	Thermal, optical, electrical and magnetic properties of materials	Books and Lecture notes
14	Individual term assignment presentations	Books and Lecture notes

RECOMMENDED SOURCES

Textbook	Materials Science and Engineering, 8th Edition by W.D.Callister,Jr; D.G.Rethwisch, Wiley

	Fundamentals of Materials Science and Engineering, 5th Edition, W.D. Callister, Jr; D.G. Rethwisch, Wiley Int to Materials Science for Engineers, 8th Edition, J.F. Shackelford, Pearson
Additional Resources	Lecture notes

MATERIAL SHARING	
Documents	Textbook and lecture notes
Assignments	Individual projects
Exams	Midterm exam, Presentation, Final exam

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm Exam	1	30
Homework and Presentation	1	30
Final Exam	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 Courses

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.

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course duration (lectures)	14	3	42
Off-the-classroom study (prep., and review)	14	12	168
Off-the classroom study for the midterm exam	1	10	10
Midterm exam	1	2	2
Off-the-classroom study for the presentation	1	10	10
Presentation	1	3	3
Off-the-classroom study for the final exam	1	10	10
Final exam	1	2	2
Total Work Load			247
Total Work Load / 25 (h)			9.88
ECTS Credit of the Course			10

Prepared by: Assoc Prof Dr Ahmet TURAN	Preparation date: 17.10.22