YEDİTEPE UNIVERSITY
FACULTY OF ENGINEERING

COURSE DESCRIPTION FORM
2021/2022-1

COURSE INFORMATON				
Course Code	**MSN 510**	**Course Title**	**Advanced Materials Characterization Techniques**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
Fall	3	10	3 + 0+ 0	-

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

Course Coordinator	Dr. Volkan Can
Instructors	Dr. Volkan Can
Assistants	Dr. Pınar Akkuş
Goals	This course provides a detailed information about material characterization. Information will be given regarding material characterization tools such as imaging, surface characterization and structure analysis. Mathematical tools will also be presented leading towards understanding and analyzing materials in great detail.
Content	XRD, SEM, AFM, TEM, XPS
Contribution of the Course to the Professional Education	

Course Learning Outcomes	**Detailed Program Outcomes**	**Teaching Methods**	**Assessment Methods**
Ability to understand nanostructures	1a,1b,4a,9b	1, 2	A, E
Ability to understand characterization of nanoparticles	1b, 9b	1, 2	A, E, G
Ability to propose a nanotechnology based system to be employed in medicine	1b, 9b	1, 2	A, E, G
Ability to report and present nanobiotechnologic devices	1b, 9b	1	A, E

Ability to participate and work as a team	6a, 6b,7c,7d	8,11	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

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction to materials characterization	Lecture Notes
2	SEM	Lecture Notes
3	AFM	Lecture Notes
4	TEM	Lecture Notes
5	SEM - Application	
6	AFM - Application	
7	TEM - Application	
8	Midterm	
9	XRD	Lecture Notes
10	XRD	Lecture Notes
11	Presentation	
12	Presentation	
13	XPS	Lecture Notes
14	XPS	Lecture Notes

15	Final Exam	

RECOMMENDED SOURCES	
Textbook	Yang Leng; Materials Characterization Introduction to microscopic and spectroscopic methods Also, any book that covers the techniques presented in the course description will be helpful.
Additional Resources	Handouts and papers will be distributed to the students on relevant topics during the semester.

MATERIAL SHARING	
Documents	Lecture Notes
Assignments	Homework
Exams	Exams and solutions

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm	1	20
Presentation	1	20
Assigment	2	20
Final		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.	

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	6	84
Midterm examnations	2	3	6
Final exam	1	3	3
Total Work Load			135
Total Work Load / 25 (h)			5,4
ECTS Credit of the Course			10

Prepared by: Dr. Volkan Can	Preparation date: 10/08/2022