YEDİTEPE UNIVERSITY

FACULTY OF ENGINEERING

COURSE DESCRIPTION FORM2019/2020-2

COURSE INFORMATON				
Course Code	**MSN 502**	**Course Title**	**Fundamentals of Nanoscience and Nanotechnology**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
1	**3**	**10**	**3 + 0 + 0**	**-**

Language of Instruction	**Course Level**	**Course Type**
English	Graduate	Compulsory
Course Coordinator	Dr. Ayşe DULDA	
Instructors	Dr. Ayşe DULDA	
Assistants	-	
Goals	This course aims to provide information on fundamental topics in nanoscience and nanotechnology (quantum confinement, surface to volume ratio, synthesis methods of nanostructured materials and their applications).	
Content	Size effects-Quantum confinement, Classifications of nanostructured materials- nano particles- quantum dots, nanowires, multilayered materials. Bottom-up and Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Lithography, CVD and PVD routes..	
Contribution of the Course to the Professional Education	Awareness in the fundamentals of Nanoscience and Nanotechnology	

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
Awareness in entrepreneurship and innovation	10 b	1, 2	C,D
Ability to write effective reports	7a	2	C,D
Ability to understand characteristics of materials at nanoscale	10b	1, 2	C, D
Awareness in the preparation of nanomaterials	10b	1, 2	C, D
Ability to make effective presentations,	7c	2	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	Fundamentals of Quantum Theory	Textbook
2	Quantum Size Effect	Textbook
3	Top down Approach	Textbook
4	Nanomanufacturing, Lithographic Techniques	Textbook
5	Bottom up Approach (Liquid Phase Synthesis Methods)	Textbook
6	Gas Phase Synthesis Methods (CVD)	Textbook
7	Gas Phase Synthesis Methods (PVD)	Textbook
8	Nanostructured Materials (1D, 2D, Quantum Dots)	Textbook
9	Current Applications	Publications
10	Literature Survey	Publications
11	Literature Survey	Publications
12	Literature Survey	Publications
13	Student Presentations	Publications
14	Student Presentations	Publications
15	Student Presentations	Publications

RECOMMENDED SOURCES

Lecture Notes	Fundamentals of Nanotechnology (By Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep Dutta),2018 Introduction to Nano: Basics to Nanoscience and Nanotechnology edited by Amretashis Sengupta, Chandan Kumar Sarkar, 2015
Additional Resources	

MATERIAL SHARING
Documents
Assignments
Exams

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Term Presentations	1	60
Final Report	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	Expertise/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	6	84
Presentation	1	3	3
Off-the-classroom study for presentation	1	60	60
Off-the-classroom study for the final report	1	60	60
Total Work Load			249

Total Work Load / 25 (h)	9,96
ECTS Credit of the Course	10

Prepared by: Dr. Ayşe DULDA	Preparation date: 25.11.2020