COURSE INFORMATION					
Course Title	*Code*	*Semester*	*L+P+L Hour*	*Credits*	*ECTS*
Environmental Nanotechnology	MSN 572	-	3+0+0	3	10

Prerequisites	-

Language of Instruction	English
Course Level	Master's Degree (Second Cycle Programmes)
Course Type	Departmental Elective
Course Coordinator	Asst. Prof. Dr. Börte Köse Mutlu
Instructors	Asst. Prof. Dr. Börte Köse Mutlu
Assistants	-
Goals	The aim of this course is to discuss about the latest situation of nanotechnology, environment-friendly production techniques, possible effects on human and environment and establishing a scientific background for the development of environmental and human sensitive environmental nanotechnology.
Content	Introduction to environmental nanotechnology, Production of materials using environmentally sensitive production techniques, The positive and negative effects of technologies in nanoscale on environmental pollution, The importance of nanotechnology in environmental technologies, Nanosensors for the determination of pollution, The effects of nanoparticles on the environment, The effects of nanoparticles on human health, Basic properties of nanoparticles in different environments, Nanotechnology use in (renewable) energy production, Characterization of nanoparticles, Scientific research and legal regulations.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Ability to list the environmental applications of nanotechnology	2,3,4,9,11	1	A, B, C
2) Ability to define the environmental effects of nanotechnology	2,3,4,9,11	1	A, B, C
3) Ability to underline the health effects of nanotechnology	2,3,4,9,11	1	A, B, C

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 environmental nanotechnology	Lecture Notes
2	Nanotechnology and environment	Lecture Notes
3	The importance of nanotechnology in environmental applications: Introduction	Lecture Notes
4	The importance of nanotechnology in environmental applications: Membrane processes	Lecture Notes
5	The importance of nanotechnology in environmental applications: Adsorption processes	Lecture Notes
6	The importance of nanotechnology in environmental applications: Groundwater remediation	Lecture Notes
7	Nanosensors in pollutant determination	Lecture Notes
8	MIDTERM/-	-
9	Nanotechnology in energy production	Lecture Notes
10	Negative impacts of nanotechnology on environment-I	Lecture Notes
11	Negative impacts of nanotechnology on environment-II	Lecture Notes
12	Impacts of nanoparticles on human health	Lecture Notes
13	Risk assessment	Lecture Notes
14	Nano ethics	Lecture Notes
15	Future of nanotechnology: Scientific researches and legal regulations	Lecture Notes

RECOMMENDED SOURCES	
Lecture Notes	The lecture notes are supplied by the instructor.

Textbook	Wiesner, M.R., Bottero, J., Environmental Nanotechnology, Mcgraw Hill, 2007.
Additional Resources	Thedore, L., Kunz, R.G., Nanotechnology: Environmental Implications And Solutions, John Wiley & Sons Inc. 2005. Sellers Et Al., Nanotechnology And The Environment, Crc Press, 2009. Cloete Et Al., Nanotechnology In Water Treatment Applications, Caister Academic Press, Uk, 2010. Masciangioli, T., Zhang, W., Environmental Technologies At Nanoscale. Environmental Science And Technology, March, 102-107, 2004.

MATERIAL SHARING	
Documents	-
Assignments	-
Exams	Exams questions are solved if demanded.

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm	1/0	60/0
Term project	1/1	40/60
Homework	0/1	0/40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		50
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		50
Total		**100**

COURSE CATEGORY	Expertise Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Attains knowledge through wide and in-depth investigations his/her field and surveys, evaluates, interprets, and applies the knowledge thus acquired.					
2	Has a critical and comprehensive knowledge of contemporary engineering techniques and methods of application.				√	
3	By using unfamiliar, ambiguous, or incompletely defined data, completes and utilizes the required knowledge by scientific methods; is able to fuse and make use of knowledge from different disciplines.			√		
4	Has the awareness of new and emerging technologies in his/her branch of engineering profession, studies and learns these when needed.				√	
5	Defines and formulates problems in his/her branch of engineering, develops methods of solution, and applies innovative methods of solution.					
6	Devises new and/or original ideas and methods; designs complex systems and processes and proposes innovative/alternative solutions for their design.					
7	Has the ability to design and conduct theoretical, experimental, and model-based investigations; is able to use judgment to solve complex problems that may be faced in this process.					
8	Functions effectively as a member or as a leader in teams that may be interdisciplinary, devises approaches of solving complex situations, can work independently and can assume responsibility.					
9	Has the oral and written communication skills in one foreign language at the B2 general level of European Language Portfolio.				√	
10	Can present the progress and the results of his investigations clearly and systematically in national or international contexts both orally and in writing.					
11	Knows social, environmental, health, safety, and legal dimensions of engineering applications as well as project management and business practices; and is aware of the limitations and the responsibilities these impose on engineering practices.				√	
12	Commits to social, scientific, and professional ethics during data acquisition, interpretation, and publication as well as in all professional activities					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	12	168
Midterm	1	3	3
Term project (Presentation)	1	25	25
Final	1	3	3
Total Work Load			241
Total Work Load / 25 (h)			10
ECTS Credit of the Course			10