Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
FİZ4024	**3**	**0**	**0**	**3**	**5**	**C**	**TR**	**4/Spring**
Course Name (Turkish**)**	Nanomalzeme ve Nanoteknoloji							
Course Name (English**)**	Nanomaterials and Nanotechnology							

Unit/Program	Physics Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	This course aims to close the gap of expert personnel to work in the field of nanoscience and nanotechnological material development and product production, to teach students production technologies and to develop and teach the ability to contribute to the development of nanotechnology.
Course Outline	Principles of physical sizing, fundamentals of nanoscience, nanoscale manufacturing, nanomaterials, nanoscale and molecular electronics, introduction to quantum mechanics and nanoelectronics, semiconductors, surfaces, interfaces, band theories of solids, nanosolids, application to nanoelectronics. theoretical foundations of nanostructures and nanomaterials, chemical approaches to nanostructures, basic principles of nanomaterial synthesis techniques, nanoparticle synthesis, shaped nanoparticles, microstructural control and physical properties of nano-sized materials, principles for understanding the behavior of nanometer-sized materials, fundamentals and applications of imaging, measurement and analysis methods of nanometer-scale structured materials and instruments. Theoretical foundations of nanostructures and nanomaterials, chemical approaches to nanostructures, basic principles of nanomaterial synthesis techniques, nanoparticle synthesis, shaped nanoparticles, microstructural control and physical properties of nano-sized materials, principles for understanding the behavior of nanometer-sized materials, nanoelectronic devices, nanosensor technology, nanointegrated circuits.
Textbook/ Material / Resources	Nanoscience and Nanotechnology, Springer Publisher Advances in Nanotechnology , Nova Science Publisher
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Bogazici University	**Materials Science Nanotechnology Engineering**	**Nano Materials and Nanotechnology**	**3-3-0; 5**	
Yeditepe University	**Materials Science and Nanotechnology Engineering.**	**Nanomaterials and Nanotechnology**	**3-3-0; 5**	
TOBB University	**Department of Nanotechnology Engineering**	**Introduction to Materials Science and Nanotechnology Engineering**	**3-3-0; 5**	

The instructor who suggested the course to be opened	*Signature*
Prof. Fahrettin YAKUPHANOĞLU, MD	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Fahrettin YAKUPHANOĞLU, MD	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Materials Science and Nanotechnology is a department that teaches to have knowledge about the production, characterization, properties and behavior of materials, and to research and develop nanotechnology applications. Learning nanotechnology is extremely important as learning the potentials of nanotechnology in production and use in technology makes important contributions to learning the production of high-tech products.

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)
The course will be taught with theoretical and laboratory applications.

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)	
Stakeholder Name	**Opinion** (It should be given as a summary, it should not exceed two lines.)
Manufacturing and Production Factories	

Weekly Course Content Distribution		
Week	**Theory**	**Application/Laboratory**
1	Principles of physical sizing, fundamentals of nanoscience,	
2	Nanoscale manufacturing, nanomaterials, nanoscale, and molecular electronics	
3	Introduction to quantum mechanics and nanoelectronics	
4	**Semiconductor materials**	
5	Band theories of solids, nanosolids, application to nanoelectronics	
6	Theoretical foundations of nanostructures and nanomaterials, chemical approaches to nanostructures	
7	Basic principles of nanomaterial synthesis techniques, Nanoparticle synthesis, shaped nanoparticles,	
8	Microstructural control and physical properties of nano-sized materials, principles for understanding the behavior of nanometer-sized materials,	
9	Midterm Exam	
10	Fundamentals and applications of imaging, measurement and analysis methods of nanometer-scale structured materials and instruments.	
11	Theoretical foundations of nanostructures and nanomaterials, chemical approaches to nanostructures, basic principles of nanomaterial synthesis techniques	
12	Nanoparticle synthesis, shaped nanoparticles	
13	**Microstructural control and physical properties of nano-sized materials,** fundamentals and applications of analysis methods of nanomaterials	
14	Nanoelectronic devices, Nanosensor technology, Nano integrated circuits	
15	Final Exam	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	%40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	%60
		Sum:	100
Remarks			
Content Design and Subject Weight (%)	Mathematics and Basic Sciences	%70	
	Engineering Sciences	%30	
	Social Sciences		
	Health Sciences		
	Educational Sciences		
	Culture and Art Sciences		
	Design Information		

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	1	2	2
Self-Study (including pre-class and exam preparation)	14	2	28
Make-up Exam	1	2	2
Experiment and Observation			
Class Participation (Theory)	14	3	42
Homework			
Final Exam Practice	1	2	2
Laboratory			
Article Review	10	2	20
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution			
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work	7	2	14
Argument	5	3	15
Application/Practice			
Other			

TOTAL WORKLOAD:	**125**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*	**5**

The Relationship Between Course Learning Outcomes and Program Outcomes

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	1	2	3	4	5	6	7	8	9	10	11
1	Recognize nanotechnological systems.	**5**	**4**	**4**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
2	Know the properties of nanomaterials.	**5**	**4**	**4**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
3	Gains the ability to solve with nanotechnology.	**5**	**5**	**5**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
4	Knows the techniques used in nanotechnological systems.	**5**	**5**	**5**	**4**	**5**	**5**	**5**	**4**	**5**	**3**	**4**
5	Knows the environments required for nanotechnology and the basics of nanotechnology.	**5**	**5**	**5**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
6	Know the basics of nanotechnology applications.	**5**	**5**	**5**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
7	Recognizes software used in nanotechnology applications.	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**4**	**5**	**3**	**4**
8	Makes the necessary definitions to solve problems in the nanotechnology process.	**5**	**5**	**5**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**
9	Knows the solution methods required for the solution of nanotechnology problems.	**5**	**5**	**5**	**4**	**4**	**5**	**5**	**4**	**5**	**3**	**4**

Organizer: Prof. Dr. Fahrettin YAKUPHANOĞLU
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