ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
MATERIALS SCIENCE AND MECHANICAL ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
COMPOSITE MATERIALS	MSME-605	FALL-SPRING	3 + 0	3	10

Prerequisite Courses	None

Type	Selective
Language	English
Coordinator	Assist. Prof. Hatice Sinem Şaş Çaycı
Instructor	Assist. Prof. Hatice Sinem Şaş Çaycı
Adjunt	none
Aim	Learning the principles of composite materials processing techniques and modeling tools and micro and macro mechanics of composite materials with failure types.
Learning Outcomes	• Learning the classification of composite materials with applications • Learning the basic composite manufacturing processing techniques • Practicing the composite modeling methods and tools by adapting the basic governing equations: mass, momentum and energy conservation • Learning the mechanics of orthotropic lamina • Learning the mechanics of laminated composites • Understanding the different failure mechanisms of composite materials
Course Content	• Introduction to Composite Materials • Introduction to Composite Manufacturing Processes • Issues and Challenges of Advanced Composite Manufacturing • Transport Equations for Composite Processing • Modeling Philosophy and Tools for Composite Processing • Case Studies on Composite Process Modeling • Behavior of Unidirectional Composites • Short Fiber Composites • Analysis of Orthotropic Lamina • Analysis of Laminated Composites • Failure Analysis of Composite Materials: Short and Long fibers • Processing and Properties of Nanocomposites • New Technologies and Applications on Composite Materials

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Introduction to Composite Materials	The relevant articles from the literature
2	Introduction to Composite Manufacturing Processes	The relevant articles from the literature
3	Issues and Challenges of Advanced Composite Manufacturing	The relevant articles from the literature
4	Transport Equations for Composite Processing	The relevant articles from the literature
5	Modeling Philosophy and Tools for Composite Processing	The relevant articles from the literature
6	Case Studies on Composite Process Modeling	The relevant articles from the literature
7	Behavior of Unidirectional Composites	The relevant articles from the literature
8	Short Fiber Composites	The relevant articles from the literature
9	Midterm	The relevant articles from the literature
10	Analysis of Orthotropic Lamina	The relevant articles from the literature
11	Analysis of Laminated Composites	The relevant articles from the literature
12	Failure Analysis of Composite Materials: Short and Long fibers	The relevant articles from the literature
13	Processing and Properties of Nanocomposites	The relevant articles from the literature
14	New Technologies and Applications on Composite Materials	The relevant articles from the literature

SOURCES

Lecture Notes	Lecture slides
Other Sources	**Course Textbooks:** "Process Modeling in Composite Manufacturing" by S. G. Advani and E. M. Sözer, CRC Press; 2nd edition, ISBN 9781420090826. "Analysis and Performance of fiber Composites" by B. D. Agarwal, L. J. Broutman, and K. Chandrashekhara, Wiley; 3rd edition, ISBN 978-0-471-26891-8 **Additional Materials:** 1. "Mechanics of Composite Materials" by A. K. Kaw, Taylor & Francis; 2nd edition, ISBN 9780849313431 2. "Mechanics of Composite Materials" by R.M. Jones, Taylor & Francis Group; 2nd edition, ISBN-10: 156032712X 3. "Principles of Composite Materials Mechanics" by R. F. Gibson, Mc Graw-Hill; 3rd edition, ISBN-10: 1439850054

COURSE MATERIALS SHARING	
Documents	Lecture notes, slides and molecular model set
Homeworks	Students will be given 5 homework assignments
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
Midterm	1	25
Homework	5	25
Project	1	20
SUB-TOTAL		70
Contribution of Semester Study		70
Contribution of Final Exam	1	30
TOTAL		100

Course Category	
Sciences and Mathematics	30%
Engineering	70%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS

No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	Accessing knowledge, evaluating and interpreting information by doing scientific research in the field of Materials Science and Mechanical Engineering					**x**
2	Ability to use science and engineering knowledge for development of new methods in Materials Science and Mechanical Engineering					**x**
3	To be able to understand and analyze materials by using basic knowledge on Materials Science and Mechanical Engineering					**x**
4	Design and implement analytical, modeling and experimental research					**x**
5	Solve and interpret the problems encountered in experimental research			**x**		
6	Considering scientific and ethical values during the collection and interpretation of data				**x**	
7	Integrating knowledge of different disciplines with the help of scientific methods, and completion and implementation of scientific knowledge using data					**x**
8	To gain leadership ability and responsibility in disciplinary and interdisciplinary team works					**x**
9	To be able to contribute to the solution of social, scientific and ethical problems encountered in the field of Materials Science and Mechanical Engineering					**x**
10	To be able to define, interpret and create new information about the interactions between various discipline of Materials Science and Mechanical Engineering					**x**

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	14	3	42
Out-of-class Study Time (Pre-study, practice)	15	5	75
Internet search, library work, literature search	15	4	60
Project	1	24	24
Homework	5	12	60
Midterm	1	20	20
Final Exam	1	25	25
Total Work Load			306
Total Work Load / 30			306/30
Course ECTS Credit			10