

**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
FUNDAMENTALS OF ORGANIC MATERIALS AND APPLICATIONS	MSME-607	FALL-SPRING	3 + 0	3	10

<b>Prerequisite Courses</b>	One of the following Courses: General Chemistry, Organic Chemistry, Polymer Chemistry, Materials Science etc. (undergraduate level courses)
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<b>Type</b>	Selective
<b>Language</b>	English
<b>Coordinator</b>	Assoc. Prof. Hakan Usta
<b>Instructor</b>	Assoc. Prof. Hakan Usta
<b>Additional Instructors/TAs</b>	none
<b>Aim</b>	Learning the fundamental principles of organic reactions and mechanisms and the detailed study of their applications in materials science and nanotechnology.
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Learning general types and chemical structures of organic molecules.</li> <li>• Learning the fundamentals of organic molecules, functional groups, hybridization and bonding theories.</li> <li>• Learning the types of organic reactions and gaining the ability to write reaction mechanisms in detail.</li> </ul>
<b>Course Content</b>	<ul style="list-style-type: none"> <li>• The Basics: Bonding and Molecular Structure</li> <li>• Families of Carbon Compounds</li> <li>• Acids and Bases: An Introduction to Organic Reactions/Mechanisms</li> <li>• Nomenclature and Conformations of Alkanes and Cycloalkanes</li> <li>• Stereochemistry: Chiral Molecules</li> <li>• Ionic Reactions: Nucleophilic Substitution and Elimination Reactions</li> </ul>

**WEEKLY TOPICS AND PRELIMINARY STUDY**

Week	Topic	Preliminary Study
1	The Basics: Bonding and Molecular Structure-I	The relevant articles from the literature
2	The Basics: Bonding and Molecular Structure-II	The relevant articles from the literature
3	The Basics: Bonding and Molecular Structure-III	The relevant articles from the literature
4	Families of Carbon Compounds-I	The relevant articles from the literature
5	Families of Carbon Compounds-II	The relevant articles from the literature
6	Acids and Bases: An Introduction to Organic Reactions/Mechanisms-I	The relevant articles from the literature
7	Acids and Bases: An Introduction to Organic Reactions/Mechanisms-II	The relevant articles from the literature
8	Acids and Bases: An Introduction to Organic Reactions/Mechanisms-III	The relevant articles from the literature
9	Midterm	The relevant articles from the literature
10	Nomenclature and Conformations of Alkanes and Cycloalkanes-I	The relevant articles from the literature
11	Nomenclature and Conformations of Alkanes and Cycloalkanes-II	The relevant articles from the literature
12	Stereochemistry: Chiral Molecules-I	The relevant articles from the literature
13	Stereochemistry: Chiral Molecules-II	The relevant articles from the literature

14	Ionic Reactions: Nucleophilic Substitution and Elimination Reactions-I	The relevant articles from the literature
15	Ionic Reactions: Nucleophilic Substitution and Elimination Reactions-II	The relevant articles from the literature
16	Final Exam	

#### SOURCES

<b>Lecture Notes</b>	Lecture slides
<b>Other Sources</b>	<p><b>Course Textbook:</b> "Organic Chemistry" by T. W. Graham Solomons, Wiley; 11th edition (January 17, 2013), ISBN-10: 1118133579. (Chapters 1-6)</p> <p><b>Additional Materials:</b></p> <ol style="list-style-type: none"> <li>"Organic Chemistry" by L. G. Wade, Pearson; 8th edition (January 6, 2012), ISBN-10: 0321768418.</li> <li>"General Chemistry: Principles and Modern Applications" by Ralph H. Petrucci, F. Geoffrey Herring, Jeffrey D. Madura, Carey Bissonnette.</li> </ol>

#### COURSE MATERIALS SHARING

<b>Documents</b>	Lecture notes, slides and molecular model set
<b>Homeworks</b>	Students will be given one homework each week
<b>Exams</b>	1 Midterm and 1 Final Exam

#### EVALUATION SYSTEM

SEMESTER STUDY	NUMBER	CONTRIBUTION
Midterm	1	20
Homework	14	25
Quiz	14	25
<b>SUB-TOTAL</b>		70
<b>Contribution of Semester Study</b>		70
<b>Contribution of Final Exam</b>	1	30
<b>TOTAL</b>		100

#### Course Category

Sciences and Mathematics	70%
Engineering	30%
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					<b>X</b>
2	Ability to use science and engineering knowledge for development of new methods in Materials Science and Mechanical Engineering					<b>X</b>
3	To be able to understand and analyze materials by using basic knowledge on Materials Science and Mechanical Engineering					<b>X</b>
4	Design and implement analytical, modeling and experimental research					<b>X</b>
5	Solve and interpret the problems encountered in experimental research					<b>X</b>
6	Considering scientific and ethical values during the collection and interpretation of data				<b>X</b>	
7	Integrating knowledge of different disciplines with the help of scientific methods, and completion and implementation of scientific knowledge using data			<b>X</b>		
8	To gain leadership ability and responsibility in disciplinary and interdisciplinary team works					<b>X</b>
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					<b>X</b>
10	To be able to define, interpret and create new information about the interactions between various discipline of Materials Science and Mechanical Engineering					<b>X</b>

\*Increasing from 1 to 5.

<b>ECTS / WORK LOAD TABLE</b>			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out-of-class Study Time (Pre-study, practice)	16	5	90
Internet search, library work, literature search	16	4	64
Presentation	7	3	21
Homework	16	4	64
Midterm	1	15	15
Final Exam	1	20	20
<b>Total Work Load</b>			322
<b>Total Work Load / 30</b>			322/30
<b>Course ECTS Credit</b>			10