
	<b>FACULTY OF ENGINEERING COURSE SYLLABUS FORM</b>	Doküman Kodu	MF.FR.003
		Yayın Tarihi	06.09.2024
		Revizyon No	0
		Revizyon Tarihi	0
		Gizlilik Sınıfı	Hizmet içi

<b>NE 316 – COMPOSITE AND NANO COMPOSITE MATERIALS</b>				
<b>Course Code</b>	<b>Course Name</b>			<b>Semester</b>
NE 316	Composite and Nano Composite Materials			Fall <input checked="" type="checkbox"/> Spring <input type="checkbox"/> Summer <input type="checkbox"/>
<b>Hours</b>			<b>Credit</b>	<b>ECTS</b>
<b>Theory</b>	<b>Practice</b>	<b>Lab</b>	3	4
3	0	0		


<b>Course Details</b>	
<b>Department</b>	Nanotechnology Engineering
<b>Course Language</b>	English
<b>Course Level</b>	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>
<b>Mode of Delivery</b>	Face to Face <input checked="" type="checkbox"/> Online <input type="checkbox"/> Hybrid <input type="checkbox"/>
<b>Course Type</b>	Compulsory <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>Course Objectives</b>	This course aims to provide comprehensive knowledge about composite and nanocomposite materials including their classification, properties, manufacturing methods, and applications in modern engineering and nanotechnology.
<b>Course Content</b>	Introduction to composite materials, matrix and reinforcement types, interface properties, fabrication methods, mechanical behavior, failure mechanisms, nanofillers, polymer-based, metal-based, and ceramic-based nanocomposites, characterization techniques, and application areas.
<b>Course Method/ Techniques</b>	Lecture <input checked="" type="checkbox"/> Question & Answer <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/>
<b>Prerequisites/ Corequisites</b>	
<b>Work Placement(s)</b>	

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<b>Textbook/References/Materials</b>
<p><b>Textbook:</b></p> <p><b>Composite Materials: Science and Engineering, Krishan K. Chawla, 3rd Edition, Springer, 2012.</b></p> <p><b>References:</b></p> <p><b>Introduction to Composite Materials Design, Ever J. Barbero, 2nd Ed., CRC Press, 2010.</b></p> <p><b>Nanocomposite Science and Technology, Pulickel M. Ajayan, Wiley-VCH, 2005.</b></p> <p><b>Polymer Matrix Composites, Ronald F. Gibson, Springer, 2016.</b></p>

<b>Course Category</b>				
Mathematics and Basic Sciences	<input type="checkbox"/>		Education	<input type="checkbox"/>
Engineering	<input checked="" type="checkbox"/>		Science	<input type="checkbox"/>
Engineering Design	<input type="checkbox"/>		Health	<input type="checkbox"/>
Social Sciences	<input type="checkbox"/>		Profession	<input type="checkbox"/>

<b>Weekly Schedule</b>		
No	Topics	Materials/Notes
1	Introduction to Composite Materials	Definition, history, basic concepts
2	Classification and Types of Composites	Particle, fiber, structural composites
3	Matrix Materials	Polymer, metal, ceramic matrices
4	Reinforcements	Fibers, whiskers, particles and their properties
5	Interface and Interphase	Role of bonding and load transfer
6	Fabrication Techniques I	Hand lay-up, pultrusion, injection molding
7	Fabrication Techniques II	CVD, PVD, in situ synthesis of nanocomposites
8	Midterm Exam	Covers Weeks 1–7


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9	Mechanical Properties of Composites	Strength, stiffness, toughness
10	Failure Mechanisms	Delamination, fiber pull-out, fatigue
11	Polymer Matrix Nanocomposites	Nanofillers, intercalation/exfoliation techniques
12	Metal and Ceramic Matrix Nanocomposites	High-temp stability and toughness
13	Characterization Techniques	SEM, TEM, XRD, FTIR, TGA, DSC
14	Environmental and Durability Aspects	Aging, moisture absorption, thermal cycles
15	Applications in Engineering	Aerospace, automotive, biomedical, energy
16	Final Exam	Cumulative assessment

 <b>OSTİM TEKNİK ÜNİVERSİTESİ</b> A N K A R A	<b>FACULTY OF ENGINEERING COURSE SYLLABUS FORM</b>	Doküman Kodu	MF.FR.003
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<b>Assessment Methods and Criteria</b>		
<b>In-term studies</b>	<b>Quantity</b>	<b>Percentage</b>
Attendance		
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework		
Presentation / Seminar	1	25
Project		
Report		
Seminar		
Midterm Exam	1	25
Final Exam	1	50
	<b>Total</b>	<b>100%</b>
<b>Contribution of Midterm Studies to Success Grade</b>	50	50
<b>Contribution of End of Semester Studies to Success Grade</b>	50	50
	<b>Total</b>	<b>100%</b>

<b>ECTS Allocated Based on Student Workload</b>			
<b>Activities</b>	<b>Quantity</b>	<b>Duration (Hrs)</b>	<b>Total Workload</b>
Course Hours	14	4	56
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	14	3	42
Quiz/Studio/Criticize			
Homework			
Presentation / Seminar	1	5	5
Project			
Report			
Midterm Exam and Preparation for Midterm	1	15	15
Final Exam and Preparation for Final Exam	1	24	24
	<b>Total Workload</b>		<b>150</b>
	<b>Total Workload / 25</b>		<b>150/25</b>
	<b>ECTS Credit</b>		<b>6</b>

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<b>Course Learning Outcomes</b>	
<b>No</b>	<b>Outcome</b>
<b>L1</b>	Define types and structures of composite and nanocomposite materials.
<b>L2</b>	Analyze mechanical and physical behavior of composites.
<b>L3</b>	Identify suitable manufacturing techniques.
<b>L4</b>	Use characterization methods to interpret material performance.
<b>L5</b>	Propose real-world applications using composite and nanocomposite systems.

<b>Contribution of Course Learning Outcomes to Program Competencies/Outcomes</b>												
<i>Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant</i>												
	<b>P1</b>	<b>P2</b>	<b>P3</b>	<b>P4</b>	<b>P5</b>	<b>P6</b>	<b>P7</b>	<b>P8</b>	<b>P9</b>	<b>P10</b>	<b>P11</b>	<b>Total</b>
<b>L1</b>	5	4	2	3	2	1	2	3	2	1	1	26%
<b>L2</b>	4	3	2	5	2	2	3	3	2	1	1	28%
<b>L3</b>	3	5	4	5	3	2	3	3	2	2	2	34%
<b>L4</b>	3	3	3	5	5	3	3	4	3	3	3	38%
<b>L5</b>	2	3	3	4	5	3	4	5	5	4	4	42%
											<b>Total</b>	<b>168</b>