

## Module(CourseSyllabus)Catalogue

### 2023-2024

College/Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering Techniques	
ModuleName	Advanced Materials Science	
ModuleCode	AMS202	
Degree	Technical Diploma <input type="checkbox"/> Bachler <input type="checkbox"/> High Diploma <input type="checkbox"/> Master <input checked="" type="checkbox"/> PhD <input type="checkbox"/>	
Semester	2 <sup>nd</sup>	
Qualification	PhD	
ScientificTitle	Lecturer	
ECTS(Credits)	9	
Moduletype	Prerequisite <input type="checkbox"/> Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>	
Weeklyhours		
Weeklyhours(Theory)	( 3 )hrClass	( 9 )TotalhrsWorkload
Weeklyhours(Practical)	( 0 )hrClass	( )TotalhrsWorkload
NumberofWeeks	16	
Lecturer(Theory)	Pro.Dr.Basim Mohammed Fadhil	
E-Mail&MobileNO.	<a href="mailto:basim.fadhil@epu.edu.iq">basim.fadhil@epu.edu.iq</a> , 07730142544	
Lecturer(Practical)		
E-Mail&MobileNO.		
Websites		

# Course Book

<b>CourseDescription</b>	<p>The intended course included an introduction to the structure-property relationships of different types of materials (metals, ceramics, polymers and composites). Topics covered include atomic structure and bonding, crystal structures, crystal structure imperfections, introduction to strength of materials and strengthening mechanisms, diffusion, phase diagrams, and the thermal, electrical, magnetic, and optical properties of materials.</p> <p>Additionally, the course focuses on the broad scope preparation in selecting and using right advanced materials for various applications. Besides, the detailed processing-composition-performance relationship is explained throughout the course based on the required applications.</p> <p>It is vital for researchers to combine the basics of materials science and engineering in order to able choose the best appropriate materials, and/or improve or invent new composites to adequate them for cutting-edge technology, considering the effective cost and performance.</p>
<b>Course objectives</b>	<p>To cover the main to picks of modifying materials structure and properties, and to provide the students with the latest developments in material technology and applications of new Advanced materials.</p>
<b>Student's obligation</b>	<ol style="list-style-type: none"><li>1-Contribution in the presentation and explanation of the course materials with the lecturer</li><li>2- Watch related video sprior to the corresponding lecture/discussion class and read the relevant references prior to the class</li><li>3-Taking note sduring class</li><li>4-Emphathysize the research related activities and update your self continuously.</li><li>5-lamreadytodownloadresearchpublications with You and discuss it when ever is convenient.</li></ol>

<b>Required Learning Materials</b>	Data show and white board are used through out the lectures There is no single textbook that covers the entire course. The course material is collected from various textbooks and research paper; lecture notes will be made available in advance (before each corresponding lecture). Useful text books include the following ones. For general reference: W. D. Callister, D. G. Rethwisch, <u>Fundamentals of Materials Science and Engineering: An Integrated Approach</u> , Wiley, 2017. Additional sources will be announced during the course.																																				
<b>Evaluation</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Task</th> <th style="text-align: center;">Weight (Marks)</th> <th style="text-align: center;">Due Week</th> <th style="text-align: center;">Relevant Learning Outcome</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Paper Review</td> <td style="text-align: center;">10%</td> <td style="text-align: center;">13</td> <td></td> </tr> <tr> <td style="text-align: center;">Attendance</td> <td style="text-align: center;">5%</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Quiz</td> <td style="text-align: center;">10%</td> <td style="text-align: center;">4</td> <td></td> </tr> <tr> <td style="text-align: center;">Seminar</td> <td style="text-align: center;">5%</td> <td style="text-align: center;">8</td> <td></td> </tr> <tr> <td style="text-align: center;">Midterm exam.</td> <td style="text-align: center;">20%</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Subtotal</td> <td style="text-align: center;">50%</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Final Exam</td> <td style="text-align: center;">50%</td> <td style="text-align: center;">15</td> <td></td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;">100%</td> <td></td> <td></td> </tr> </tbody> </table>	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	Paper Review	10%	13		Attendance	5%			Quiz	10%	4		Seminar	5%	8		Midterm exam.	20%			Subtotal	50%			Final Exam	50%	15		Total	100%		
Task	Weight (Marks)	Due Week	Relevant Learning Outcome																																		
Paper Review	10%	13																																			
Attendance	5%																																				
Quiz	10%	4																																			
Seminar	5%	8																																			
Midterm exam.	20%																																				
Subtotal	50%																																				
Final Exam	50%	15																																			
Total	100%																																				
<b>Specific learning outcome:</b>	By the end of this course, students should demonstrate the following: <b>1- Knowledge and understanding:</b> Learn materials by properties and application-based selection  <b>2-Applying knowledge and understanding</b> -Use concepts discussed and learned in the class room lectures for the laboratory practice. -Solves imply exercises and computations dealing with Materials performance in selected energy-related applications																																				

	<p><b>3- Making judgements</b> Be able to select materials for specific applications</p> <p><b>4- Communication skills</b> -Be able to produce a portion laboratory activity -Make and present a Power Point projection on a specific topic of the course and/or a laboratory activity</p> <p><b>5- Learning skills</b> -Be able to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation. -Carry out assigned jobs in the laboratory practice, Independently and as part of a small team.</p>	
<b>Course References:</b>	<ol style="list-style-type: none"> <li>1. W.D.Callister, <u>Fundamentals of Materials Science and Engineering</u>, (all editions)</li> <li>2. W.D.Callister, <u>Foundations of Materials Science and Engineering</u>, An integrated Approach (6<sup>th</sup> edition)</li> <li>3. William Smith, <u>Foundations of Materials Science and Engineering</u>, (6<sup>th</sup> edition)</li> <li>4. J.F.Shackelford, <u>Foundations of Materials Science and Engineering</u>, An Interactive e text, (5<sup>th</sup> edition)</li> <li>5. Donald Askeland, <u>The Science and Engineering of Materials</u>, (5<sup>th</sup> edition)</li> </ol>	
<b>Course topics (Theory)</b>	<b>Week</b>	<b>Learning Outcome</b>
Course Introduction	1	
Atomic Structure	2	
Atomic Bonding	3	
Structure of Solids	4	
Structure of Crystal line Solids	5	
Structure of Metals	6	
Structure of Ceramics	7	

Structure of Polymers	8	
Imperfections in Solids	9	
Diffusion	10	
Mechanical Properties Metals	11	
Electrical, Thermal, Magnetic and Optical properties	12	
Failure: Fracture, Fatigue, Creep	13	
Mechanical Properties Ceramics	14	
Mechanical Properties Polymers	15	
Composites	16	

## Questions Example Design

**Extranotes:**

**External Evaluator**

**I have looked at this Catalogue, it is well-written and clearly organized. It covered most of the topics that are necessary, for master students, to know in materials science.**



**Dr. Dlair O. Ramadan**