



**NEAR EAST UNIVERSITY**  
**FACULTY OF ENGINEERING**  
**CIVIL ENGINEERING DEPARTMENT**  
**2015-16 FALL**  
**COURSE OUTLINE**

<b>Course Unit Title</b>	Materials Science	
<b>Course Unit Code</b>	CE241	
<b>Type of Course Unit</b>	Compulsory	
<b>Level of Course Unit</b>	2	
<b>National Credits</b>	4	
<b>Number of ECTS Credits Allocated</b>	6	
<b>Theoretical (hour/week)</b>	4	
<b>Practice (hour/week)</b>		
<b>Laboratory (hour/week)</b>	2	
<b>Year of Study</b>	2 <sup>nd</sup>	
<b>Semester when the course unit is delivered</b>	1 <sup>st</sup>	
<b>Course Coordinator</b>	Asst. Prof. Dr. Pınar Akpınar	
<b>Name of Lecturer (s)</b>	Asst. Prof. Dr. Pınar Akpınar	
<b>Name of Assistant(s)</b>	Ikenna Uwanuakwa	
<b>Mode of Delivery</b>	Face to Face; Formal Lectures and Laboratory practice	
<b>Language of Instruction</b>	English	
<b>Prerequisites and co-requisites</b>	None	
<b>Recommended Optional Programme Components</b>	Basic background on chemistry and atomic theory	
<p><b>Objectives of the Course:</b> Review of basic concepts related to internal structures of materials; atomic bonding and their characteristics, properties of molecular, amorphous and crystal structures and structural imperfections. Mechanical properties of engineering materials. Concepts of force, stress, deformation, strain, elasticity and Hooke's Law, plasticity and flow, viscosity, creep, relaxation, impact loads, toughness, resilience, fracture, ductility and brittle.</p>		
<b>Learning Outcomes</b>		
	<b>When this course has been completed the student should be able to</b>	<b>Assessment</b>
1	Develop a thorough understanding on essential materials science concepts, especially on the mechanical properties of engineering materials.	1 & 2
2	Gain experience on the laboratory experiments on the mechanical behaviour of engineering materials while observing related standard test methods.	5

Assessment Methods: 1. Written Exam 2. Assignment 3. Project/Report 4. Presentation 5. Lab. Work		
Course's Contribution to Program		
		CL
1	Ability to relate and apply fundamental sciences to learning the essential civil engineering concepts and theories of different branches.	4
2	Ability to understand the derivation of these concepts and theories by relating them to the real-life engineering cases within the related civil engineering branch.	4
3	Ability to define clearly and analyze the engineering problems by applying the introduced civil engineering concepts and theories of the related branch.	5
4	Ability to use decision-making skills and perform design calculations correctly for the solution of the defined problem/project by applying the introduced theories of the related civil engineering branch.	5
5	Ability to understand and carry out the practical applications of learned civil engineering concepts and theories on site and/or laboratory.	4
6	Ability to use software packages for the analysis and/or the design of the defined civil engineering problems/projects.	1
7	Ability to manage time and resources effectively and efficiently while carrying out civil engineering projects.	1
8	Ability to participate in team-works for the solution of the targeted problem.	3
9	Ability to write technical reports and/or to carry out presentations on the studied engineering project using the modern techniques and facilities..	1
10	Ability to carry out and finalize a civil engineering study/project by showing professional ethics.	1
CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)		

Course Contents			
Week	Chapter		Exams
1.	1	Introduction to Materials Science	
2.	1	Internal structures of materials; atomic bonding and their characteristics	
3.	1	Properties of molecular, amorphous Structures	
4.	1	Properties of crystal structures with related examples and problem solutions, structural imperfections	
5.	2	Mechanical properties of engineering materials. Concepts of force, stress, deformation, strain	
6.	2	Problem solutions on the concepts of force, stress, deformation, strain	

7.	2	Properties of Cements elasticity and Hooke's Law with related examples and problem solutions	
8.			Mid-term Examination
9.	2	Concepts of plasticity and flow, ductility and brittleness	
10.	2	Concepts of viscosity, creep, relaxation	
11.	2	Concepts of impact loads, toughness, resilience, fracture	
12.	2	Problem solutions on impact loads, toughness, resilience	
13.	2	Concepts of fatigue and hardness	
14.	3	Concepts of thermal properties of materials	
15.			Final Examination

#### Recommended Sources

1. **Textbook:** Introduction to Materials Science, [Turhan Y. Erdoğan](#), [İ. Özgür Yaman](#), [Mustafa Tokyay](#), [Sinan T. Erdoğan](#), METU press, Ankara 2012.
2. Materials Science Lecture Notes, Kaşif Onaran, NEU press, 2000.
3. Malzeme Bilimi ve Mühendisliği, G. Göller, Ö. Keleş, İ. Akın, İTÜ.

**Supplementary Material(s):** CE241 LECTURE NOTES-NEU.

#### Assessment

Attendance & Assignment		
Midterm Exam (Written)	35%	
Laboratory	10%	
Final Exam (Written)	50%	
Attendance	5%	
Total	100%	

#### ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
Course duration in class (including the Exam week)	15	4	60
Tutorials			
Assignments	2	2	4
Laboratory Experiments	3	1	3
Laboratory Report Writing	3	2	6
Quizzes			
Midterm Examination	1	2	2
Final Examination	1	2	2

Self-Study	15	4	60
Total Workload			137
Total Workload/30 (h)			4.6
ECTS Credit of the Course			5