DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MWT304	3			1
Title	**T**	**A**	**L**	**ECTS**
Mechanical Properties of Materials	3	2		6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Material Science and Technology					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	In this course, the relationships between the basic deformation mechanisms at the microstructural level and the macroscopic mechanical properties of functional and structural materials are systematically examined. In this context, eg. Fundamental topics such as crystal elasticity, anelasticity, dislocation plasticity at medium and high temperatures, fracture mechanics aspects, fatigue, friction and wear are covered in depth. The course provides the theoretical foundations for the students and shows the current practical applications.					
Content	General Elasticity Anelasticity Plasticity Dislocations I Dislocations II Temperature-, Twinning Recovery and Recrystallization Creeping, Relaxation Localization Phenomena Multi-axis Loading Fracture Mechanics Fatigue Ultrafine grain / nanocrystalline Materials					
Prerequisites	-					
Coordinator	-					
Lecturer(s)	Asist Prof.Dr. Çağatay Elibol					
Assistant(s)	-					
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	W. Schatt: Werkstoffwissenschaft, Wiley-VCH, Weinheim 2003. G. Gottstein: Physikalische Grundlagen der Materialkunde, Berlin, Heidelberg 2007. P. Haasen: Physikalische Metallkunde, 3. Auflage, Springer Verlag, Berlin 1994 E. Macherauch: Praktikum in Werkstoffkunde, 3. Auflage, Vieweg & Sohn,

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	Wiesbaden 1981 F. Vollertsen, S. Vogler: Werkstoffeigenschaften und Mikrostruktur, Carl Hanser Verlag, München 1989 J.P. Hirth, J. Lothe: Theory of Dislocations, Second Edition, Krieger Publishing Company, Malabar, Florida 1992
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		10%
Engineering		60%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		30%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	7	10	70
Assignments	5	10	50
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14

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Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**180**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes	
1	This course enables students to understand the often complex interaction of deformation mechanisms that occur in materials of different sizes, and thus gain accurate/effective perspective about the propertiy and microstructure optimization of modern engineering materials.
2	
3	
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11	
12	

Weekly Content	
1	General
2	Elasticity
3	Anelasticity
4	Plasticity
5	Dislocations I
6	Dislocations II
7	Temperature-, Speed Effect Twinning
8	Recovery and Recrystallization
9	Creep, Relaxation
10	Localization Phenomena
11	Multi-axis Loading
12	Fracture Mechanics
13	Fatigue

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14	Ultra fine grained / nanocrystalline materials
15	

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7	P8
1	3	5	5	2	4	5	2	2
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=207	
Compiled by:	Res. Asst. Burak Evren
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