

<b>Óbuda University</b> BánkiDonátMechanical Safety Engineering Faculty		<b>Institute of Engineering and Technology</b> Department of Materials Technology		
<i>Name of the subject:</i> <b>Engineering Materials</b>		<i>NEPTUN-code:</i> BAXMNE2BNE, BAGMN1ENND, BAXMNY2BNE		
<i>Subject leader:</i> Dr Tünde Kovács associate professor <i>Practice:</i> PéterVarga assistant professor		Semester: 2022/2023. 2.		
<b>Course description:</b>				
Fundamentals of materials testing, mechanical, physical metallurgical and non-destructive testing methods. Atomic and higher structures of metals, polymers, ceramics and composites. Solidification and crystalline structure of metals. Interpretation of the equilibrium diagram and its information content. Iron-carbon alloys. The process of cold forming and recrystallisation and the consequences in practice. Structure, types and processing of polymers. Structure and properties of ceramics and composite materials.				
Lessons per Week:	Lectures: 3	Labs: 0	Practice: 2	Consultation by request
Evaluation:	practice mark			

<b>1. Lecture program</b>	
<b>Date</b>	<b>Subject</b>
March.01.	A general overview of engineering materials. Tensile test, Brinell, and Vickers hardness tests, Charpy impact test.
March 08.	Crystal structure of metals. Ideal crystals. Crystal structure of metals. Real crystals, imperfections in crystals.
<b>March 15.</b>	<b>Hungarian National Day</b>
March 22.	The crystallisation of metals and alloys. The structure of alloys.
March 29.	Deformation, strain hardening, recrystallization
April 05.	Phase diagrams.
April.12.	Iron-carbon phase diagram. Metastable system.
April 19.	Steels. International steel designation system.
April 26.	Iron-carbon phase diagram. Stable system. Cast irons. Types of cast irons.
May 03.	Non-equilibrium transformation of steels
May.10.	Nonferrous metals and alloys
May 17.	Structure, types and processing of polymers. Reinforced plastics. Synthesis of the semester study.
May 24.	<b>Test</b>
May 31.	<b>Repeated test</b>

<b>2. References</b>
<b>J. Verebély-Dévényi, P. Rácz:</b> Engineeringmaterials, Óbuda University, 2012.
<b>R. E. Smallman, R. J. Bishop:</b> Modern Physical Metallurgy and Materials Engineering, Butterworth-Heinemann
<b>P. Rácz:</b> Lecture presentation slides; <a href="http://www.elearning.uni-obuda.hu">www.elearning.uni-obuda.hu</a>
<b>Donald R. Askeland, Pradeep P. Fulay, Wendelin J. Wright :</b> The Science and Engineering of Materials, ISBN-13: 978-0-495-29602-7

### 3. Requirements

**a) Taking part in lessons:**

Taking part in practical lessons is obligatory, visiting lectures is recommended.

**b) Tests and other tasks**

Date	Tests
May 24.	Test
May 31.	Repeater tests

**c) Terms of signature and practice mark**

Students who accomplish semester requirements get signature and practice mark.

**d) Evaluation of the semester mark**

Midterm mark is the mean value of the test (or repeater test) results and the result of the exercises (see practical lessons), if none of those unsatisfactory (1). If any of these results remains unsatisfactory by the end of the semester the midterm mark is also unsatisfactory (1).

The result of the exercises (practical lessons) is the mean value of all three exercises, if none of those are unsatisfactory (1). Otherwise this result is unsatisfactory (1).

**e) Practice**

The participation on practical lessons is compulsory. Three missed lessons are allowed without penalties. The fourth missed lesson will result in a “forbade” result of the subject.

Assignments should be handed in on the topic of the practical lessons where indicated. Assignments should be handed in on the next lesson in written form.

The result based on assignments is the mean value of all three assignments, if none of those are unsatisfactory (1). Otherwise this result is unsatisfactory (1). Failed assignments should be corrected and handed in one week after the evaluation.

Failing in handing in any of the assignments will result in failing the Engineering Materials subject.

**f) Repeater tests**

A failed test can be rewritten on last week of the lesson period of the semester.

**g) Repeater test in examination period of the semester**

Failed midterm mark can be improved in the first two weeks (10 working days) of the examination period. The date of it is given by the reader before the end of the lesson period.

Budapest, 2022.02.01.

**Dr Tünde Kovács Lecture,**  
associate professor

## Instructions for practical lessons

### Schedule

Academic week	Date	Topic	Room
1	03.01.	Introduction of academic requirements	F16
2	03.08.	Hardness tests	P22A
3	03.15.	Public holiday	
4	03.22.	Tensile test (assignment)	F16
5	03.29.	Charpy Impact test (Tensile test assignment hand in)	P22A
6	04.05.	Recrystallization of metals	F16
7	04.12.	Microscopy	F16
8	04.19.	Phase transformations in metals (assignment)	F16
9	04.26.	No class	
10	05.03.	Phase diagrams (Phase transformation assignment hand in)	F16
11	05.10.	The iron-carbon phase diagram, steels (assignment)	F16
12	05.17.	The iron-carbon phase diagram, cast irons (Iron-carbon phase diagram assignment hand in)	F16
13	05.24.	Non-equilibrium transformation of steels	F16
14	05.31.	Consultation	F16

**Course 1: Wednesday, 8.00 – 9.30**

**Course 2: Wednesday, 15.20 – 16.50**

Budapest, 2022.02.01.

**Peter Varga**