Óbuda University BánkiDonátMechanical Safety Engineering Faculty	**Institute of Materials and Manufacturing Sciences** Department of Materials Technology
Name of the subject: **Engineering Materials**	*NEPTUN-code:* ***credits:*** *4* BAXMNE2BNF,
Subject leader: Dr. habil. Tünde Kovács PhD associate professor *Practice:* PéterVarga PhD assistant professor	Semester: 2024/2025. 1.

Course description:

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: 2	Labs: 0	Practice: 2	Consultation by request
Evaluation:	exam			

1. Lecture program

Date	Subject
1	A general overview of engineering materials. Tensile test,Brinell, and Vickers hardness tests,impact test.
2	Crystal structure of metals. Ideal crystals.
3	Crystal structure of metals. Real crystals, imperfections in crystals.
4	The crystallisation of metals and alloys. The structure of alloys.
5	Deformation, strain hardening, recrystallization
6	Phase diagrams.
7	Iron-carbon phase diagram. Metastable system.
8	Steels. International steel designation system.
9	Iron-carbon phase diagram. Stable system. Cast irons. Types of cast irons.
10	Non-equilibrium transformation of steels
11	Nonferrous metals and alloys
12	Structure, types and processing of polymers. Reinforced plastics. Synthesis of the semester study.
13	**Test**
14	**Repeated test**

2. References

J. Verebély-Dévényi, P. Rácz: Engineeringmaterials, Óbuda University, 2012.
R. E. Smallman, R. J. Bishop: Modern Physical Metallurgy and Materials Engineering,Butterworth-Heinemann
P. Rácz: Lecture presentation slides; www.elearning.uni-obuda.hu

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
13	Test
14	Repeater tests

c) Terms of signature and practice mark
Students who accomplish semester requirements get signature and practice mark.

d) Evaluation of practice mark
Follow the Moodle instructions also about the practice!

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). Othervise this result is unsatisfactory (1).

e) Repeater tests
A failed test can be rewritten on last week of the lesson period of the semester.

f) 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, 06.06.2024.

Dr Tünde Kovács

Lecture, associate professor

Instructions for practical lessons

Schedule

Academic week	Topic	Room
1	Introduction of academic requirements	F16
2	Hardness tests	P22A
3	Tensile test (assignment)	U9
4	Charpy Impact test (Tensile test assignment hand in)	P22A
5	Recrystallization of metals	F16
6	Microscopy	F16
7	Phase transformations in metals (assignment)	F16
8	Phase diagrams (Phase transformation assignment hand in)	F16
9	The iron-carbon phase diagram, steels (assignment)	F16
10	The iron-carbon phase diagram, cast irons (Iron-carbon phase diagram assignment hand in)	F16
11	Non-equilibrium transformation of steels	F16
12	Consultation	F16
13	Heat treatment of steels	P22A
14	Consultation	F16