

Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering		Institute of Mechanical Engineering and Technology Department of Materials Technology	
Lecture name and Neptun code: Modern material technologies BAXKAE1MNF Credits: 4			
Course type: Full-time			
Period: 2026/27 1st semester			
Master course: Mechanical Engineering			
Lecturer:	Dr. Péter Pinke associate professor		Practice: Dr. Péter Pinke
Number of sessions/week/term: Weekly	Lecture: 2		Practise:1
Exam/ course assignment: Midterm mark		Language: English	
Course objective			
Goal of the course: Systematization of modern material technologies, overview of modern material technologies in industrial practice.			
Thematics: Innovative material technologies in the field of pig iron and steel production. Non-ferrous metals and their modern material technologies. The technology of powder metallurgy, modern powder technologies. The modern metal casting processes used in the production of components. Processing procedures of plastics, processing procedures of ceramics. Composites, composite manufacturing technologies. Heat treatments of mechanical engineering practice. Annealing, strength- and hardness-increasing heat treatments, toughness-increasing heat treatments. Changing the properties of surface layers with modern technologies.			

	Subjects	
Weeks	Lectures	Practices
1	Modern materials, modern material technologies. Shaping technologies.	Handing out the individual tasks
2	Innovative material technologies in the field of pig iron production.	Consultation of the first task
3	Innovative technologies in the field of steel production. Steel production, trends, modern steels and their production technologies.	Consultation of the first task
4	Steel production, trends, modern steels and their production technologies	Consultation of the first task
5	Non-ferrous metals and their modern material technologies.	Administration (handing in) the first task
6	The technology of powder metallurgy, modern powder technologies.	First test
7	Modern metal casting technologies.	Consultation of the second task
8	Plastics processing procedures, modern plastics.	Consultation of the second task
9	Processing procedures for ceramics, modern ceramics.	Consultation of the second task
10	Composites, composite manufacturing technologies.	Administration (handing in) the second task
11	Heat treatments of mechanical engineering practice. Annealing, strength- and hardness-increasing heat treatments, toughness-increasing heat treatments.	Examples of modern steel production, examples of modern powder technology
12	Modern heat treatment technologies.	Second test

13	Changing the properties of surface layers with modern technologies.	Examples of modern plastics, ceramics and composite technologies
14	Summary	Task replacement and repeated test

Semester week	Test
6.	First test
12.	Second test
14.	Task replacement and repeated test

Course assessments:

Participation in the practices is required. Tests evaluation happens by scoring. The tasks must be prepared minimum with pass marks. If you can fulfil the requirements of the tests writing in the 6th and 12th weeks (both tests need to be minimum pass marks) and passed tasks you participate in lecture and practice classes your midterm mark calculable. The midterm mark is determined from the test results and task results. Midterm mark=(Test1+Test2+1stTask+2ndTask)/4.

Intervals of the grade:

under 50%: 1 (unsatisfying)
50-62,5 %: 2 (pass mark)
62,5-75 %: 3 (satisfactory mark)
75-87,5 % 4 (class)
87,5-100% 5 (excellence)

In the case of an unsatisfying midterm mark, you can take a midterm grade replacement exam.

The method of the supplement: You can take a midterm mark replacement exam only one time, in the first 10 days of the exam period with the payment of the examination fee. This is a writing exam with the whole curriculum of the subject.

Compulsory literature

- 1) Smallman, R. E., Ngan, A. H.W.: Physical Metallurgy and Advanced Materials, Butterworth-Heinemann, 2015
- 2) Groover, M. P: Fundamentals of Modern Manufacturing, John Willey & Sons Inc., 2010
- 3) Kalpakjian, S., Schmid, S. R.: Manufacturing Processes for Engineering Materials, 6th edition, Pearson, 2021

Suggested literature

- 1) Cant, R. (editor): Modern Materials and Manufacturing Techniques, 1th edition, CRC Press, 2024

Quality assurance methods of the subject:

The standard of theoretical and practical education is annually overviewed at an institution's conference based on the feedback of the teachers and students. They assess the success of the subject and make suggestions for necessary changes in order to maintain the interaction between theory and practical training.

Budapest, 2026.09.04.

Dr Péter Pinke
Subject Leader
Lecturer