BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS
FACULTY OF MECHANICAL ENGINEERING

SUBJECT DATASHEET

I. SUBJECT DESCRIPTION

1. GENERAL DATA

1.1. Subject name (in Hungarian, in English)

Metals engineering ● Materials Engineering

1.2. Neptun code

BMEGEMTBGF1

1.3. Type

study unit with contact hours

1.4. Course types and number of hours (weekly / semester)

course type	number of hours (weekly)	nature (connected / stand-alone)
lecture (theory)	2	-
exercise	-	-
laboratory exercise	1	coupled

1.5. Type of assessments (quality evaluation)

exam

1.6. ECTS

4

1.7. Subject coordinator

name:	Dr. Orbulov Imre Norbert (71505269331)
post:	associate professor
contact:	orbulov@eik.bme.hu

1.8. Host organization

Department of Material Science and Engineering (http://www.att.bme.hu/)

1.9. Course homepage

http://www.att.bme.hu/oktatas/bsc

1.10. Course language

hungarian, english, german

1.11. Primary curriculum type

mandatory

1.12. Direct prerequisites

Strong prerequisite:	BMEGEMTBGA1
Weak prerequisite:	-
Parallel prerequisite:	-
Milestone prerequisite:	-
Excluding condition:	BMEGEMTAGK2

(the subject cannot be taken if you have previously completed any of the following subjects or groups of subjects)

2. AIMS AND ACHIEVEMENTS

2.1. Aim

The main objective of the course is to establish the selection of metal, ceramic and composite raw materials and their prefabrication technologies for mechanical engineering structures. Getting to know the production and grouping of metals and ceramics, their marking, setting and modifying their properties. Casting, powder metallurgy, plastic forming, heat treatment and bonding technologies of metallic structural materials. The impact of technologies on the structure and properties of materials. Analysis of the use of structures and tools, selection of the most suitable materials and pre-products, as well as the technologies required for production, prescribing their basic technological data.

2.2. Learning outcomes

Competences that can be acquired by completing the course:

A. Knowledge

- The student understands the role of metals and ceramics in mechanical engineering practice.
- Knows the production technology of iron-based alloys (pig iron production, steel production).
- Understands the technology of producing non-ferrous metals.
- Understands the main groups and marking systems of metals used in mechanical engineering practice.
- The student knows the groups, properties and applications of iron-based structural materials (steels, cast irons).
- The student is aware of the groups, properties and applications of non-ferrous structural materials (non-ferrous and light metals, superalloys).
- Understands the concept of curable section diameter and the basic technology of heat treatment.
- The student is knowledgeable about the basic technologies of plastic formation.
- The student is familiar with the basic procedures of welding and related technologies.
- Knows the basics of foundry and powder metallurgy technology.

B. Ability

- With the knowledge of a given application and system of requirements, he is able to propose the material to be used and the production technology.
- Able to group and identify substances by indication.
- Able to propose heat treatment technology for a specific part.
- At the bottom of certain aspects, you select the appropriate production technology for the given part.
- Defines the main parameters of the selected manufacturing technology.
- Selects the appropriate manufacturing technology for the structures made with the material sealing joint, with special regard to welding and related technologies.
- The student expresses his thoughts in an orderly form, both orally and in writing.
- The student designs the manufacturing technology of a particular part from material selection to post-production.

- The student differentiates between possible manufacturing technologies based on feasibility and economic considerations.
- The student develops the knowledge and information repository of material selection, and is constantly informed about new materials.

C. Attitude

- The student takes the initiative in enriching knowledge with the instructor and fellow students.
- The student expands your professional knowledge and experience through continuous acquisition of knowledge.
- Open to the use of information technology tools.
- The student seeks to learn about and routinely use the tool system required to solve thermodynamic problems in material and technology selection.
- The student strives for an accurate and error-free solution.

D. Independence and responsibility

- The student independently thinks through material and technology selection tasks and problems and solves them based on specific resources.
- Accepts well-founded professional comments and critical criticisms.
- In some situations, as part of a team, you work with your fellow students to solve tasks.
- The student is committed to a systematic approach in his thinking.
- The student feels a responsibility towards sustainable development and environmental awareness.

2.3. Teaching methodology

Lectures, laboratory exercises, written and oral communication, use of IT tools and techniques, independent and group work. Lectures are given as part of contact classes (frontal but interactive education). Laboratory exercises are small groups and require the performance of tasks that require the direct and active participation of students. Laboratory exercises must also be reported in the form of a report.

2.4. Support materials

a) Textbooks

-

b) Lecture notes

István Artinger, Gábor Csikós, György Krállics, Árpád Németh, Béla Palotás: Technology of Metals and Ceramics, Műületemi Kiadó, Budapest, 1997. (na 2005)

c) Online materials

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2.5. Validity of the course description

Start of validity:	2019. September 1.
End of validity:	2024. September 1.

II. SUBJECT REQUIREMENT

3. ACHIEVEMENT CONTROL AND EVALUATION

3.1 General rules

The assessment of the formulated learning outcomes is based on the performance assessment performed during the examination period (oral examination) and the active participation in the laboratory exercises during the diligence period (partial performance assessment). Performance appraisal has a comprehensive approach. The basic requirement is the correct choice of the material and production technology of the part issued in the exam. The requirement is knowledge of the materials and technologies at the application level, knowledge of the potential advantages and possible disadvantages of each material and technology.

3.2 Assessment methods

A. Detailed description of mid-term assessments

Mid-term assessment

type: formative assessment, project-based, complex

count: 1

purpose, description: The basic goal of partial performance assessment is to examine the existence of learning outcomes belonging to the competence group of knowledge, ability, attitude, independence and responsibility. The way to do this is to do a half-year homework. The topic of the assignments is determined by the instructor, which the student receives in the first half of the semester. Homework is obligatory, a condition for obtaining a signature, a grade does not belong to it.

B. Detailed description of assessments performed during the examination period (if relevant)

Elements of the exam:

1. written partial exam
   -
2. oral partial exam
   obligation: mandatory (partial) exam unit, failing the unit results in fail (1) exam result
   description: Oral performance assessment, during which the candidate reports on the acquisition of the subject elements of the subject's knowledge, ability, attitude, and independence and responsibility type, especially in the field of material and technology choice. The oral exam has a comprehensive approach. The basic requirement is the correct choice of the material and production technology of the part issued in the exam. The requirement is knowledge of the materials and technologies at the application level, knowledge of the potential advantages and possible disadvantages of each material and technology.
3. practical partial exam
   -
4. inclusion of mid-term results
   -

3.3 The weight of mid-term assessments in signing or in final grading

identifier	weight

Mid-term assessment	100 %

The condition for signing is that the score obtained in the mid-year assessments is at least **40%**.

3.4 The weight of partial exams in grade (if relevant)

type	**weight**
written partial exam	0 %
oral partial exam	100 %
practical partial exam	0 %
inclusion of mid-term results	0 %

3.5 Determination of the grade

grade ● [ECTS]	**the grade expressed in percents**
very good(5) ● Excellent [A]	above 86%
very good(5) ● Very Good [B]	86% .. 86%
good(4) ● Good [C]	71% .. 86%
satisfactory(3) ● Satisfactory [D]	66% .. 71%
sufficient(2) ● Pass [E]	41% .. 66%
insufficient(1) ● Fail [F]	below 41%

The lower limit specified for each grade already belongs to that grade.

3.6 Attendance and participation requirements

Must be present at at least **70%** (rounded down) of lectures.

At least **100% of** laboratory practices (rounded down) must be actively attended.

3.7 Special rules for improving, retaken and replacement

The special rules for improving, retaken and replacement shall be interpreted and applied in conjunction with the general rules of the CoS (TVSZ).

Taking into account the previous result in case of improvement, retaken-improvement:

new result overrides previous result

Completion of unfinished laboratory exercises:

missed laboratory practices must be performed in the repeat period

Repetition of laboratory exercises that performed incorrectly (eg.: mistake in documentation):

incorrectly performed laboratory practice (e.g. Incomplete/incorrect report) can be corrected upon improved re-submission

3.8 Study work required to complete the course

Activity	**hours / semester**
participation in contact classes	42
preparation for laboratory practices	14
elaboration of a partial assessment task	30
exam preparation	28

additional time required to complete the subject	36
summary	**150**

3.9. Validity of subject requirements

Start of validity: 2019. September 1.

End of validity: 2024. September 1.

4. ADDITIONAL INFORMATION

4.1 Primary course

The primary (main) course of the subject in which it is advertised and to which the competencies are related:

Mechanical engineering

4.2 Link to the purpose and (special) compensations of the Regulation KKK

This course aims to improve the following competencies defined in the Regulation KKK>

a) knowledge

- Student has the knowledge and understanding of the basic facts and limits of the knowledge and activity systems in the field of engineering and of the expected directions of development and improvement.
- Student has the detailed knowledge and understanding of the methods of knowledge acquisition, data collection, ethical constraints and problem-solving techniques in the technical field.
- Student has the comprehensive knowledge of the main properties and applications of structural materials used in engineering.

b) ability

- Student has the ability to approach and solve specific problems within student's field of specialisation in a multi-disciplinary and interdisciplinary manner.
- Student has the ability to apply innovative methods of knowledge acquisition and data collection to solve specific technical problems in student's field of specialisation.
- Student has the ability to perform managerial tasks after adequate practice.

c) attitude

- Student is open and receptive to learning, embracing and authentically communicating professional, technological development and innovation in engineering.
- Student strives to acquire a broad and comprehensive literacy.
- Student strives to implement sustainability and energy efficiency requirements.

d) independence and responsibility

- Student has the ability to work independently on engineering tasks.
- Student takes responsibility for the sub-processes under student's management.
- Student encourages student's colleagues and subordinates to act in a responsible and ethical manner.

4.3 Prerequisites for completing the course

Knowledge type competencies

(a set of prior knowledge, the existence of which is not obligatory, but greatly facilitates the successful completion of the subject)	-

Ability type competencies

(a set of prior abilities and skills, the existence of which is not obligatory, but greatly contributes to the successful completion of the subject)	-