General Information:

Name of Course: # MATERIAL SCIENCE

Course Code: MSB021AN-EA-00
Semester: 1st
Number of Credits: 2
Allotment of Hours per Week: 2 Lectures /Week
Evaluation: Signature (with grade)
Prerequisites: High School Chemistry and Physics

Instructor: **Dr. Adél LEN**
Office: 7624, Pécs, Boszorkany u. 2. Office Nº B307
E-mail: len.adel@mik.pte.hu

Introduction, General Course Description:

The course provides basic knowledge about the materials structure on different - macroscopic, mesoscopic, atomic - levels, destructive and non-destructive methods of studying materials. The course topics starts from the smallest entities of the material, and builds up the macroscopic objects step by step, with emphasis on how the construction materials are composed. Several novel technologies and materials will also be discussed.

Learning Objectives:

Students will gain from this course:
- Knowledge about materials chemical and physical properties
- Methods of studying materials
- Knowledge about various novel materials used especially in construction

Methodology:

- **Lectures**: will introduce the students into the main properties, characteristics of the solid state material, and give an introduction to the structural analysis methods
- **Students task**: Students will be assigned tasks to complete. These tasks may expand on the experimental work and may have "research components" where students need to gather information required to complete a task and present its conclusions.
- **Exams:** Accumulated knowledge is tested by the completed practical tasks

Attendance:

Attendance is required in all classes, and will impact the grade (max. 10%). Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of classes will be ground for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Grading:

10 points - Attendance
90 points - Completed practical work

Grade	5	4	3	2	1
Points	85 - 100	74 - 84	63 - 73	51 - 62	0 – 50

- Exam
  - each student will have a task to complete during the semester
  - the task consists of an English language scientific article, a Case Study, that has to be read, studied, understood, and presented in the class
  - the task involves personal work and study, it has several objectives:
    - the student has to learn how to understand a problem, presented in a scientific way, understand the solution
    - the student has to get used to individual research using different type of resources, such as printed bibliography or internet
    - the student has to get used to formulate his own opinion about a scientific statement
    - the student needs to learn to present and explain a theme or subject, and to answer to questions related to it
  - Power Point Presentation of 10-12 minutes: 6-8 slides, that needs to be sent to the *len.adel@mik.pte.hu* previously

- Grading: 90 points as follows:
  - 50 points: content – how the student understood the topic
  - 20 points: additional information, explanation of terms, methods
  - 10 points: presentation: logic of the presentation, how well is explained
  - 10 points: working during the semester - activity in the class, consultation

Schedule:

Week	**Topic of lecture**
Week 1	Course description. Orientation. Students tasks
Week 2	Introduction. From quarks to atoms. Atomic structure. Quantum numbers
Week 3	Periodic table. Elements. Chemical bonding. Relation between chemical bonding and macroscopic characteristics of the materials
Week 4	Solid, liquid and gas phases. Amorphous and crystalline structure.
Week 5	Real crystals, crystallographic defects
Week 6	Solid construction materials, Novel materials in construction
Week 7	Materials study (Destructive and non-destructive methods) I
Week 8	Materials study (Destructive and non-destructive methods) II
Week 9	**Free week**
Week 10	Scanning electron microscopy
Week 11	**Scanning electron microscopy in practice**
Week 12	Practical work – students tasks 1
Week 13	Practical work – students tasks 2
Week 14	Practical work – students tasks 3
Week 15	Practical work – students tasks 4

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

William D. Callister Jr.: Material Science and Engineering, John Wiley and Sons, Inc., 2007, New York
J. W. Morris Jr.: A Survey of Materials Science, Department of Material Science and Engineering, Berkley, 2007