Assessment and subject description

Obuda University Kandó Kálmán Faculty of Electrical Engineering					Institute of Microelectronics and Technology			
Subject name and	d co	ode: Materials	, KEEVR5ABNE C	credits: 3				
Full-time								
Course: Electrica	Course: Electrical Engineering							
Responsible.		Andrea. PhD		staff.	Csikóné Dr Pan Andrea PhD			
Prerequisites:	Prerequisites: none							
Contact hours]	Lecture:	Class d	iscussion: ()	Lab hours: 1	Tutorial	: 2
per week:								
Assessment and	•	exam						
Evaluation. Subject description / Tutorial								
Learning objecti	ves	s. Introduction	to and	basic know	vle	doe of materials sci	ence Relatio	ons among
preparation meth	od	s, structure and	propert	ies of mater	ial	8.	ence. Relativ	ono uniong
Topics to be covered:								
			Topics				Week	Lessons
Introduction to materials science. Relations between composition, structure,						1.	2	
Structure of atom	15.	Bohr model and	d wave i	mechanics'	mo	dels. The periodic		
table. Characteristic parameters. Atomic bonding. Relation between bonding 2. 2						2		
Crystal structure. Types of crystals, lattice parameters. Packing factors, 3. 2						2		
densities. Keal crystals. Types of defects, lattice vibrations.								
microscopy. Atomic force and scanning tunneling microscopy. X-ray and 4. 2								
electron diffraction.								
Transport in materials. Equilibrium vs. non-equilibrium. Electrical and heat								
transport. Material transport: steady-state and non-steady-state diffusion. 5. 2							2	
Uxidation.						6	2	
Allows Dhase transitions and phase diagrams						0.	2	
Machanical properties of metericle. Deformation, stress and stress						1.	<u> </u>	
Ductility, toughness, hardness. Mechanical failures.						8.	2	
Electrical properties of materials. Band theory. Metals, semiconductors, insulators.							9.	2
Magnetic properties of materials. Types of magnetism. Ferro- and						10.	2	
terrimagnetism. Magnetic storage of information.								
reflection transmission refraction polarization and their relation to algorran 11						2		
structure. Light emission.								
New results in Material Sciences						12.	2	
Test 2						13.	2	
Course closure /	reta	ake tests					14.	2
Subject description / I shoretory								
Aims: Giving st	nd	ents practical	materia	ls science	tes	ting knowledge, an	plicable in	the
industrial practice. The material covered roughly corresponds to that contained in the course								
of the Hungarian language B.Sc. programme. Tasks: • Learning theoretical background of								
measurements • Measure the properties of given materials • Recording and evaluating the								
measurement data in the laboratory practice report.								
Topics to be covered: Spectrophotometry; measuring concentration; Polarization optics;								
Insulating materials: measuring dielectric parameters; Mechanical properties: tensile								
strength and hardness; Microscopy basics.								

Topics	Week	Lessons
Information about the laboratory works, safety regulations		2
Spectrophotometry; measuring concentration		2
Polarization optics		2
Insulating materials: measuring dielectric parameters		2
Mechanical properties: tensile strength and hardness		2
Microscopy basics, Reports, test		2
Missing lab hours, repeated test		2

Assessment and evaluation / Tutorial

This course continues as e-learning / remote learning via Moodle and MS Teams platforms. The learning material will be uploaded in the Moodle. Questions regarding the learning topics should be posted in the Forum of the course and answers will also be posted on the Forum visible for all students. On-line chat or other form of consultation will also be possible in the time slot predefined to this course.

During the semester students need to fill in 10 on-line quizzes. Students should complete quizzes on time with greater than 50% grade. There will be 3 attempts to complete a practice quiz.

Students will fill in two on-line tests during the course. Duration of tests is 30 minutes and one attempt is allowed with deferred feedback.

Assessment and evaluation / Laboratory

The attendance of laboratory practice is mandatory. Students work in measuring groups of 3 people. At the beginning of each measurement, teacher asks questions controlling the preparation for the tasks. In case of online education students get tasks to solve to be submitted in Moodle by the predefined deadline.

Every student makes his/her own laboratory practice report, and delivers and uploads the report to the associated Moodle task by deadline.

Students get marks both for the lab task and report (Total scores: 5+5 = 10 for each laboratory practice) The maximum lab score for the entire semester: 50, which will contribute to the final mark).

Requirements of the signature:

10 practice quizzes submitted on time with > 50% grade.

2 on-line tests completed within the predefined timeslot with > 50% grade.

5 laboratory reports and tasks accepted (mark ≥ 2) in Moodle .

Retaking the quizzes, tests or laboratory tasks/report is possible only in week 14 (free of charge) or at the beginning of exam period (Aláíráspótló vizsga. Retaking of only 3 or less quizzes is allowed.

<u>Type of exam</u>: Oral and written by simultaneously using MS Teams and Moodle. At the start of the exam, each student should answer 3 questions. The exam continues in case of 2 or 3 correct answer, otherwise the mark of the exam is 1. Written part of the exam will be a Moodle test, covering the all topics of the course. Total score of the written test: 50.

<u>Evaluation of the mark</u>: Total score will be the sum of the score of laboratory and score of the written exam (100 in total). Mark is calculated from the total score according to the table below:

Mark	Total score
5	85-100 %
4	74-84 %
3	63-73 %
2	50-62 %
1	0-49 %

Suggested material

Fundamentals of Materials Science and Engineering

William D. Callister, Jr.; David G. Rethwisch; 910 pages; John Wiley & Sons; 4 Edition (2013);

ISBN: 978-1-118-32269-7

Semiconductor Devices: Physics and Technology

Simon M. Sze, Ming-Kwei Lee; 592 pages; John Wiley & Sons; 3 Edition (2012); ISBN-10: 0470537949; ISBN-13: 978-0470537947