Assessment and subject description

Óbuda University Kandó Kálmán Faculty of Electrical Engineering			Institute of Microelectronics and Technology	
Subject name and code**:** *Manufacturing Engineering I. KEXGTBABNE* **Credits: 3** **Full-time, Spring Semester**				
Course: Mechatronical Engineering BSc				
Responsible:	**Dr Bugyjás József**	Teaching staff:	**Gröller György**	
Prerequisites:				
Contact hours per week:	Lecture: 2	Class discussion: 0	Lab hours: 1	Tutorial: 0
Assessment and evaluation:	é			

Subject description

Aims: The first part of this subject is about the technologies of the electronics industry. Microelectronics is one of the most important field of hitech. To understand the advanced products is necessary to know their technological background.

Topics to be covered:

Topics	Week	Lessons
Introduction to the technology and electronic industry. Short history. Hierarchy of the products; discrete parts, integrated circuits, modules and devices.	1	2
Electronic interconnection technology. PCB basics: photolithography, screen printing, etching, electroless and galvanic plating.	2	2
Single and double side PCB; main steps of production. Multilayer PCB-s,	3	2
High Density Interconnections (HDI); new requirements, new processes. Control methods. Design for Manufacturing (DfM).	4	2
Manufacturing of the electronic modules; Surface Mounted Technology (SMT) Soldering basics. Solder paste printing, device shooting, reflow soldering.	5	2
SMT II: wave soldering, inspection methods, rework. ESD protection.	6	2
Test 1	7	2
Hybrid Integrated Circuits (HIC) *Thin Film HIC:* vacuum deposition methods.	8	2
Thick Film HIC: screen printing methods Thin and thick passive circuits, trimming of resistors *Multichip Modules:* types, manufacturing methods	9	2
holiday	10	2
Introduction to the semiconductor technology: Materials (silicon and compounds semiconductors) Main processes of IC technology: lithography, doping, oxidizing, etching, epitaxy and vacuum deposition methods Student presentations	11	2
Micro Electro-Mechanical Systems (MEMS) Student presentations	12	2
Organic and printed electronics: materials and technology Student presentations	13	2
Test 2	14	2

Laboratory practises		
Introduction, safety rules, CNC drilling	6	3
PCB manufacturing processes: electroless and galvanic plating	7	3
Photolithography	8	3
Screen printing	9	3
Component placing, reflow and hand soldering	10	3

Assessment and evaluation

Requirements: Participation in the lectures and lab practices is compulsory.
Tests about theory are 25 points each
Presentation worth 20 points
Laboratory work, lab report and the test worth 30 points.

Evaluation of the mid-term mark:

0 – 49 points	1
50 – 59 points	2
60 – 69 points	3
70 – 79 points	4
80 – 100 points	5

Suggested material

Gröller György: Electronic technology (presentations and handouts) Moodle
and: http://uni-obuda.hu/users/grollerg/Manufacturing_engineering/
Recommended: Happy Holden: The HDI Handbook http://www.hdihandbook.com/download.php

Comment: