Assessment and subject description

Óbuda University Kandó Kálmán Faculty of Electrical Engineering		Microelectronics and Technology Institute		
Subject name and code**: Digital technics II. laboratory, KMEDG31ANC Credits: 2** **Full-time, Fall Semester**				
Course: **Electrical engineering**				
Responsible	**Dr. Rita Lovassy**	Teaching staff:	**Dr. Rita Lovassy**	
Prerequisites:	**Digital technics II., KMEDG21ANC**			
Contact hours per week::	Lecture: 0	Class discussion.: 0	Lab hours: **2**	Tutorial:
Assessment	**assignment**			

Subject description

Aim:

This course will give an overview of the basic concepts and applications of digital technics, from Boolean algebra to FPGAs. The aim is to acquaint the future electrical engineers with the fundamentals of digital technics, with the digital circuits, and with their characteristics and applications.

Topics:

Fundamentals of digital technics. Logic (Boolean) algebra, logic operations and functions. Combinational logic, analysis and synthesis and implementation of logic circuits. Binary arithmetics, algorithms and circuits. Code systems, code conversion. Multiplexers, demultiplexers, comparators, arithmetic elements, half-adder, full adder. Flip-flops, registers, counters. FGPA basics, architecture, examples.

Topics:	**Week:**	**Lessons:**
Combinational logic design. Review of Boole algebra and of logic functions. XOR logic. Karnaugh map and applications. The concept and relevance of hazards in logic circuits. FPGA basics.	**3.**	**4**
Digital logic functional building blocks I. Encoders and decoders. Simple code changing combinational circuits. Binary/BCD and BCD/binary decoders. Gray code, binary/Gray conversion, decoders. Encoding: error detection and correction, parity bit. FPGA design	**5.**	**4**
Digital logic functional building blocks II. Multiplexers, demultiplexers, comparators, arithmetic elements, half-adder, full adder. FPGA design	**7.**	**4**
Sequential circuits. Flip-flops. Registers. Shift registers. FPGA design	**9.**	**4**
Analysis and synthesis of sequential circuits. Counters. Binary counters, decimal counters, Mod-N counters, Gray-code counters. FPGA design	**11.**	**4**
3-bit model arithmetic logic unit (ALU) with FPGA.	**13.**	**4**

Assessment and evaluation

The attendance of the laboratory is obligatory. The coursework comprises several home assignments.

Supplement: According to the Rules and Regulations of the Obuda University

Evaluation

The threshold for pass mark (including the results of home assignments) is 55 %.

References

Rita Lovassy: Digital Technics, 2013, http://www.e-bookspdf.org/download/digital-technics.html
Arató Péter: Logikai rendszerek tervezése, Tankönyvkiadó, Budapest, 1990, Műegyetemi Kiadó 2004
Zsom Gyula: Digitális technika I, Műszaki Könyvkiadó, Budapest, 2000, (KVK 49-273/I
Rőmer Mária: Digitális rendszerek áramkörei, Műszaki Könyvkiadó, Budapest, 1989, (KVK 49-223).
Rőmer Mária: Digitális technika példatár, KKMF 1105, Budapest 1999.

Bálint Pődör: Digital technics (course materials for final year elective English language course), mti.kvk.uni-obuda.hu
Pődör Bálint: Digital technics I (course materials for 1st year course), mti.kvk.uni-obuda.hu