

RTU Course "Digital Devices and Systems"

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General data

Code	RAE362
Course title	Digital Devices and Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Academic
Field of study	Electronics and Telecommunications
Responsible instructor	Andis Supe
Academic staff	Mihails Usanovs Sergejs Vdovins Armands Pundurs
Volume of the course: parts and credits points	1 part, 3.0 Credit Points, 4.5 ECTS credits
Language of instruction	LV, DE
Annotation	Pulse signals and their impact on linear electrical circuits. Pulse signals transformer. Digital switches. Logic families, their parameters and electrical structures. Limiters. Pulse generators. Analogue and digital comparators. Digital to Analogue and Analogue to Digital Converters. Timers. Computer memories. Computer internal and external interfaces.
Goals and objectives of the course in terms of competences and skills	Skills to use the right logic families for a specific digital structure design. Skills to use algorithms for various discrete and digital applications practically.
Structure and tasks of independent studies	Independent work has been intended for: • studying lecture notes • preparing oneself for laboratory work and its defense
Recommended literature	1. RABAEY, J. M., CHANDRAKASAN, A., AND NIKOLIC, B. Digital Integrated Circuits: A Design Perspective. 2nd ed. Upper Saddle River, NJ: Pearson Education, Inc., 2003. 363 p. 2. M. Predko. Digital Electronics Guidebook. New-York: Mc Graw-Hill, 2002. 530 p. 3. D. C. Green. Digital Electronics. Edinburg: Longman, 1999. 398 p. 4. Опадчий Н., Глудкин О., Гуров А. Аналоговая и цифровая электроника. Москва: Горячая Линия–Телеком, 1999. 768 с. 5. Угрюмов Е. Цифровая схемотехника. Санкт-Петербург: Сбхв, 2000. 518 с. 6. Laboratorijas darbu praktikums impulsu iekārtās. Rīgā: RPI, 1980. 107 lpp. 7. Laboratorijas darbu praktikums diskrētās un ciparu iekārtās. Rīgā: RTU, 1993. 44 lpp. 8. J. Greivulis, I. Raņķis. Iekārtu vadības elektroniskie elementi un mezgli. Rīga: Avots, 1997. 288 lpp. 9. ADC and DAC Glossary. Available: http://www.maxim-ic.com/app-notes/index.mvp/id/641
Course prerequisites	Logic algebra and its functions (Boolean algebra)

Course outline

Theme	Hours
Pulse signals and their impact on linear electrical circuits.	4
Transistor digital switches.	4
Logic families: DL, RTL, DTL, TTL, I2L, ECL, MOS, CMOS, their parameters and electrical structures.	4
Limiters.	4
Pulse generators.	4
Analogue comparators.	4
Digital to Analogue and Analogue to Digital Converters, ADC and DAC.	6
Timers.	4
Optoelectronics.	2
Computer memories: SRAM, DRAM, ROM, PROM, EPROM, EEPROM, Flash EPROM.	6
Computer internal and external interfaces.	6

Learning outcomes and assessment

Learning outcomes	Assessment methods
Students are able to explain the shape and parameters of digital signals.	Tests.
Students are able to analyse impulse signals in linear circuits.	Labs.
Students are able to analyse digital switches and signal limiters, the operating principles and applications.	Labs.
Students are able to describe DL, RTL, DTL, TTL, I2L, ECL, MOS, CMOS logic families and general parameters of the base elements of the structure.	Tests.
Students are able to describe the design and operating principles of a rectangular-shaped and triangular pulse generator.	Labs.

Students are able to describe the design and operation of the analogue signal comparators and timers.	Labs.
Students are able to describe the digital to analogue and analogue to digital converters, their types and parameters.	Tests.
Students are able to describe the structure of SRAM, DRAM, ROM, PROM, EPROM, EEPROM, Flash EPROM.	Tests.

Study subject structure

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	2.0	0.0	1.0		*	