SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Computer science/ Engineer
1.7 Form of education	Full time
1.8 Subject code	17.

2. Data about the subject

2.1 Subject name				***Analog and digital circuits***	
2.2 Course responsible/lecturer				Prof. dr. eng. Dădârlat Vasile Teodor – Vasile.Dadarlat@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Conf. dr. eng. Peculea Adrian – Adrian.Peculea@cs.utcluj.ro Sl. dr. eng. Iancu Bogdan – Bogdan.Iancu@cs.utcluj.ro	
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DD
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										10
(b) Supplementary study in the library, online and in the field										12
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
(d) Tutoring										2
(e) Exams and tests										6
(f) Other activities:										0

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	44
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.2 Competence	Basic knowledge in Physics, Electronics, Mathematics

5. Requirements (where appropriate)

5.1. For the course	Multimedia means. Online: collaborative platforms (Teams, Moodle, etc)
5.2. For the applications	Classroom, PC with internet access, specific software, test boards, multimeters, voltage sources, signal generators, oscilloscopes. Online: PC with internet access, specific software, collaborative platforms (Teams, Moodle, etc)

6. Specific competence

6.1 Professional competences	**C2:** Designing hardware, software and communication components **C2.1:** Describing the structure and functioning of computational, communication and software components and systems **C2.2:** Explaining the role, interaction and functioning of hardware, software and communication components **C2.3:** Building the hardware and software components of some computing

	systems using algorithms, design methods, protocols, languages, data structures, and technologies **C2.4:** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics **C2.5:** Implementing hardware, software and communication systems
6.2 Cross competences	N/A

7. Discipline objective (as results from the *key competences gained*)

7.1 General objective	Teamwork, understanding of basic digital electronics principles The main objective is to provide specific information and to prepare students for projects using discrete electronic devices and analog and digital integrated circuits. Thus, ADC will offer students the capacity to analyse, design and implement electronic systems
7.2 Specific objectives	Each student able to understand the functionality for the main circuits from a motherboard Theoretical knowledge on discrete electronic devices Skills in designing and implementing devices using discrete electronic devices Theoretical knowledge on analog integrated circuits Skills in designing and implementing devices using analog integrated circuits Theoretical knowledge on digital integrated circuits Skills in designing and implementing devices using digital integrated circuits

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Electrical signals, passive devices, linear circuits behavior at elementary signals application.	2	Oral Presentations using multimedia means Q & A Interactive teaching Online: collaborative platforms (Teams, Moodle, Skype, etc)	
Semiconductor devices (I). Semiconductor, Schottky, Zener and light emitting diode.	2		
Semiconductor devices (II). Bipolar and field effect transistor.	2		
Operational amplifiers. Characteristics, circuits with operational amplifiers with negative feedback.	2		
DC power supplies. Rectifiers, filters. Parametric, feedback and integrated voltage regulators. Oscillators. Positive feedback, oscillator circuits.	2		
Integrated logic circuit parameters. Static transfer characteristics, noise margins, fan-in and fan-out, propagation time, power dissipation.	2		
Integrated logic circuit families (I). TTL integrated logic circuits.	2		
Integrated logic circuit families (II). NMOS, CMOS and HCT integrated logic circuits.	2		
Bus building with logic circuits. Open collector and three state integrated logic circuits, connecting circuits to buses, transfer between registers and three state logic.	2		
Positive feedback circuits (I). Schmitt trigger and flip-flop circuits.	2		
Positive feedback circuits (II). Monostable and astable circuits.	2		
Semiconductor memories. Volatile and non-volatile semiconductor memories.	2		
Converters. Sampling, signal quantization, analog to digital and digital to analog converters.	2		
Microcontrollers. Architecture, memory addressing, interrupt and timer system, serial communication.	2		
Bibliography 1. Vasile Teodor Dadarlat, Adrian Peculea, „Circuite analogice si numerice”, Ed. U.T.PRES, Cluj-Napoca, 2006, ISBN (10) 973-662-243-6 ISBN (13) 978-973-662-243-4.			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes

Electrical signals and liner circuits.	2	Practical exercises Brief presentation of possible solutions Self testing programmes. Online: collaborative platforms (Teams, Moodle, etc)	
Semiconductor, Schottky, Zener and light emitting diode.	2		
Bipolar and field effect transistor.	2		
Circuits with passive and semiconductor devices.	2		
Circuits with operational amplifiers with negative feedback.	2		
Rectifiers, filters and regulators.	2		
Oscillator circuits.	2		
Bipolar integrated logic circuits.	2		
MOS integrated logic circuits.	2		
Open collector integrated logic circuits.	2		
Three state integrated logic circuits.	2		
Schmitt trigger circuits.	2		
Multivibrator circuits.	2		
Laboratory test	2		

Bibliography

1. Slides for Analog an digital circuits courses + sets of problems and applications for individual study at ftp://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc

Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Course content is kept state of the art by using latest technologies and devices available on the market

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Interactivity and initial preparation, intermediary and final written examinations	Written exam (2,5 h).	60%
Seminar			
Laboratory	Quality of practical work, participation	Continuous assessment, final written colloquium	40%
Project			

Minimum standard of performance:
Grade calculus: 40% laboratory + 60% final exam
Conditions for participating in the final exam: Laboratory ≥ 5
Conditions for promotion: grade ≥ 5

Date of filling in:	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Prof. dr. eng. Vasile Dădârlat	
	Applications	Conf. dr. eng. Adrian Peculea	
		Sl. dr. eng. Bogdan Iancu	

Date of approval in the department	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the Faculty Council	Dean Prof.dr.ing. Liviu Miclea