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	101

2. Data about the subject

2.1 Subject name	***Fundamentals of Electronic Circuits***				
2.2 Course responsible / lecturer	Prof. Oltean Gabriel PhD - Gabriel.Oltean@bel.utcluj.ro				
2.3 Teachers in charge of seminars / laboratory / project	Prof. Oltean Gabriel PhD - Gabriel.Oltean@bel.utcluj.ro				
2.4 Year of study	I	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	C
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DD
	DI – Impusă, DOp – opțională, DFac – facultativă				DFac

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars	-	Laboratory	1	Project	1
3.2 Number of hours per semester	56	of which:	Course	28	Seminars	-	Laboratory	14	Project	14
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										28
(b) Supplementary study in the library, online and in the field										12
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										28
(d) Tutoring										3
(e) Exams and tests										3
(f) Other activities:										-

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	69
3.5 Total hours per semester (3.2+3.4)	125
3.6 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.2 Competence	Basic knowledge about electrical signals, electric circuits, passive electronic components

5. Requirements (where appropriate)

5.1. For the course	N/A
5.2. For the applications	N/A

6. Specific competence

6.1 Professional competences	**C1 -** Operating with basic concepts of mathematics, physics, measurement science, mechanical engineering, chemical engineering, electrical engineering in systems engineering

	C1.1 - Using the concepts, theories and methods of the fundamental sciences of systems engineering in professional communication **C1.2 -** Explaining the problems to be solved and the argumentation of the solutions in system engineering using the techniques, concepts, and methods of mathematics, physics, technical graphics, electrical engineering and electronics. **C1.3 -** Solving common problems of systems engineering by identifying the appropriate techniques, principles, methods and application of mathematics, with emphasis on numerical methods. **C1.4 -** Assessing the potential, advantages and disadvantages of the methods and procedures of the systems engineering field, the scientific documentation level and the consistency of project applications using mathematical techniques and other scientific methods. **C1.5 -** Development of projects in the field of systems engineering by selecting and applying mathematical and other scientific methods specific to the field.
6.2 Cross competences	N/A

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

7.1 General objective	Developing the competences regarding the use of electronic devices, analysis and (re)design of fundamental electronic circuits.
7.2 Specific objectives	1. Recognizing and understanding basic concepts specific to electronic devices and fundamental electronic circuits. 2. Developing skills and abilities necessary for the use of electronic devices in simple electronic circuits 3. Developing skills and abilities necessary for the use of electronic circuits 4. Developing skills and abilities for the analysis and (re)design of basic electronic circuits.

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Fundamentals: electrical signals, relations and theorems for electric circuits.	2	Presentation, euristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of ppt presentation, projector, blackboard
Diodes. Models for diode. DR circuits. DC circuits. Single-phase rectifiers with capacitive filter. Zener Diode. LED	2		
Operational amplifier (op amp). Op-amp terminals. Op-amp operation. Ideal op amp. Modes of use.	2		
Simple op-amp comparators. Inverting and noninverting comparators. Voltage transfer characteristic. Waveforms	2		
Positive feedback op-amp comparators. Inverting and noninverting comparators. Voltage transfer characteristic. Waveforms	2		
Negative feedback op-amp amplifiers. Inverting, noninverting amplifiers: voltage transfer characteristic, waveforms, gain, input and output resistances.	2		
Op-amp applications: summing amplifiers, differential amplifiers, voltage domain conversion circuits, integrator and differentiator; precision rectifier.	2		
Transistor digital circuits. MOSFET Digital Circuits. Bipolar digital circuits. Noise margins.	2		
DC voltage regulators. Parametric regulators. Linear voltage regulators with op amp. Increasing the output current. Over - current and short - circuit protection.	2		
Integrated voltage regulators. The 723 voltage regulator. Three – terminal fixed regulator. Switching voltage regulators.	2		

Sinusoidal oscillators. Oscillation criterion. RC oscillators. Op – amp and Wien bridge oscillators. Automatic control of the amplitude. Op amp and RC ladder network oscillator.	2		
Nonsinusoidal oscillators. Astable multivibrators. Astable multivibrator with one op – amp. Astable multivibrator with an integrator and a comparator. Quartz – crystal clock generator. LM555 timer.	2		
Power amplifiers. Amplifier classes. Class B amplifiers. Operating principle, VTC, crossover distortions, waveforms, powers, efficiency.	2		
Class AB amplifiers. Biasing using diodes. Biasing using V_{BE} multiplier. Overcurrent protection. Use of compound transistors with higher current gain.	2		
Bibliography 1. Oltean, G.,Electronic Devices, Editura U.T. Pres, Cluj-Napoca, ISBN 973-662-220-7, 2006; 317 pag. 2. Oltean, G., Circuite electronice, UT Pres, Cluj-Napoca, 2007, ISBN 978-973-662-300-4, 203 pag. 3. Sedra, A. S., Smith, K. C., Microelectronic Circuits, Fifth Edition, Oxford University Press, ISBN: 0-19-514252-7, 2004. **On-line resources:** Oltean, G. Fundamentals of Electronic Circuits (course slides, exam subjects) http://www.bel.utcluj.ro/dce/didactic/fec_aai/fec_aai.htm			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Seminars		Didactic and experimental proof, didactic exercise, team work	Use of laboratory instruments, experimental boards, computers, magnetic board, blackboard
Fundamentals	1		
Diodes	1		
Op-amp comparators	1		
Op-amp amplifiers. Logic Circuits with Transistors	1		
Voltage Regulators. Integrated Voltage Regulators	1		
Sinusoidal Oscillators. Nonsinusoidal oscillators	1		
Power Amplifiers. Review	1		
Laboratory			
Lab instrumentation	1		
Applications of DR circuits	1		
Op-Amp voltage comparator	1		
Op-Amp basic amplifier	1		
LM 7805 voltage regulator	1		
Class B amplifier	1		
Laboratory test	1		
Bibliography 1. Oltean, G., Sipos, Emilia, Miron, C., Ivanciu, Laura, Laboratory Manual for Electronic Devices, Editura UTPRESS, Cluj Napoca, 2010, ISBN 978-973-662-542-8, 90 pag. 2. Şipoş, Emilia, Oltean, G., Miron, C., Ivanciu, Laura, Gordan, Mihaela, Fundamental Electronic Circuits. Laboratory Manual, UT Pres, Cluj-Napoca, 2009, ISBN 978-973-662-503-9; 91 pag ***On – line references*** 1. Oltean, G., Fundamentals of Electronic Circuits, PowerPoint slides, http://www.bel.utcluj.ro/dce/didactic/fec_aai/fec_aai.htm 2. Oltean, G, et al., Fundamentals of Electronic Circuits. Seminars and laboratories, http://www.bel.utcluj.ro/dce/didactic/fec_aai/fec_aai.htm			

**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

The discipline content and the acquired skills are in agreement with the expectations of the professional organizations and the employers in the field, where the students carry out the internship stages and/or occupy a job, and the expectations of the Romanian Agency for Quality Assurance (ARACIS).

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	The level of theoretical knowledge and practical skills acquired for the analysis and (re)design of electronic circuits	- 3 formative evaluation tests (problem solving) - Summative evaluation written exam (theory and problems)	- T, max 10 pts. 10% - E, max 10 pts. 60%
Seminar	The level of the abilities acquired for problem solving and experimental analysis of electronic circuits	- Continuous formative evaluation	- S, max. 10 pts. 10%
Laboratory			- L, max. 10 pts. 20%
Project			
Minimum standard of performance: L ≥ 5, E ≥ 4 0.6E+0.1T+0.2L+0.1S ≥ 4.5			

Date of filling in: 26.07.2025	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Prof. Gabriel OLTEAN, PhD	
	Applications	Prof. Gabriel OLTEAN, PhD	

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. Vlad Muresan