SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Bases of Electronics
1.4	Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Applied Electronics/ Engineer
1.7	Form of education	Full time
1.8	Subject code	20.00

2. Data about the subject

2.1	Subject name	Fundamental Electronic Circuits						
2.2	Subject area	Theoretical area Methodical area Analytic area						
2.3	Course responsible	Prof. Gabriel OLTEAN, PhD Eng., gabriel.oltean@bel.utcluj.ro						
2.4	Teachers in charge of applications	Prof. Gabriel OLTEAN, PhD Eng., gabriel.oltean@bel.utcluj.ro Assist. prof. Emilia ŞIPOŞ, PhD Eng., emilia.sipos@bel.utcluj.ro Assist. prof. Laura IVANCIU, PhD Eng., laura.ivanciu@bel.utcluj.ro						
2.5 Year of study	II	2.6 Semester	1	2.7 Assessment	E	2.8 Subject category	DD/DI	

3. Estimated total time

3.1 Number of hours per week	5	3.2 of which, course:	2	3.3 seminar/lab	1/2
3.4 Total hours in the curriculum	70	3.5 of which, course:	28	3.6 seminar/lab	42
Individual study					hours
Manual, lecture material and notes, bibliography					21
Supplementary study in the library, online and in the field					-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays					28
Tutoring					3
Exams and tests					3
Other activities					-

3.7	Total hours of individual study	55
3.8	Total hours per semester	125
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	Relations and theorems for electric circuits, frequency response representation; operating principles for electronic devices: diode,

		operational amplifier, MOSFET and BJT transistors; use of electronic devices in electronic circuits; analysis methods for electronic circuits; voltage transfer characteristics; transfer function

5. Requirements (where appropriate)

5.1	For the course	Amphitheatre, Cluj-Napoca
5.2	For the applications	Cluj-Napoca

6. Specific competences

Professional competences	According to the RNCIS grid: C1. Use of the fundamental elements related to the devices, circuits, systems, instrumentation and electronic technology C2. Application of basic methods for signals acquisition and processing C4. Design and use of low complexity hardware and software applications specific to the applied electronics C5. Application of the basic knowledge, concepts and methods from: power electronics, automatic systems, electricity management, electromagnetic compatibility Other competences: - knowledge of transistor biasing circuits for transistor amplifiers; - knowledge of logic circuits with transistors; - knowledge of small signal models for transistors and amplifiers with transistors (MOS, BJT); - identification of feedback circuits structure, type of feedback, the fundamental equation of the negative feedback; - knowledge of configuration, operating principle and analysis and (re)design methods for fundamental electronic circuits: amplifiers with one transistor, current sources and mirrors, linear voltage regulators, sinusoidal and non-sinusoidal oscillators, power amplifiers, other circuits with operational amplifiers; - using of lab instrumentation for the experimental study of electronic circuits; - using of experimental boards; - connecting the lab instrumentation with the experimental boards, in order to experimentally study electronic circuits; - using the computer to the numerical data obtained through the explorations; - storing and analysis the numerical data obtained through the explorations.
Cross competences	CT1: Methodical analysis of the problems encountered in the activity, identifying the elements for which there are established solutions, thus ensuring the fulfilment of professional tasks

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

7.1	General objective	Developing the competences regarding the use of electronic devices, regarding the use, analysis and (re)design of fundamental electronic circuits.
7.2	Specific objectives	1. Recognizing and understanding basic concepts specific to fundamental electronic circuits.

		2. Developing skills and abilities necessary for the use of electronic circuits 3. Developing skills and abilities for the analysis and (re)design of electronic circuits.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1.	Introduction. Course Presentation. Transistor Circuits	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard
2.	Transistor Digital Circuits. Transistor Amplifier. DC biasing in active region		
3.	MOSFET Biasing and BJT Biasing in active region		
4.	MOSFET Small-Signal Model. MOSFET Basic Amplifiers		
5.	BJT Small-Signal Model. BJT Basic Amplifiers		
6.	Frequency Response: CS and CE. Current Sources and Current Mirrors with MOSFET and BJT		
7.	Power Amplifiers. Class A, Class B and Class AB Power Amplifiers		
8.	Feedback Circuits. Feedback Configurations. Negative feedback effects over an amplifier parameters		
9.	DC voltage regulators. Linear voltage regulators with op amp. Over - current and short - circuit protection.		
10.	Integrated voltage regulators. The 723 voltage regulator. Switching voltage regulators.		
11.	Sinusoidal oscillators. Op – amp and Wien bridge oscillators. Automatic control of the amplitude.		
12.	Nonsinusoidal oscillators. Astable multivibrators. LM555 timer.		
13.	Class D power amplifier. Operating principle. PWM generator. Power stage. Low – pass filter.		
14.	Recapitulation. Exam preparation		

Biblography
1. Oltean, G.,Electronic Devices, Editura U.T. Pres, Cluj-Napoca, ISBN 973-662-220-7, 2006; 317 pp.
2. Oltean, G., Circuite electronice, UT Pres, Cluj-Napoca, 2007, ISBN 978-973-662-300-4, 203 pp.
3. Sedra, A. S., Smith, K. C., Microelectronic Circuits, Fifth Edition, Oxford University Press, ISBN: 0-19-514252-7, 2004.

On – line references
1. Oltean, G, Fundamentals of Electronic Circuits, on-line: http://www.bel.utcluj.ro/dce/didactic/fec
Sipos, Emilia, Ivanciu, Laura, Dispozitive Electronice. Probleme rezolvate, 2016

8.2. Seminar / laboratory / project		Teaching methods	Notes
	Laboratory	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instruments, experimental boards, computers,
1.	Introduction. Labor protection		
2.	Collecting experimental data using the computer		
3.	Logic circuits with TMOS		
4.	Single-stage BJT amplifiers. CE configuration		
5.	Single-stage BJT amplifiers. CC, CB configurations		

6.	Class B amplifiers		smart board, blackboard
7.	Negative feedback effects on amplifiers		
8.	LM7805 voltage regulator		
9.	DC – DC converter		
10.	Multivibrator circuits using the 555 timer		
11.	Sinusoidal oscillator		
12.	Function generator		
13.	Laboratory test		
14.	Lab recovery and finalization of laboratory activity		
	Seminars		
1.	Logic circuits with transistors. D.C. equivalent circuit		
2.	Basic Amplifiers with MOSFET		
3.	Basic Amplifiers with BJT. Current sources		
4.	Power amplifiers. NF Circuits		
5.	DC Voltage Regulators		
6.	Sinusoidal Oscillator		
7.	Nonsinusoidal Oscillators. Recap		

Bibliography
1. Oltean, G.,Electronic Devices, Editura U.T. Pres, Cluj-Napoca, ISBN 973-662-220-7, 2006; 317 pp.
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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	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of theoretical knowledge and practical skills acquired for the analysis and (re)design of electronic circuits	- Written exam: problem solving	- E, max 10 pts. 60%

10.5 Seminar/ Laboratory	The level of the abilities acquired for problem solving and experimental analysis of electronic circuits	- Continuous formative evaluation	- L, max. 10 pts. 25% - S, max. 10 pts. 15%

10.6 Minimum standard of performance

Quality level:

Minimum knowledge:

- ✓ Recognizing and understanding basic concepts specific to fundamental electronic circuits
- ✓ Analyzing and (re)designing of electronic circuits

Minimum competences:

- ✓ To recognize and understand basic concepts specific to fundamental electronic circuits.
- ✓ To develop skills and abilities necessary for the use of electronic circuits
- ✓ To analyze and (re)design of electronic circuits.

Quantitative level:

- ✓ Full laboratory attendance
- ✓ Final grade computed as: Grade = 0.6E+0.25L+0.15S, where L ≥ 5, E ≥ 4

Data of filling in:	**Responsible**	**Title Surname NAME**	**Signature**
01.10.2019	Course	Prof. Gabriel OLTEAN, PhD Eng.	
	Applications	Prof. Gabriel OLTEAN, PhD Eng.	
		Assist.prof. Emilia ȘIPOȘ, PhD Eng.	
		Assist.prof. Laura IVANCIU, PhD Eng.	

Date of approval in the department _____	Head of department Prof. Sorin HINTEA, PhD Eng.
Date of approval in the council of the faculty _____	Dean Prof. Gabriel OLTEAN, PhD Eng.