SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and information Technology
1.3 Department	Applied 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	Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E28.00/EA-E28.00

2. Data about the subject

2.1 Subject name	CAD Techniques						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assist.Prof. Raul FIZESAN, Ph.D. - Raul.Fizesan@ael.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assist.Prof. Raul FIZESAN, Ph.D. - Raul.Fizesan@ael.utcluj.ro						
2.5 Year of study	II	2.6 Semester	4	2.7 Assessment	V	2.8 Subject category	DD/DI

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	100	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	14
Supplementary study in the library, online specialized platforms and in the field	4
Preparation for seminars / laboratories, homework, reports, portfolios and essays	22
Tutoring	2
Exams and tests	2
Other activities:	

3.7 Total hours of individual study	44
3.8 Total hours per semester	100
3.9 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 curriculum	
4.2 competence	

5. Requirements (where appropriate)

5.1. for the course	
5.2. for the seminars / laboratories / projects	

6. Specific competences

Professional competences	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C2. Applying the basic methods for the acquisition and processing of signals C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information
Transversal competences	N/A

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

7.1 General objective	Development of skills in the field of simulation and modeling of electronic circuits
7.2 Specific objectives	1. Assimilation of theoretical knowledge regarding the simulation of electronic circuits 2. Obtaining skills for using electronic circuit simulation programs

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1. Introduction in circuit simulation techniques	Exposition, discussions	Video projector
2. DC Analysis		
3. AC Analysis		
4. Time domain Analysis		
5. Parametric and Performance Analysis		
6. Statistical Analysis		
7. Behavioral modeling and hierarchical simulation		
8. Standard simulation algorithms for electrical and electronic circuits		
9. Introduction in modeling of electronic devices		
10. Semiconductor diode modeling		
11. Modeling of bipolar transistor		
12. Modeling of JFET transistors		
13. Modeling of MOS transistors		
14. Modeling of operational amplifiers		
Bibliography 1. Ovidiu Pop, Raul Fizeşan, Computer Aided Design. Editura U.T. Press, Cluj-Napoca, 2016.		

2. Ovidiu Pop, Proiectare asistata de calculator, Ed. Mediamira, Cluj-Napoca, 2007
3. Ana Rusu -Proiectare asistata de calculator,Editura Dacia, Cluj, 1994
4. G.Chindris, A.Rusu-Proiectarea asistata de calculator a circuitelor electronice, Ed. Casa Cartii de Stiinta, 1999
5. G. Chindris, O. Pop, G.Deak-Simularea si modelarea avansata a circuitelor electronice, Ed. Casa Cartii de Stiinta, 2002

8.2 Laboratory	Teaching methods	Notes
1. Introduction in PSPICE simulation	Exposition, discussions	Laboratory platforms
2. DC Analysis		
3. AC Analysis		
4. Time Domain Analysis		
5. Parametric and Optimization Analysis		
6. Performance and Statistical Analysis		
7. Analog behavior modeling		
8. Modeling of systems with ABM circuits		
9. PSPICE modeling of semiconductor diodes		
10. PSPICE modeling of bipolar transistor		
11. PSPICE modeling of JFET and MOS transistors		
12. PSPICE modeling of sub-circuits		
13. PSPICE of modeling of operational amplifiers		
14. Evaluation		

Bibliography

1. Raul Fizeşan, Ovidiu Pop, Gabriel Chindriş, Computer Aided Design: laboratory applications, Editura U.T. Press, Cluj-Napoca, 2015
2. Ovidiu Pop, Raul Fizeşan, Gabriel Chindriş, Proiectare asistată de calculator: aplicaţii, Editura U.T. Press, Cluj-Napoca, 2013, ISBN 978-973-662-856-6

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 Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

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 acquired theoretical knowledge and practical skills	Written test	20%
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	Practical test	80%
10.6 Minimum standard of performance			

Quality level:

Minimum knowledge:

- ✓ Knowledge of methods of analysis of electronic circuits.
- ✓ Knowledge of the means of simulation and modeling of electronic circuits.
- ✓ Area Evaluation and interpretation of data obtained from electronic circuit simulation.

Minimum competences:

- ✓ Be able to identify the main types of analysis.
- ✓ To use standard simulation algorithms for electrical and electronic circuits.
- ✓ To perform the simulation of electronic circuits.
- ✓ To perform behavioral modeling and hierarchical simulation of a circuit
- ✓ To display and interpret the simulation results.
- ✓ To design electronic devices and circuits.

Quantitative level:

- ✓ Perform all laboratory work
- ✓ The exam and laboratory notes must be at least 5.
- ✓ The mark for the subject is calculated with the relation: 0.2 * Exam score + 0.8 * Laboratory score

Date of filling in:	**Responsible**	**Title First name SURNAME**	**Signature**
27.09.2021	Course	Assist.Prof. Raul FIZESAN, Ph.D.	
	Applications	Assist.Prof. Raul FIZESAN, Ph.D.	

Date of approval in the Department of Communications 27.09.2021	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology 27.09.2021	Dean Prof. Gabriel OLTEAN, Ph.D.