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	Applied Electronics
1.4	Field of study	Electronics and Telecommunications Engineering
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					Computer Aided Design					
2.2	Subject area					Design with electronic devices and circuits					
2.3	Course responsible/lecturer					Prof. Ovidiu Aurel Pop, PhD					
2.4	Teachers in charge of applications					Prof. Ovidiu Aurel Pop, PhD Assist.Prof Raul Fizesan, PhD					
2.5	Year of study	II	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DD/DI

3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course [hours/week]	Applications [hours/week]			Course [hours/sem.]	Applications [hours/sem.]			Indiv. study	TOTAL	Credits
				S	L	P		S	L	P			
II / 2	Computer Aided Design	14	2		2		28		28		44	100	4

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	14
Supplementary study in the library, online and in the field	-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	26
Tutoring	2
Exams and tests	2
Other activities	0

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	N / A
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	Laboratory, Cluj-Napoca

6. Specific competences

Professional competences	Theoretical knowledge (what the student must know):	After completing the discipline, the students will know: -analysis methods of electronic circuits; -simulation and modeling tools of electronic circuits; - to evaluate the electronic circuits simulation results;
	Acquired skills (what the student is able to do):	After completing the discipline, the students will be able to: - identify the analysis types;; - use the standard electronic circuits simulation algorithms; - make electronic circuits simulation ; - make behavioral models hierarchical simulation of electronic circuits; - make models for electronic devices and circuits; - display and evaluate the simulation results; - analyze and experimentally determine the performance of fundamental electronic circuits.
	Acquired abilities: (what type of equipment the student is able to handle)	After completing the discipline, the students will be able to: - use the software tools used for simulation and study of electronic circuits ; - edit an electronic design for simulation. - Identify the conditions needs for a specific analysis type; - use the data sheets in order to determines the model parameters of electronic devices. - Make an electronic sub-circuit model
	In accordance with Grila1 and Grila2 RNCIS	C1. To use the fundamental elements regarding electronic devices, circuits, systems, instrumentation and technology C2. To apply basic methods for signal acquisition and processing C3. To apply knowledge, concepts and basic methods regarding computing systems' architecture, microprocessors, microcontrollers, programming languages and techniques C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission.
Cross competences (Grila1 and Grila2 RNCIS)		N.A.

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

7.1	General objectives	Developing the competences regarding the use, analysis, simulation and modeling of electronic circuits.
7.2	Specific objectives	1. Assimilation of theoretical knowledge's in the area of simulation and modeling of electronic devices and circuits 2. Developing skills and abilities necessary for the use of electronic circuits simulation tools .

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Course description. Classification of simulation tools. Simulation rules.	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard
2	DC current analyses.		
3	AC current analyses.		
4	Time domain analyses.		
5	Performances analyses. Optimization parameters in SPICE for circuits elements.		
6	Statistical analyses.		
7	Behavioral modelling and hierarchical simulation		
8	Standard electronic circuits simulation algorithms.		
9	Introduction in modeling of electronic circuits.		
10	Models of semiconductor diodes.		
11	Models of bipolar transistors.		
12	Models of JFET transistors.		
13	Models of MOS transistors.		
14	Models of operational amplifiers		
8.2. Applications (lab)		Teaching methods	Notes
1	Introduction. Labour protection	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, white/magnetic board
2	DC current analyses.		
3	AC current analyses.		
4	Time domain analyses.		
5	Performances analyses. Optimization parameters in SPICE for circuits elements.		
6	Statistical analyses.		
7	Introduction in behavioral modelling and hierarchical simulation		
8	Modelling of electronic circuits with ABM		
9	Models of semiconductor diodes.		
10	Models of bipolar transistors.		
11	Models of JFET and MOS transistors.		
12	Sub-circuits PSpice modelling		
13	Laboratory test		
14	Lab recovery and finalization of laboratory activity		

Bibliography

1. Ovidiu Pop, *Proiectare asistata de calculator*, Ed. Mediamira, Cluj-Napoca, 2007
2. Ovidiu Pop, Raul Fizesan, G. Chindris, Proiectare asistata de calculator-Aplicatii, UTPRESS, 2013
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

On-line references

1. Ovidiu Pop. Computer Aided Design (course slides, laboratories, problem examples, exam subjects), http://www.mce.utcluj.ro/pac.html#

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

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. Evaluations

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The level of acquired theoretical knowledge and practical skills		- 2 formative evaluation tests (problem solving) - Summative evaluation written exam (theory and problems)		- T, max 10 pts. 50% - E, max 10 pts. 30%
Applications		The level of acquired abilities		- Continuous formative evaluation - practical lab test		- L, max. 10 pts. 20%
10.4 Minimum standard of performance						
$L,T \geq 5$ and $E \geq 4$ and $0,2E+0,2L+0,5T \geq 4.5$						

Date of filling in	Course responsible	Teachers in charge of applications
1.10.2018	Prof. Ovidiu Aurel Pop, PhD	Assistant Raul Fizesan, PhD