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
1.7	Form of education	Full time
1.8	Subject code	TST-E107.00

2. Data about the subject

2.1	Subject name					Electronic Microsystems Technology					
2.2	Subject area					Electronig and telecommunication Engeneering					
2.3	Course responsible/lecturer					Assistant Prof. Vlad Bande, PhD					
2.4	Teachers in charge of applications					Assistant Prof. Vlad Bande, PhD					
2.5	Year of study	III	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DS/ FAC

3. Estimated total time

Year / Sem.	Subject name	No. of weeks	Course	Applications			Course	Applications			Stud. Ind.	TOTAL	Credits
			[hours/week]				[hours/sem.]						
				S	L	P		S	L	P			
III/2	Technology of Electronic Microsystems	14	2		2		28		28		74	130	5

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								Ore
Manual, lecture material and notes, bibliography								28
Supplementary study in the library, online and in the field								4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								28
Tutoring								2
Exams and tests								2
Other activities								-

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competente	

5. Requeirments (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):	Physical phenomena which characterize heat transfer Knowledge obtained at Digital Circuits lectures Knowledge related to bipolar and MOS transistors Electromagnetic field theory.
	Acquired skills (what the student is able to do):	After completing the discipline, the students will be able to: - Knowing the main settlements in domain - Improving the capacity of analyzing non-disturbances phenomena for an electronic system - Knowing adequate solutions for minimizing the disturbances in an electronic system - Developing of capacities for designing in a correct way the PCBs using CAD tools - Using of some dedicated PC programs for designing of micro-integrated structures
	Acquired abilities: type of (what equipment the student is able to handle)	After completing the discipline, the students will be able to: - Designing PCB according to standards - Analyse electronic circuits according to EMC, SI, PI - Using CAD programs for designing PCB.
	In accordance with Grila1 and Grila2 RNCIS	N.A.
Cross competences (Grila1 and Grila2 RNCIS)		N.A.

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

7.1	General objectives	Knowlage improvement in PCB design, modeling and simulation of electronic circuits
7.2	Specific objectives	1. Theoretical knowlage about simulation of electronic circuits. 2. Practical knowlages about CAD programs for PCB design, simulation and modeling of electronic circuits.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introductive lecture. Standardization.	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard
2	Design for Thermal Compatibility I		
3	Design for Thermal Compatibility II		
4	Design for Compatibility with Technology		
5	Design for Electromagnetic Compatibility I		
6	Design for Electromagnetic Compatibility II		
7	Design for Electromagnetic Compatibility III		
8	Design for Signal Integrity I		
9	Design for Signal Integrity II		
10	Design for Signal Integrity III		
11	Design for Power Supply Integrity I		
12	Design for Power Supply Integrity II		
13	Non-disturbances design for PCBs I		
14	Non-disturbances design for PCBs II		
8.2. Applications (lab)		Teaching methods	Notes
1	PCBs fabrication technologies presentation. Project description.	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, white/magnetic board
2	General presentation of program **OrCAD 9.x.** Creation of a project with PCB finality, files names and extensions, significations.		
3	Using CAPTURE window, hierarchical blocks. Electrical schematic editing.		
4	Libraries, components and symbols creation.		
5	Electrical schematic processing, report files generation.		
6	Generation and correcting the NETLIST file, footprints creating and modifying.		
7	Intermediary examination for small project.		
8	**LAYOUT Program**: steps to initialize a PCB project		
9	Steps for setting a PCB.		
10	Footprint placement on PCB, routing rules.		
11	Smart Route program presentation, PCB's geometry optimization.		
12	Post processing and report files generation (files for fabrication process).		
13	Small project examination.		
14	Discipline examination.		

Bibliography

1. Pitica D. - *Proiectare antiperturbativă în sisteme electronice,* Ed. Albastră, Cluj-Napoca, 2000;
2. Schwab A.J. - *Compatibilitatea electromagnetică*, Editura Tehnică, Bucureşti, 1996;
3. Tummala R. – Fundamentals of Microsystems Packaging, McGraw-Hill,2001

Virtual didactic materials

1. Pitica Dan, Technology of Electronic Microsystems, PowerPoint presentations for lecture: http://www.ael.utcluj.ro/ORGANIZARE/curs&tem_TME.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		Multiple choice test with 20 questions		test duration 1.5 h		E - 60%
Laboratory		Project evaluation		Practical application – 1 h		L - 40%

10.4 Minimum standard of performance
$E \geq 5$ and $L \geq 5$ and $0{,}6E+0{,}4L \geq 4.5$

Date of filling in	Course responsible	Teachers in charge of applications
01.10.2018	Assistant Prof. Vlad Bande, PhD	Assistant Prof. Vlad Bande, PhD