SYLLABUS

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty[1]/ Department [2]	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES/EA
1.3 Field of study (name/code[3])	ELECTRONIC ENGINEERING, TELECOMUNICATION AND INFORMATION TECHNOLOGIES
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	TST-ENG/20/20/10/100/10/TST-ENG

2. Information about the discipline

2.1 Name of discipline/ formative category[4]			ELECTRONIC TECHNOLOGY/DS				
2.2 Coordinator (holder) of course activities			Lecturer Adrian Avram, Ph.D				
2.3 Coordinator (holder) of applied activities[5]			Lecturer Adrian Avram, Ph.D				
2.4 Year of study[6]	4	**2.5** Semester	8	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DII

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [8]

3.1 Number of fully assisted hours / week	3 of which:	**3.2** course	1.5	**3.3** seminar / laboratory / project	0/1.5/0
3.1* Total number of fully assisted hours / semester	42 of which:	**3.2*** course	21	**3.3*** seminar / laboratory / project	0/21/0
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	5,93 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			2
		hours of individual study after manual, course support, bibliography and notes			2
		training seminars / laboratories, homework and papers, portfolios and essays			1,93
3.7* Number of hours of unassisted activities / semester	83 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			28
		hours of individual study after manual, course support, bibliography and notes			28
		training seminars / laboratories, homework and papers, portfolios and essays			27
3.8 Total hours / week [9]	8,93				
3.8* Total hours /semester	125				
3.9 Number of credits	5				

4. **Prerequisites** (where applicable)

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[1] The name of the faculty which manages the educational curriculum to which the discipline belongs
[2] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[3] The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.
[4] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[5] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] Year of studies in which the discipline is provided in the curriculum.
[7] Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).
[8] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[9] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.1 Curriculum	• Technical drawing
4.2 Competencies	• Working with concept from fundamental disciplines

5. Conditions (where applicable)

5.1 of the course	• Classroom with a minimum 50 seats equipped with projector
5.2 to conduct practical activities	• Laboratory equipped with working station on witch simulation environments and computer assisted design can be run

6. Specific competencies acquired through this discipline

Specific competencies	• The use of graphical, electrical and analysis tools for the description and design of systems based on electronic circuits. • Application of design methods and analysis of electronic circuits • Application of basic knowledge, concepts and methods regarding the architecture of computing systems, microprocessors, microcontrollers, programming languages and techniques • Application of basic knowledge, concepts and methods from: power electronics, automatic systems, electrical energy management, electromagnetic compatibility
Professional competencies ascribed to the specific competencies	• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. • Application of basic methods for signal acquisition and processing. • Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrolers, programming languages and techniques. • Design, implementation and service operation of data, voice, video multimedia, based on understanding and applying fundamental concepts in communications and information transmission. • Selection, instalation, configuration and operation of fixed and mobile equipment and equipping the site with common telecommunication networks. • Solving technological problems in fields of applied electornics.
Transversal competencies ascribed to the specific competencies	• Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment • Definition of activity stages and their distribution to subordinates in terms of responsabilities, providing effective exchange of information and interpersonal communication. of professional tasks • Adaptation to new technologies, professional and personal development through continuous training, using printed documentation sources, specialized software and electronic resources in Romanian and at least one foreign language. •

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Studying computer-aided design/engineering (CAD/CAE) systems including mechanical, and thermal design
7.2 Specific objectives	• Description of PCB assembly technologies • Acquiring knowledge and training skills regarding: describing electronic circuits, verifying and optimizing their operation through PCB analysis and computer-aided manufacturing

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. Component level packaging. Component selection. Schematic design	2	Presentation of slides using a projector, lecture based on the presented materials, conversation, explanation, example, demonstration, comparative analysis. Case Study
2. PCB Libraries. Footprint editor	2	
3. Assembly technologies. PCB manufacturing and assembly	4	
4. Defects in manufacturing process	2	
5.Electrostatic protection	2	
6.Computer aided manufacturing. Guest speaker	2	

[10] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[11] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Bibliography [12] 1.H.CARSTEA, A. AVRAM, M.RANGU, Tehnologie electronica, Editura Augusta, 2003. 2. K. MITZNER, Complete PCB Design using ORCAD Capture and PCB Editor, 2009, Elsevier Inc		
8.2 Applied activities [13]	Number of hours	Teaching methods
PADS – Mentor Graphics, layout design environment.	2	Comparative analysis, demonstration, simulation, project method
PADS Layout: Working tools, Definition of technological parameters and design rules. Importing the connections file. Placement of components – optimization techniques	4	
Checking the layout project. Post routing checks and changes	2	
Optimization process	2	
Defects in manufacturing process.	2	
CAM files	2	Comparative analysis, demonstration, simulation, project method
Bibliography [14] .H.CARSTEA, A. AVRAM, M.RANGU, Tehnologie electronica, Editura Augusta, 2003. 2. K. MITZNER, Complete PCB Design using ORCAD Capture and PCB Editor, 2009, Elsevier Inc		

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- As part of the POSDRU OVDIP project, the content of the discipline was the subject of discussions with the representatives of the following companies: Continental Automotive Romania, Hella Romania, Yazaki Srl, Flex and Huf Timișoara. Based on the companies' proposals and suggestions, the content of the course and application activities were defined following an iterative process, resulting in a final form agreed by the employers' representatives

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	- Knowledge of the facilities of CAD/CAE/CAM systems for design of electronic circuits and optimization process.	The theoretical knowledge is verified by marking two written papers (distributed assessment) with a duration of 1.5 hours each, which can be redone under the conditions provided by the regulation. The arithmetic mean of the grades from the two papers represents the "exam" grade. The subjects consist of theoretical questions combined with grid-type questions and short applications	50%
10.5 Applied activities	**S:**		
	L: Acquiring knowledge and training skills regarding the	The evaluation of practical knowledge, skills and abilities is carried out through two	50%

[12] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[13] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".
[14] At least one title must belong to the discipline team.
[15] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

	operation of computer-aided design environments for CAD/CAM/CAE design and manufacturing process.	laboratory tests in which students must solve a layout design problem.	
	P[16]**:**		
	Pr:		

10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [17])

- The composition of the exam subjects considers that half of them refer to elementary aspects: drawing schemes, interconnection methods, generating transfer files, setting elementary analyses, operating the graphics processor, configuring templates, importing connections and fingerprints, placing components and drawing manual. Dealing with the mentioned issues ensures the minimum level for promotion.

Date of completion 02.07.2023	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
Head of Department (signature)	**Date of approval in the Faculty Council** [18] 14.09.2023	**Dean (signature)**

[16] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.
[17] It will not explain how the promotion mark is awarded.
[18] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.