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 Devices ⁄ DD						
2.2 Coordinator (holder) of course activities	Dr.eng. Radu Mirsu, Lecturer						
2.3 Coordinator (holder) of applied activities[5]	Dr.eng. Radu Mirsu, Lecturer						
2.4 Year of study[6]	1	**2.5** Semester	2	**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	5 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	0/2/0
3.1* Total number of fully assisted hours / semester	70 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	0/28/0
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	3.93 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1
		hours of individual study after manual, course support, bibliography and notes			1.53
		training seminars / laboratories, homework and papers, portfolios and essays			1.4
3.7* Number of hours of unassisted activities / semester	55 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			14
		hours of individual study after manual, course support, bibliography and notes			21.4
		training seminars / laboratories, homework and papers, portfolios and essays			19.6
3.8 Total hours / week [9]	8.93				
3.8* Total hours /semester	125				
3.9 Number of credits	5				

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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) $\geq$ 28 hours / wk. and (3.8) $\leq$ 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. Prerequisites (where applicable)

4.1 Curriculum	• Materials Science for Electronics
4.2 Competencies	• Elementary Highschool Physics and Math, Electrical circuits

5. Conditions (where applicable)

5.1 of the course	• laptop, video projector, whiteboard
5.2 to conduct practical activities	• laboratory, minimum 5 workplaces with PC and specific equipment

6. Specific competencies acquired through this discipline

Specific competencies	• Fundamentals of electronic devices, circuits, systems, instrumentation and technology
Professional competencies ascribed to the specific competencies	• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. • Application of knowledge, concepts and basic methods related to computer system architecture, microprocessors, microcontrolers, programming languages and techniques • 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 of professional tasks • Definition of activity stages and their distribution to subordinates in terms of responsablities, providing effective exchange of information and interpersonal communication • 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	• Understand the operating principles of electronic devices • The use of electronic devices in the context of simple electronic circuits
7.2 Specific objectives	• Students will learn the essentials of the electronic devices, with emphasizes on diodes and transistors. Also some of the high-power switching devices are presented: silicon-controlled rectifier, diacs and triacs. • A special attention will be paid to simulate and experiment the behavior of electronic devices, using the tools and techniques used by practicing electronic engineers

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]

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[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.).

INTRODUCTION	3	PowerPoint
SEMICONDUCTOR FUNDAMENTALS (The Bohr Model of the Atom, Band Theory of Solids, Conductors, Semiconductors and Insulators, Intrinsic and Extrinsic Semiconductors, Carrier Transport).	5	Presentation, demonstrations using whiteboard, quizzes
THE PN JUNCTION (Fabrication and Structure of the pn Junction, Thermal Equilibrium, The Biased pn Junction, Junction Characteristic, Dynamic Regime of the pn Junction, Small and Large Signal pn Junction Model).	6	
DIODES (Common Diode Applications, Types of Diodes)	6	
FIELD EFFECT TRANSISTORS (JFET Structures and Symbols, Physical Behaviour and Modes of Operation, Parameters, Characteristics, DC/Large Signal Model, Biasing, AC/Small Signal and Midband Frequency Model, Small Signal, High Frequencies JFET Model, MOSFETs).	8	
HIGH-POWER SWITCHING DEVICES (Silicon-Controlled Rectifier, Diacs, Triacs).	6	

Bibliography [12]

1. C.D. Căleanu, V. Tiponuţ, A. Filip, V. Maranescu, "Electronic Devices", Politehnica Publishing House, 2010.

2. Thomas L. Floyd, "Electronic Devices", Electron Flow - Fifth Edition, USA, Pearson/Prentice Hall, 2005.

3. Jimmie J. Cathey, "Theory and Problems of Electronic Devices and Circuits", Second Edition, McGraw-Hill, 2002.

8.2 Applied activities [13]	Number of hours	Teaching methods
Introduction on lab equipment. Safety rules	2	Short theoretical introduction, approach description, implementation, measurements, SPICE simulation, tests, solved problems, homework
The diode characteristic	2	
The diode as a circuit element	2	
Fundamentals of SPICE	2	
Rectifiers	2	
DC power supply rectifiers. Zener diode regulator	2	
The Bipolar Junction Transistor (BJT) characteristics	2	
The DC Analysis of BJTs	2	
BJT Small-Signal model	2	

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[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".

Signal Analysis of BJT Amplifying Circuits	2	
The Field Effect Transistor (FET) characteristics.	2	
The DC Analysis of FETs (L10).	2	
Small-Signal Analysis of FET Amplifying Circuits	2	
Make-up Lab		

Bibliography [14]

1.	C.D. Căleanu, A. Filip, V. Tiponuţ – "Electronic Devices and Circuits. Experiments and Simulations", Second Ed., ISBN 978-606-554-160-3, Politehnica Publishing House, Timişoara, 2010.

2.	https://intranet.etc.upt.ro

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

- The acquired knowledge is intensively used in next courses, e.g. Analog Integrated Circuits, Power Electronics, etc.

- Most companies from the field afferent to the program (Continental, Hella, Elster, Yazaki, Alcatel, Flextronics, etc.) require emploies with strong knowledge of electronic devices.

10. Evaluation

Type of activity	10.1 Evaluation criteria [15]	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Theory Applications	Written examination	2/3
10.5 Applied activities	**S:**		
	L: Measurements, calculations, SPICE programs, homework, attendance	Oral examination, Written tests, attendance evidence	1/3
	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])

- At least 5 scored for the exam

- At least 5 scored for the practical activity

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
30.06.2023		

Head of Department (signature)	**Date of approval in the Faculty Council [18]**	**Dean (signature)**
	14.09.2023	

[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.)
[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.