

SYLLABUS¹

1. Information about the program

1.1 Higher education institution	"POLITEHNICA" University of Timisoara
1.2 Faculty ² / Department ³	Electronics and Telecommunications / Applied Electronics
1.3 Chair	—
1.4 Field of study (name/code ⁴)	Electronics and telecommunications engineering / L20202010010
1.5 Study cycle	Bachelor
1.6 Study program (name/code)/Qualification	ENG/engineer

2. Information about the discipline

2.1 Name of discipline	Electronic Devices						
2.2 Coordinator (holder) of course activities	Dr.eng. Cătălin-Daniel CĂLEANU, Prof.						
2.3 Coordinator (holder) of applied activities ⁵	Dr.eng. Radu MÎRȘU, Assistant						
2.4 Year of study ⁶	I	2.5 Semester	2	2.6 Type of evaluation	E	2.7 Type of discipline	Compulsory

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	4 , of which:	3.2 course	2	3.3 seminar/laboratory/ project/training	2
3.4 Total no. of hrs. in the education curricula	56 , of which:	3.5 course	28	3.6 applied activities	28
3.7 Distribution of time for individual activities related to the discipline					hrs.
Study using a manual, course materials, bibliography and lecture notes					20
Additional documentation in the library, on specialized electronic platforms and on the field					10
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays					14
Tutoring					7
Examinations					3
Other activities					
Total hrs. of individual activities					44
3.8 Total hrs. / semester ⁷	100				
3.9 No. of credits	4				

4. Prerequisites (where applicable)

4.1 Curriculum	<ul style="list-style-type: none"> Materials Science for Electronics,
4.2 Competencies	<ul style="list-style-type: none"> Elementary Highschool Physics and Math, Electrical circuits

5. Conditions (where applicable)

5.1 of the course	<ul style="list-style-type: none"> laptop, videoprojector, whiteboard
5.2 to conduct practical activities	<ul style="list-style-type: none"> laboratory, minimum 5 workplaces with PC and specific equipment

6. Specific competencies acquired

¹ The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).

² The name of the faculty which manages the educational curriculum to which the discipline belongs.

³ The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.

⁴ Fill in the code provided in GD no. 493/17.07.2013.

⁵ The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

⁶ The year of study to which the discipline is provided in the curriculum.

⁷ It is obtained by summing up the number of hrs. from 3.4 and 3.7.

Professional competencies ⁸	<ul style="list-style-type: none"> Fundamentals of electronic devices, circuits, systems, instrumentation and technology
Transversal competencies	<ul style="list-style-type: none"> The analysis and design of practical engineering applications

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

7.1 General objective of the discipline	<ul style="list-style-type: none"> Understand the operating principles of electronic devices The use of electronic devices in the context of simple electronic circuits
7.2 Specific objectives	<ul style="list-style-type: none"> 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

8.1 Course	No. of hours	Teaching methods
1. INTRODUCTION	1	PowerPoint Presentation, demonstrations using whiteboard, quizzes
2. SEMICONDUCTOR FUNDAMENTALS (The Bohr Model of the Atom, Band Theory of Solids, Conductors, Semiconductors and Insulators, Intrinsic and Extrinsic Semiconductors, Carrier Transport).	3	
3. 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).	4	
4. DIODES (Common Diode Applications, Types of Diodes).	4	
5. BIPOLAR JUNCTION TRANSISTORS (Construction and Symbols, Operating Modes, Connections and i-u Characteristics, The Physical Behaviour of a BJT. Current Relationship, Ebers-Moll Model, The BJT Transistor Current-Voltage Characteristics, BJT Large Signal/DC Model, BJT biasing circuits, BJT Small Signal/AC Model).	6	
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	6	

⁸ The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Național al Calificărilor din Învățământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

Frequency Model, Small Signal, High Frequencies JFET Model, MOSFETs).		
7. HIGH-POWER SWITCHING DEVICES (Silicon-Controlled Rectifier, Diacs, Triacs).	4	
Bibliography ⁹		
1. C.D. Căleanu, V. Tiponuț, 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 activities¹⁰	No. of hours	Teaching methods
1. Introduction on lab equipment. Safety rules.	2	Short theoretical introduction, approach description, implementation, measurements, SPICE simulation, tests, solved problems, homework
2. The diode characteristic.	2	
3. The diode as a circuit element	2	
4. Fundamentals of SPICE	2	
5. Rectifiers	2	
6. DC power supply rectifiers. Zener diode regulator	2	
7. The Bipolar Junction Transistor (BJT) characteristics	2	
8. The DC Analysis of BJTs	2	
9. BJT Small-Signal model	2	
10. Small-Signal Analysis of BJT Amplifying Circuits	2	
	2	
11. The Field Effect Transistor (FET) characteristics.	2	
	2	
12. The DC Analysis of FETs (L10).	2	
	2	
13. Small-Signal Analysis of FET Amplifying Circuits		
14. Make-up Lab		

⁹ At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

¹⁰ The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:”, „Laboratory:”, „Project:” and/or „Practice/Training:”.

Bibliography¹¹

1. C.D. Căleanu, A. Filip, V. Tiponuş – “Electronic Devices and Circuits. Experiments and Simulations”, Second Ed., ISBN 978-606-554-160-3, Politehnica Publishing House, Timișoara, 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 employes with strong knowledge of electronic devices.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share of the final grade
10.4 Course	Theory Applications	Written examination Written examination	1/3 1/3
10.5 Applied activities	S:		
	L: Measurements, calculations, SPICE programs, homework, attendance	Oral examination, Written tests, attendance evidence	1/3
	P:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)			
<ul style="list-style-type: none"> • At least 5 scored (half of the subjects) at the theoretical part. • At least 5 scored (half of the subjects) at the applicative part. • At least 5 scored for the practical activity. 			

Date of completion

20.01.2015

**Course coordinator
(signature)**

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**Coordinator of applied activities
(signature)**

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**Head of Department
(signature)**

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**Date of approval in the Faculty
Council¹²****Dean
(signature)**

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¹¹ At least one title must belong to the staff teaching the discipline.¹² Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparține programul de studiu cu privire la fișa disciplinei.