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 Circuits Fundamentals/DD				
2.2 Coordinator (holder) of course activities			S.l.dr ing. Maranescu Valentin				
2.3 Coordinator (holder) of applied activities[5]			S.l.dr ing. Maranescu Valentin				
2.4 Year of study[6]	2	**2.5** Semester	3	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DI

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	4 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	0/ 2/0
3.1* Total number of fully assisted hours / semester	56 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	0/2 8/0
3.4 Number of hours partially assisted / week	0 of which:	**3.5** training	0	**3.6** hours for diploma project elaboration	0
3.4* Total number of hours partially assisted / semester	0 of which:	**3.5*** training	0	**3.6*** hours for diploma project elaboration	0
3.7 Number of hours of unassisted activities / week	3.14 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1.1 4
		hours of individual study after manual, course support, bibliography and notes			1.5
		training seminars / laboratories, homework and papers, portfolios and essays			0.5
3.7* Number of hours of unassisted activities / semester	44 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			16
		hours of individual study after manual, course support, bibliography and notes			21
		training seminars / laboratories, homework and papers, portfolios and essays			7
3.8 Total hours / week [9]	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

[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	• Electronic Devices
4.2 Competencies	• Elementary Highschool Physics and Math

5. Conditions (where applicable)

5.1 of the course	• Notebook, beamer, witheboard
5.2 to conduct practical activities	• Lab with minimum 5 working places (with specific electronic equipment and computers)

6. Specific competencies acquired through this discipline

Specific competencies	• Operating point measurement • Gain measurement • Cut off frequencies and bandwidth measurement • Design and solve basic amplifier circuits with 1 or 2 BJTs or FETs • Measure output power and efficiency of an amplifier • How to avoid perturbations and distortions in amplifiers • Determination of the parameters for negative feedback amplifiers • Ensure harmonic oscillators working conditions •
Professional competencies ascribed to the specific competencies	• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology
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

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

7.1 The general objective of the discipline	• Theoretical and practical introduction to electronic circuits. Study of amplifiers and oscillators circuits. Theory of negative feedback, stability and frequency compensation
7.2 Specific objectives	• Solving electronic circuits with active devices • measurement and determination of electronic circuits parameters using oscilloscopes, signal generators, voltage supplies, multimeters • Using computed aided design for electronic circuits analysis

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. Introduction. Discrete Amplifier, Amplifier in DC and AC regime. Small Signal	2	Slides, discussion, exemplifying, comparative analysis

[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.).

BJT and MOSFET models. Multistage amplifiers		
2. BJT and MOSFET amplifier topologies and schematics	4	
3. Frequency response of an amplifier. Bode plots, OCTC, SCTC analysis methods. Miller effect and theorem. Amplifiers Time response	4	
4. Power amplifier stages. Push-pull stage: efficiency, crossover distortion, biasing, thermal dissipation. High efficiency output stages. Class D output stage: structure and topologies	4	
5. Feedback in amplifiers and circuit design. Uses of basic feedback topologies for amplifiers	6	
6. Amplifiers stability. Stability analysis for amplifiers and frequency compensation. Noise sources.	4	
7. Positive feedback and Oscillators. Oscillators topologies and uses	4	

Bibliography [12]

[1] V. Maranescu, Course Notes, and recordings 2021.

[2] C.-D. Căleanu, V. Tiponuţ, V. Maranescu, A. Filip, Electronic Devices, Politehnica Publishing House, 2010.

[3] Thomas L. Floyd, Electronic Devices, Electron Flow - Fifth Edition, USA, Pearson/Prentice Hall, Upper Saddle River, NJ, 2005.

[4] R. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, 7th Edition, Prentice Hall, 1998

[5] M. Tooley Electronic Circuits: Fundamentals and Applications, Routledge, 2019

8.2 Applied activities [13]	Number of hours	Teaching methods
1. Recall BJT&FET biasing, small signal models, equivalent schematics rules	2	Problem solving, simulations, experiments
2. Small signal BJT amplifier	2	
3. Small signal midband frequency amplifier analysis	2	
4. The effect of coupling and bypass capacitors over the amplifier frequency response	2	
5. Amplifer frequency response (Time constant Methods)	2	
6. Complementary-Symmetry power amplifier (Push-Pull stages)	2	
7. Power amplifiers	2	
8. The effect of negative feedback	2	
9. Feedback amplifiers. Shunt-Shunt topology. 10. Small signal series-shunt amplifier	2+2+2+2+2+2	

[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".

11. Feedback amplifiers. Series-Series topology 12. Wien-bridge RC oscillators 13. RC oscillators 14. Make up lab		
Bibliography [14] Mârşu, R., Maranescu, V., Căleanu, C., Practical aspects of electronic device and circuits, editura Politehnica, Timișoara, 2015, ISBN/ISSN 978-606-554-990-6;		

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

- This discipline offers basic knowledge for Electronic Circuits Project, Analogue Integrated Circuits, Power Electronics. etc.)
- Representatie employers (Continental, Vitesco, Hella, Elster, Yazaki, Alcatel, Flextronics, etc.) reqiure electronic circuits knowledge

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Theoretical aspects description Applications solving	Exam	66%
10.5 Applied activities	**S:**		
	L: Measurements, calculations, simulations, homeworks, attendance	Written test, Oral test	34%
	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])			
• Minimum 5 (50% explained correctly) for theoretical aspects • Minimum 5 (50% solved correctly) for applications • Minimum 5 for application activity (design, test of a medium complexity electronic circuit, attendance			

Date of completion 17.06.2023	**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)**

[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.