SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Mathematics
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E05.00/EA-E05.00

2. Data about the subject

2.1 Subject name	Passive Components and Circuits						
2.2 Subject area	Theoretical area Methodological area Analysis area						
2.3 Course responsible	Assist.Prof. Vlad BANDE, Ph.D. – vlad.bande@ael.utcluj.ro						
2.4 Teacher in charge with the laboratory / seminar	Assist.Prof. Vlad BANDE, Ph.D. – vlad.bande@ael.utcluj.ro Assist.Prof. Alexandra FODOR, Ph.D. – alexandra.fodor@ael.utcluj.ro						
2.5 Year of study	I	2.6 Semester	I	2.7 Assessment	E	2.8 Discipline category	DD/DI

3. Estimated total time

3.1 Numbers of hours per week:	4	3.2 of which, lecture:	2	3.3 applications	2
3.4 Total hours in the curriculum:	56	3.5 of which, lecture:	28	3.6 applications	28
Distribution of time					hours
Manual, lecture material, lecture notes and bibliography study					30
Supplementary study in the library, online and on site					4
Preparation for applications, homework, essays, discipline portfolio					30
Tutoring					2
Examinations and tests					3
Other activities:					-

3.7 Total hours of individual study	69
3.8 Total hours per semester	125
3.9 Credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	-
4.2 Competences	-

5. Requirements (where appropriate)

5.1. For the lecture	Attendance at the scheduled classes
5.2. For applications	Attendance at the scheduled classes

6. Specific competences

Professional competences	C1. Use of the fundamental elements related to devices, circuits, systems, instrumentation and electronic technology C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information C6. Solving specific problems of the broadband communications networks: propagation in different environment, circuits and equipment for high frequencies (microwaves and optical).
Transversal competences	N/A

7. Discipline objectives (as resulted from the *key competences gained*)

7.1 General objective	To develop abilities and skills in the passive electronic components and circuits domain.
7.2 Specific objectives	1. To acquire theoretical knowledge involving the passive electronic components and circuits behavior. 2. To obtain practical skills with the help of which the student will be able to analyze any electronic circuit that contains passive components.

8. Contents

8.1 Lecture	Teaching methods	Notes
1. PECC Lecture Presentation. Introduction – part I.	PowerPoint interactive presentation	video-projector, whiteboard
2. Introduction – part II.		
3. Electrical Circuits Analysis Methods.		
4. Circuit Parameters.		
5. The Capacitance – The DC and AC Regime Behavior.		
6. The Capacitance – The Transient Regime Behavior.		
7. The Inductance – The DC and AC Regime Behavior.		
8. The Inductance – The Transient Regime Behavior.		
9. Resistors.		
10. Capacitors.		
11. Coils (Inductors).		
12. Quartz Resonators. Passive Electronic Components with a Non-Linear Behavior.		
13. PCB Design Overview.		

14. Final Review.		
Bibliography: 1. Dan Pitică, Vlad Bande – *Passive Electronic Components and Circuits – Part I – Circuit Elements,* UTPRESS, 2016. 2. P. Svasta, Al. Vasile, V. Columbeanu, C. Ionescu, D. Moraru, A. Fleschiu, N.D. Codreanu, I. Plotog, D. Leonescu – *Rezistoare, Condensatoare, Inductoare. Probleme,* Cavallioti, 2012. 3. P. Svasta, Golumbeanu V. et al., - *Passive electronic components – applications,* Cavallioti, 2007. 4. Dan Pitică – Digital lecture notes: http://www.ael.utcluj.ro/beta/?page_id=357&lang=ro 5. Vlad Bande – Digital lecture notes: http://www.ael.utcluj.ro/beta/?page_id=357&lang=en		
8.2 Applications	Teaching methods	Notes
1. Basics about Labor Protection, Prevention and Firefighting inside the PECC Laboratory. 2. Laboratory Equipment Presentation. 3. Series and Parallel Connections. Ohm's Law. 4. Resistive Voltage and Current Dividers. 5. Electrical Signals. 6. Kirchhoff's Laws. 7. The Superposition Principle. 8. Thevenin's Theorem. Norton's Theorem. 9. 1st Theoretical Test (Electrical Circuits Analysis Methods) 10. The RC and RL Circuits' Behavior in the AC Regime. 11. The RC and RL Circuits' Behavior in the Transient Regime. 12. 2nd Theoretical Test (The RC and RL Circuits' Behavior in the DC, AC and Transient Regimes). 13. Practical Test - Designing and Analyzing a Circuit Built with Passive Components. 14. Final review – problem solving.	Explanations. Problem solving from the thematic of the current application. Practical experiments.	PC, electronic board for passive components connectivity, command and control software interface.
Bibliography: 1. Dan Pitică, Vlad Bande – Passive Electronic Components and Circuits – Part I – Circuit Elements, UTPRESS, 2016. 2. P. Svasta, Al. Vasile, V. Columbeanu, C. Ionescu, D. Moraru, A. Fleschiu, N.D. Codreanu, I. Plotog, D. Leonescu – Rezistoare, Condensatoare, Inductoare. Probleme, Cavallioti, 2012. 3. P. Svasta, Golumbeanu V. et al., - Passive electronic components – applications, Cavallioti, 2007. 4. Dan Pitică – Digital lecture notes: http://www.ael.utcluj.ro/beta/?page_id=357&lang=ro 5. Vlad Bande – Digital lecture notes: http://www.ael.utcluj.ro/beta/?page_id=357&lang=en 6. Applications - digital format: http://www.ael.utcluj.ro/beta/?page_id=357&lang=ro		

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The discipline content and the acquired skills are in agreement with the expectations of the professional 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. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Lecture	Theoretical subjects explanation, Problems solving	Written Exam.	50%
10.5 Applications	The ability of designing a circuit, The ability of analyzing the behavior of a circuit, Experimental data analysis.	2 written tests (50%) 1 practical test (25%) 2 specific technical essays (15%) 2 sets of solved problems (10%)	50%
10.6 Minimum standard of performance			

Minimum quality standard:

- ✓ Applying correctly the most important analysis methods for a simple electric circuit (voltage/current dividers, superposition principle, Thevenin/Norton theorems)
- ✓ Knowing and understanding the meaning of the most important properties for resistors, capacitors and coils.

Minimum quantity standard:

Final grade calculus:

1. Applications: The weighted grade at least 5/10.
2. Exam: Grade at least 5/10.
3. Final grade mathematical formula: 0.5*Application_Grade + 0.5*Exam_Grade

Date of filling in:	**Responsible**	**Title First name SURNAME**	**Signature**
16.06.2025	Course	Assist. Prof. Vlad BANDE, Ph.D	
	Applications	Assist. Prof. Vlad BANDE, Ph.D	
		Assist. Prof. Alexandra FODOR, Ph.D.	

Date of approval in the Council of the Communications Department 18.06.2025	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of the Faculty of Electronics, Telecommunications, and Information Technology 25.06.2025	Dean Prof. Ovidiu POP, Ph.D.