SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Electronics, Telecommunications and Information Technology
1.3 Department	Applied Electronics
1.4 Field of study	Electronics Engineering, Telecommunications and Informational Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Applied Electronics, Telecommunications Technologies and Systems / Engineer
1.7 Form of education	Full time
1.8 Subject Code	5.00

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	Lect. PhD. Eng. Vlad Bande – vlad.bande@ael.utcluj.ro						
2.4 Teacher in charge with the laboratory / seminar	Lect. PhD. Eng. Vlad Bande – vlad.bande@ael.utcluj.ro Lect. PhD. Eng. Alexandra Fodor – 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					32
Supplementary study in the library, online and on site					4
Preparation for applications, homework, essays, discipline portfolio, tests					28
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	1. To describe the passive electronic components and circuits behavior and as well the measurement and analysis methods for the circuits that contain passive components. 2. To understand the passive elements/components behavior during all functionality regimes (e.g.: DC regime, AC regime, transient regime). 3. To use properly the specific laboratory equipment and to correctly identify the passive components parameters by using the output data from them. 4. To convert an electronic schematic into a real electronic circuit and to identify the differences between the real circuit and its simplified model used in the mathematical analysis. 5. To define and to understand abstract concepts such as *electrical signals* and to be able to identify their parameters. 6. Qualitative and quantitative analysis over the passive electronic components and circuits behavior. 7. To define the methods and fundamental basics for designing, adjusting, testing and repairing passive electronic circuits.
Cross competences	

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. PCC Lecture Presentation. Introduction – part I.		
2. Introduction – part II.		
3. Electrical Circuits Analysis Methods.		
4. Circuit Parameters.		

5. The Capacitance – DC and AC Regime Behavior. 6. The Capacitance – Transient Regime Behavior. 7. The Inductance – DC and AC Regime Behavior. 8. The Inductance – 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.	PowerPoint interactive presentation	video-projector, blackboard
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. Vlad Bande – Digital lecture notes – available on Teams		
8.2 Applications	Teaching methods	Notes
1. Basics about Labor Protection, Prevention and Firefighting inside the PCC 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. RC and RL Circuits' Behavior in the AC Regime. 11. RC and RL Circuits' Behavior in the Transient Regime. 12. 2nd Theoretical Test (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. Vlad Bande – Digital lecture notes – available on Teams. 5. Applications - digital format – available on Teams.		

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

The acquired competences and skills will be mandatory for future graduates in order to fulfil the requirements of an employer which activates in the electronics and telecommunications branch.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Lecture	Theoretical subjects, Problem 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 (problem solving - T1, T2) - 60%. 1 practical test (TP) – 40%.	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 (ML): Weighted grade: **ML = 0,3xT1 + 0,3xT2 + 0,4xTP** - at least 5/10.
2. Exam (ME): Grade at least 5/10.
3. Final grade mathematical formula (MF): **MF=0,5xML + 0,5xME**.

Filling Date:	Resposibles	Title/Forname/Surname	Signatures
21.06.2023	Lecture	SL. dr. ing. Vlad Bande	
	Applications	SL. dr. ing. Vlad Bande	
		SL. dr. ing. Alexandra Fodor	

Approval date in the Applied Electronics Department 30.06.2023	Head of the department, Prof.dr.ing. Dorin Petreuş
Approval date in the Faculty Council ETTI 12.07.2023	Dean, Prof.dr.ing. Aurel Ovidiu Pop