SYLLABUS

1. Program information

1.1 Higher education institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Bases of Electronics
1.4 Field of study	Electronic engineering, telecommunications and information technologies
1.5 Cycle of study	Bachelor of Science
1.6 Study program / Qualification	Electronic engineering, telecommunications and information technologies/ Engineer
1.7 Form of education	IF – full-time education

2. Course information

2.1 Course title	Basics of Electrotechnics I				Course code	13.00
2.2 Course coordinator	Prof. Denisa STET – Denisa.Stet@ethm.utcluj.ro					
2.3 Seminar	Prof. Denisa STET – Denisa.Stet@ethm.utcluj.ro					
2.4 Year of study	I	2.5 Semester	2	2.6 Type of assessment		E
2.7 Course status	Formative category					DF
	Optionality					DOB

3. Estimated total time

3.1 Hours per week	4	of which:	3.2 Lecture	2	3.3 Seminar	2	3.3 Laboratory	0	3.3 Project	0	3.3 Practical training	0
3.4 Hours per semester	56	of which:	3.5 Lecture	28	3.6 Seminar	28	3.6 Laboratory	0	3.6 Project	0	3.3 Practical training	0

3.7 Time distribution (hours per semester) for individual study and assessment:	
(a) Assessment	3
(b) Study using textbook, course materials, bibliography, and notes	28
(c) Additional documentation in the library, on specialized electronic platforms, and in the field	-
(d) Preparation for seminars/laboratories, assignments, reports, portfolios and essays	10
(e) Tutoring	3
(f) Other activities	-
3.8 Total hours of individual study and assessment (sum of (3.7(a)...3.7(f))	44
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credits	4.0

4. Prerequisites (where applicable)

4.1 curriculum	N/A
4.2 competencies	Basic knowledge of mathematics, physics, and electricity; understanding of fundamental electrical circuit laws and theorems.

5. Requirements (where applicable)

5.1. for the development of the lecture	Existence of multimedia infrastructure
5.2. for the development of the seminar/ laboratory/ project	Existence of multimedia infrastructure

6. Specific competencies acquired

Professional competencies	C1. Use of fundamental elements related to electronic devices, circuits, systems, instrumentation and technology C1.1 Description of the operation of electronic devices and circuits and of the fundamental methods for measuring electrical quantities. C1.2 Analysis of low-/medium-complexity electronic circuits and systems for their design and measurement. C4. Design and use of low-complexity hardware and software applications specific to applied electronics C4.1 Definition of the concepts, principles and methods used in: computer programming, high-level and specific languages, CAD techniques for creating electronic modules, microcontrollers, computer-system architecture, programmable electronic systems, graphics and reconfigurable hardware architectures. C4.2 Explanation and interpretation of the requirements specific to hardware and software structures in the fields of: computer programming, high-level and specific languages, CAD techniques for creating electronic modules, microcontrollers, computer-system architecture, programmable electronic systems, graphics and reconfigurable hardware architectures. C5. Application of basic knowledge, concepts and methods from: power electronics, automatic systems, electrical energy management and electromagnetic compatibility C5.1 Definition of the specific elements that characterize electronic devices and circuits in the fields of: power electronics, automatic systems, electrical energy management, medical electronics, automotive electronics and consumer goods. C5.2 Qualitative and quantitative interpretation of the operation of circuits in the fields of: power electronics, automatic systems, electrical energy management, medical electronics, automotive electronics and consumer goods; analysis of operation from the standpoint of electromagnetic compatibility.

Transversal competencie	

7. Expected learning outcomes

Knowledge	- The student/graduate describes, identifies and summarizes elementary concepts and methods related to electronic devices, circuits and instrumentation, as well as their application in concrete problems.
Skills	- The student/graduate uses fundamental methods for measuring electrical quantities and assesses electronic devices and circuits, as well as linear and digital integrated circuits of low/medium complexity. - The student/graduate designs, measures, evaluates performance, diagnoses and troubleshoots functional blocks composed of low/medium-complexity electronic devices and/or circuits.
Responsibility and autonomy	- The student/graduate carries out project management processes in electronics, telecommunications and information technologies, taking on different team roles and clearly and concisely describing the results, both orally and in writing.

8. Course objectives (based on the grid of specific competencies acquired)

8.1 General objective of the course	On successful completion of this course, students will be able to: analyze the operation of linear circuits in response to DC, sinusoidal, non-sinusoidal and transient waveforms.
8.2 Specific objectives	- To present systematically the basic theory of electric circuits -To introduce electrical components and the fundamental laws that govern the behavior of an electrical circuit in case of 1) DC and AC circuits; 2) two-ports networks; 3) steady-state periodic non-sinusoidal regime; 4) transient regime of linear circuits; 5) three-phase circuits.

9. Contents

9.1 Lecture	**No. of hours**	**Teaching methods**	**Remarks**
1. Introduction to the circuit theory and recap of fundamental principles of electricity and physics	2	On-site lecture (problematization, debate, case studies, evaluation)	The course will be delivered in the form of presentations, discussions and
2. Methods and theorems for the analysis of the DC circuits	2		
3. Linear electric circuits in the sinusoidal steady state	2		

9.1 Lecture	No. of hours	Teaching methods	Remarks
4. Symbolic representation of sinusoidal quantities, linear complex electric circuits equations	2		mathematical demonstrations on the blackboard, completed with multimedia tools such as graphics tablet and presentations in .ppt format
5. Equivalent impedances	2		
6. Conservation of power, energy transfer	2		
7. Resonance in electric circuits	2		
8. Methods and theorems for the analysis of the AC circuits	2		
9. Two-port networks	4		
10. Three-phased electric circuits	2		
11. Non-sinusoidal steady state	4		
12. The transient regime of the linear electric circuits	4		
Bibliography [1] Ch. K. Alexander, M.N.O. Sadiku, "Fundamentals of Electric Circuits", Eg. Mc Graw Hill, 2012; [2] R.C. Dorf, J.A. Svoboda, "Introduction in Electric Circuits", Ed. Johm Wiley & Sons, Inc., 1996; [3] RV Ciupa, V Topa,The Theory of Electric Circuits, Ed. Casa Cartii de Stiinta Publishing House, 2003; [4] RV Ciupa, Bazele electrotehnicii. Teorie și aplicații. (vol.1-157 pag., vol.2 -277 pag.), Ed. Casa Cărții de Știință Cluj-Napoca.			

9.2 Seminar	No. of hours	Teaching methods	Remarks
1. Methods of solving DC circuits (equivalent resistances, Kirchhoff's laws, Ohm's law, superposition theorem, the method of loop currents),	2	On-site lecture (problematization, debate, case studies, evaluation)	The seminars will be delivered in the form of presentations, discussions and mathematical demonstrations on the blackboard
2. Methods of solving DC circuits (the method of node-voltages, maximum power transfer, Thevenin and Norton equivalent network theorems)	2		
3. Mathematical operations with sinusoidal quantities. Representation of sinusoidal functions by vectors and complex number. The phase diagrams	2		
4. Method of solving AC circuits using phase diagrams	2		
5. Method of solving AC circuits (equivalent impedances, Kirchhoff' s current and voltage laws)	2		
6. Method of solving AC circuits (method of loop currents, method of node-voltage)	2		
7. Method of solving AC circuits (Thevenin and Norton equivalent network theorems, the conservation of complex power)	2		
8. Resonance in electrical circuits	2		
9. Two – port networks – finding the ABCD, impedance and admittance parameters	2		

9.2 Seminar	No. of hours	Teaching methods	Remarks
10. Two – port networks – equivalent T and Π networks, the interconnection of twoport networks	2		
11. Steady –state periodic non-sinusoidal regime – finding the coefficients of the Fourier series	2		
12. Network analysis in non-sinusoidal regime (resonance, power balance for nonsinusoidal periodic variables)	2		
13. Transmission lines (determination of primary and secondary line parameters, voltage and current waves on long lines)	2		
14. Review of the methods and theorems	2		
Bibliography [1] Ch. K. Alexander, M.N.O. Sadiku, "Fundamentals of Electric Circuits", Eg. Mc Graw Hill, 2012; [2] D. Micu, L. Darabant, D. Stet sa, "Teoria circuitelor electrice. Probleme, Ed. UTPress, 2016.			

10. Alignment of the course contents with the expectations of the epistemic community, professional associations, and representative employers in the field related to the program

The course content and the teaching-learning-assessment methods are aligned with the current requirements of the Electronics, Telecommunications, and Information Technology Engineering field, considering the expectations of the academic and professional community, representative employers, as well as the national quality assurance standards in higher education. The course helps prepare students in line with employer expectations and the quality requirements set for engineering study programs.

11. Assessment

Activity type	11.1 Assessment criteria	11.2 Assessment methods (and type of assessment: continuous/ summative)	11.3 Weight in final grade
11.4 Lecture	The level of acquired theoretical knowledge and practical skills	Exam	40%
11.5 Seminar	The level of acquired knowledge and abilities		60%
11.6 To demonstrate knowledge of the fundamental laws that govern electrical circuit behavior and to apply them correctly in solving practical problems.			

Completion date:	**Course coordinators**	**teaching rank, title First nam2e LAST NAME**	**Signature**
23.06.2026	Lecture	Prof. Phd. Eng. Denisa STET	
	Applications (Seminar)	Prof. Phd. Eng. Denisa STET	

Approval of the Head of the Department coordinating the course, only if this differs from the department organizing the study program	Head of the Electrotechnics and Measurements Department Prof. Dan D. MICU, Ph.D.

Date of approval by the Council of the Department of Bases of Electronics 26.06.2026	Head of the Bases of Electronics Department Prof. Sorin HINTEA, Ph.D.
Date of approval by the Council of the Faculty of Electronics, Telecommunications and Information Technology 30.06.2026	Dean, Prof. Ovidiu-Aurel POP, Ph.D.