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	Electrotechnics and measurements
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	Applied Electronics / Engineer
1.7 Form of education	Full time
1.8 Subject code	13.00 *(https://etti.utcluj.ro/planuri-de-invatamant.html)*

2. Data about the subject

2.1 Subject name	**BASES OF ELECTROTECHNICS I**						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assistant professor Denisa STET – Denisa.Stet@ethm.utcluj.ro						
2.4 Teacher in charge with seminar / laboratory / project	Assistant professor Denisa STET – Denisa.Stet@ethm.utcluj.ro						
2.5 Year of study		2.6 Semester		2.7 Assessment		2.8 Subject category	

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	40
Supplementary study in the library, online specialized platforms and in the field	-
Preparation for seminars / laboratories, homework, reports, portfolios and essays	28
Tutoring	3
Exams and tests	3
Other activities:	-

3.7 Total hours of individual study	48
3.8 Total hours per semester	104
3.9 Number of credit points	4

4. **Pre-requisites** (where appropriate)

4.1 curriculum	N / A
4.2 competence	Relations and theorems for electric circuits; analysis methods for electric circuits; transfer function

5. **Requirements** (where appropriate)

5.1. for the course	Existence of multimedia infrastructure
5.2. for the seminars / laboratories / projects	Existence of multimedia infrastructure

6. Specific competences

Professional competences	**Theoretical knowledge (what the student must know):** ✓ This course should stimulate students' interest, for they often tend to view a course in EM as a dry experience, which does not go beyond mathematical manipulations. ✓ The more logical presentation of the traditional approach can be made sufficiently exciting to engineering students by relating the theory to real-world problems which are covered in the application sections **Acquired skills (what the student is able to do):** ✓ To enable the student to solve various types of theoretical problems using methods and theorems ✓ To enable the student to analyse and study electronic circuits by means of quadripoles. ✓ To convince students that their understanding of many areas, such as solid state, physical electronics, microwaves, etc. depends on EM **In accordance with Grila1 and Grila2 RNCIS:** C1. To use the fundamental elements regarding electronic devices, circuits, systems, instrumentation and technology; C4. To design and use low complexity hardware and software applications, specific to applied electronics; C5. To apply knowledge, concepts and basic methods from power electronics, automated systems, electric energy management, electromagnetic compatibility.
Cross competences	

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

7.1 General objective	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.
7.2 Specific objectives	- To present systematically the basic theory of the 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; 5) transmission lines.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1. Introduction to the circuit theory. lines	On-site lecture (problematization, debate, case studies, evaluation)	The course will be delivered in the form of presentations, discussions and mathematical demonstrations on the blackboard, completed with multimedia tools such as graphics tablet and presentations in .ppt format
2. Direct current circuits (Kirchhoff theorems, ideal sources, node analysis, loop analysis, Thevenin and Norton equivalent generator)		
3. Linear electric circuits in the sinusoidal steady state.		
4. Symbolic representation of sinusoidal quantities, linear complex electric circuits equations		
5. Equivalent impedances		
6. Power, conservation of complex power, energy transfer		
7. Resonance in electric circuits (series, parallel, real, inductively coupled circuits)		
8. Methods and theorems for the analysis of the a.c. circuits (elements of topology and graph theory, transfiguration methods).		
9. Two-port networks (the physical significance of the parameters, connections, equations, equivalent circuit diagrams)		
10. Three-phased electric circuits		
11. Non-sinusoidal steady state		
12. The transient regime of the linear electric circuits (continuity conditions, first order circuits, second order circuits).		
13. The transient regime of the linear electric circuits (Laplace transform, Fourier transform, state equations).		
14. Transmission lines		
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.		
8.2 Seminar	Teaching methods	Notes
1. Methods of solving D.C. circuits (equivalent resistances, Kirchhoff’s laws, Ohm’s law, superposition theorem, the method of loop currents),	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 D.C. circuits (the method of node-voltages, maximum power transfer, Thevenin and Norton equivalent network theorems)		
3. Mathematical operations with sinusoidal quantities. Representation of sinusoidal functions by vectors and complex number. The phase diagrams		
4. Method of solving A.C. circuits using phase diagrams		
5. Method of solving A.C. circuits (equivalent impedances, Kirchhoff’ s current and voltage laws)		
6. Method of solving A.C. circuits (method of loop currents, method of node-voltage		

7. Method of solving A.C. circuits (Thevenin and Norton equivalent network theorems, the conservation of complex power)		
8. Resonance in electrical circuits		
9. Two – port networks – finding the ABCD, impedance and admittance parameters		
10. Two – port networks – equivalent T and Π networks, the interconnection of twoport networks		
11. Steady –state periodic non-sinusoidal regime – finding the coefficients of the Fourier series		
12. Network analysis in non-sinusoidal regime (resonance, power balance for nonsinusoidal periodic variables)		
13. Transmission lines (determination of primary and secondary line parameters, voltage and current waves on long lines)		
14. Review of the methods and theorems		
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.		

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 organizations and the employers in the field, where the students carry out the internship stages and/or occupy a job, and the expectations of the national organization for quality assurance (ARACIS).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	Exam (online/onsite)	40%
10.5 Seminar	The level of acquired knowledge and abilities		60%
10.6 Minimum standard of performance: final grade ≥ 5			
To know 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; 5) transmission lines.			

Date of filling in:	Responsible	Title Surname NAME	Signature
11.07.2024	Course	As. Prof. Phd. Eng. Denisa STET	
	Applications	As. Prof. Phd. Eng. Denisa STET	

Date of approval in the Department of ……..

Head of Department

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Date of approval in the Council of Faculty of Electronics, Telecommunications and Information Technology

Dean
Prof. Ovidiu POP, PhD eng.

_____11.07.2024_____