SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electrical Engineering
1.3	Department	Electrotechnics and Electrical Measurements
1.4	Field of study	Electronics and Telecommunications Engineering
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-E14.00, EA-E14.00

2. Data about the subject

2.1	Subject name					Basis of Electrotechnics					
2.2	Subject area					Basis of electrotechnics					
2.3	Course responsible/lecturer					Prof. Vasile Topa					
2.4	Teachers in charge of applications					Assistant Prof. Mihaela Cretu, PhD					
2.5	Year of study	I	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DD/DI

3. Estimated total time

Year / Sem.	Subject name	No. of weeks	Course [hours/week]	Applications [hours/week] S	L	P	Course [hours/sem.]	Applications [hours/sem.] S	L	P	Indiv. study	TOTAL	Credits
I / 2	Theory of electric circuits	14	2	2			28	28			44	100	4

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications 2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	applications 28

Individual study	Hours
Manual, lecture material and notes, bibliography	10
Supplementary study in the library, online and in the field	-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	28
Tutoring	3
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	44
3.8	Total hours per semester	100
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	Amphitheatre, Cluj-Napoca
5.2	For the applications	Laboratory, Cluj-Napoca

6. Specific competences

<table>
<tr><td rowspan="4">Professional competences</td><td>Theoretical knowledge (what the student must know):</td><td>• 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</td></tr>
<tr><td>Acquired skills (what the student is able to do):</td><td>• To enable the student to solve various types of theoretical problems using methods and theorems
• To enable the student to analyze 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</td></tr>
<tr><td>Acquired abilities: (what type of equipment the student is able to handle)</td><td>After completing the discipline, the students will be able to:

- use the lab instrumentation (power supply, oscilloscope, function generator, multimeter, voltmeter, ampermeter) for the experimental study of electric circuits
- connect the lab instrumentation to different experimental boards, in order to study electric circuits</td></tr>
<tr><td>In accordance with Grila1 and Grila2 RNCIS</td><td>C1. To use the fundamental elements regarding electronic devices, circuits, systems, instrumentation and technology
C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission.
C5. To select, install, configure and exploit fixed and mobile telecommunications equipment. To equip a site with common telecommunications networks.</td></tr>
<tr><td colspan="2">Cross competences (Grila1 and Grila2 RNCIS)</td><td>N.A.</td></tr>
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7. Discipline objectives (as results from the key competences gained)

7.1	General objectives	• to provide a grounding in the electrical circuits theory • to present the fundamental notions necessary in the study of an a.c. circuit
7.2	Specific objectives	• Recognizing and understanding basic concepts specific to fundamental electric circuits. • Developing skills and abilities necessary for the use of fundamental electric circuits.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction to the circuit theory.	Presentation, exemplification, solving problems, teaching exercise, case study, evaluation	Use of .ppt presentation, projector, blackboard
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		

8.2. Applications (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)	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, white/magnetic board
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 two-port 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 non-sinusoidal 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. The Theory of Electric Circuits, authors: RV Ciupa, V Topa, Casa Cartii de Stiinta Publishing House, 2003
2. Bazele electrotehnicii. Teorie și aplicații. (vol.1-157 pag., vol.2 -277 pag.), RV Ciupa, Editura Casa Cărții de Știință Cluj-Napoca, ISBN 973-686-849-4 (vol.1), ISBN 973-686-880-X (vol.2) – in Romanian
3. Electric circuits, author: Balabanian N.N., Mc Graw-Hill, 1994

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

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. Evaluations

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
Course	The level of acquired theoretical knowledge and practical skills	Three hours written examination	70%
Applications	The level of acquired abilities	Continuous assessment	30%
10.4 Minimum standard of performance			
N = 0,7 E + 0,3 S (E =exam grade, S=seminar grade) N≥5; S≥5;			

Date of filling in	Course responsible	Teachers in charge of applications
1.10.2018	Prof. Vasile TOPA, PhD	Assist. Prof. Mihaela Cretu, PhD