COURSE GUIDE
2019-2020

Dean, Prof. Daniela Tărniceriu

1. Program info

1.1 Higher education institution	"Gheorghe Asachi" Technical University of Iaşi
1.2 Faculty / Department	Electronics, Telecommunications and Information Technology
1.3 Department	Telecommunications and Information Technologies
1.4 Field	Electronic Engineering, Telecommunications and Information Technology
1.5 Study level	Bachelor's Degree Studies
1.6 Study program / Qualification	Telecommunications Systems and Technologies

2. Course info

2.1 Course name: **Fundamentals of Electrical Engineering I**						Code: EDID131	
2.2 Course organizer (lecturer)		Lecturer Cristina Vatavu					
2.3 Teaching assistants		Lecturer Cristina Vatavu					
2.4 Year of study	1	2.5 Semester	1	2.6 Assessement	VP	2.7 Type of subject	DID

3. Estimated total time (hours per semester for teaching activities)

3.1 Number of hours per week	4	3.2 lecture	2	3.3 seminar/laboratory	2
3.4 Total number of hours in curricula	56	3.5 lecture	28	3.6 seminar/laboratory	28

Time distribution	hours
Textbook, course support, references and course notes study	28
Library, electronic platforms and on site documentation	6
Seminar/laboratory preparation, homework, reports, portfolios and essays	14
Tutoring	14
Assessment	2
Other activities	-

3.7 Total individual study hours	64
3.9 Total hours per semester	120
3. 10 Number of credit points	5

4. Prerequisites (where applicable)

4.1 curricula type	• No
4.2 competence type	• cognitive competencies on mathematics

5. Infrastructure (where applicable)

5.1. for lectures	• Conference room with video projector, projection shield and blackboard. • Internet access, Moodle accounts for students
5.2. for laboratories	• Electrical components, power supplies, signal generators, cables, measuring devices. • The laboratory activities are compulsory and each student presents a written report at the end of each class.

6. Specific competences

			ECTS[i]: 5	ECTS Distribution[ii]
Professional competences	CP1	The acquisition of energy, power, voltage, and current intensity notions		0.5
	CP2	The understanding of network topology		0.5
	CP3	The application of Kirchhoff Laws		0.5
	CP4	The reduction, transformation, and equivalence of the circuits		0.5
	CP5	The determination of a signal with divider rule		0.5
	CP6	The determination of a signal applying different analysis methods		0.5
	CPS	The ability to merge the theoretically assimilated knowledge with technical skills		0.8
Interdisciplinary competences	CT1	Developing teamwork abilities		0.3
	CT2	Efficient communication		0.3
	CT3	Creativity developing		0.3
	CTS	Process-orientated technical skills developing		0.3

7. Course targets (as resulting from 6. Specific competences table)

7.1 Course main target	Introduce the fundamental theorems and analysis techniques for problem-solving in electrical circuit theory. Provide students with the knowledge and intellectual skills necessary to model and analyze circuits in a wider electrical engineering and electronics context. Develop practical and written skills by providing laboratory experiments and tutorial exercises which demonstrate electrical circuit theory.
7.2 Course specific targets	1. Explain terms and symbols used for DC electrical circuits. 2. State the basic components of a DC electrical circuit. 3. Describe the differences between schematic and wiring diagrams. 4. Differentiate between various resistive circuits such as series, parallel, and series-parallel circuits. 5. Use Kirchhoff's law to solve for unknowns in various resistive circuits. 6. Solve for unknowns within a circuit using various network theorems. 7. Mastering the general techniques of circuit analysis: Kirchhoff and node voltages. 8. Simplifying circuits using component associations and Thevenin/Norton equivalents.

8. Contents

8. 1 Lectures	**Teaching methods**	**Notes**
1. Definition of physical quantities: current, voltage, energy, and power. Basic circuit components. Basic electrical values. Circuit topology. Ohm's Law, Kirchhoff's Laws.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	6 hours
2. Circuit reduction techniques: series, parallel, voltage divider, current divider, delta-star conversion, voltage and current source conversions. Equivalent resistance. Transformations.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	4 hours
3. Circuit analysis techniques: Kirchhoff and node voltage analysis.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	4 hours
4. Circuit theorems: superposition principle, Thevenin and Norton theorems.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	4 hours
5. Power in direct current circuits: power of two-port, power balance, source-load matching.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	4 hours
6. AC circuits with steady-state sinusoidal excitation. Basic concepts of frequency, angular frequency, phase shift, amplitude, peak-to-peak, and root-mean-square values. Mathematical representation of sinusoidal voltages and currents, phasor representation, complex number representation of voltage and current phasors, the j operator and its application in circuit analysis. Complex impedance, admittance, resistance, reactance, conductance and susceptance. Solution of simple circuits by combining impedances in series and parallel.	Oral presentation of theory and numerical examples, Solving exercises, case studies.	6 hours
8. 2a Seminar	**Teaching methods**	**Notes**
	Observation, analog correlation, algorithmic formulation, discovery	
8. 2b Laboratory	**Teaching methods**	**Notes**
1. Work safety training. General concepts relating to electrical devices and measurement techniques. 2. Circuits representation and topological analysis. 3. Voltage measuring. Kirchhoff's voltage law. Voltage divider.	Observation, experiment, analog correlation, simulation - modeling, discovery	2 hours 2 hours 2 hours

4. Current measuring. Kirchhoff's current law. Current divider.		2 hours
5. Network transformation and reduction. Resistors grouping.		2 hours
6. On-going verification activity (VP1)		2 hours
7. Circuits analysis with superposition theorem.		2 hours
8. Circuit analysis with nodal voltages method.		2 hours
9. Maximum power transfer theorem applying.		2 hours
10. On-going verification activity (VP2)		2 hours
11. A.c. signals measurement. Verification of Kirchhoff's laws in frequency domain.		2 hours
12. Determination of a.c. steady-state characteristics of consumers with and without magnetic couplings.		2 hours
13. Electrical resonance in RLC circuits.		2 hours
14. On-going verification activity (VP3)		2 hours

References:
1. E-course on http://edu.etti.tuiasi.ro/course/view.php?id=122
2. https://www.academia.edu/35781350/Basic_Engineering_Circuit_Analysis_by_J.David_Irwin_R.Mark_Nelms_10th_Edition.pdf
3. Iustina Zaharia , Bazele electrotehnicii. Teoria circuitelor electrice , editia a IIa, Editura Tehnopress, 2013

9. Course contents corroboration with the expectations of the epistemic community representatives, professional associations and relevant employers in the field of the program

The objectives of the course and the used teaching methods have goal to develop in students the idea of competence, the spirit of competitiveness, creativity, imagination, technical skills, seriousness and responsibility.

10. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Percentage of final grade
10.4 Lectures	Theoretical knowledge acquired (quantity, correctness, accuracy)	Periodically evaluation: written examination week 6 - VP1 week 10 – VP2 week 14 – VP3	80 % (minimum grade 5)
	Problem solving capabilities		
10.5a Seminar	Frequency / relevance of interventions or responses		
10.5b Laboratory	Knowledge of devices, how to use specific instruments; the evaluation of some tool, the processing and interpretation of results	Continuously evaluation: practical demonstration	20%
10.6 Minimum performance standard			
Proper application of Kirchhoff's Laws.			

Completion date:
09/10/2019

Course organizer signature,
Lecturer Cristina Vatavu

Teaching assistant signature,
Lecturer Cristina Vatavu

Department approval date,
16/02/2019

Department director signature,
Assoc. Prof. Luminița Scripcariu