Syllabus

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Automation and Computer Science
1.3 Departament	Automation
1.4 Field of study	Systems Engineering
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Automation and Applied Informatics (English)
1.7 Form of education	Full time
1.8 Codul disciplinei	10.00

2. Data about the subject

2.1 Subject name	Electrotechnics				
2.2 Course responsible/lecturer	Assoc.Prof.Eng.Ec. Claudia PĂCURAR, Dr.Habil - Claudia.Pacurar@ethm.utcluj.ro				
2.3 Teachers in charge of applications	Assist.Eng. Sergiu ANDREICA, PhD Student - Sergiu.Andreica@ethm.utcluj.ro Assist. Eng. Marian GLIGA, PhD Student – Marian.Gliga@ethm.utcluj.ro				
2.4 Year of study	1	2.5 Semester	2	2.6 Assessment *(E/C/V)*	C
2.7 Type of subject	*DF – fundamental, DID – in the field, DS – specialty, DC – complementary*				DD
	DOB – compulsory, DOP – elective, FAC – optional				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	3	Seminar	0	Laboratory	1	Project	0
3.2 Number of hours per semester	56	of which:	course	42	Seminar	0	Laboratory	14	Project	0
3.3 Individual study										
(a) Manual, lecture material and notes, bibliography										30
(b) Supplementary study in the library, online and in the field										15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										28
(d) Tutoring										5
(e) Exams and tests										5
(f) Other activities:										0

3.4 Total hours of individual study (sum of (3.3(a)…3.3(f)))	83
3.5 Total hours per semester (3.2+3.4)	125
3.6 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	Mathematics
4.2 Competence	Differential and integral equations, vectorial calculation

5. Requirements (where appropriate)

5.1. For the course	Attendance is not required
5.2. For the applications	The laboratory classes can be recovered according with the ECTS rules!!! All the presences are required to be allowed at the laboratory colloquium (test) and then at the exam!!!

6. Specific competences

6.1 Professional competences	Ability to identify, formulate, and solve engineering problems in a systemic approach Ability to approach and manage specific applications of electrical engineering Ability to know the particularities of electrical circuits in different function regimes The ability to determine the flow of currents, voltage drops and to perform power balances in specific applications of electrical circuits.
6.2 Cross competences	Flexibility in approaching and using in practice the latest existing technologies in the assumed areas of competence Ability to work in a team Flexibility to use the knowledge acquired in the subjects previously studied

	Flexibility to apply the knowledge acquired to the specialized subjects of the following years

7. Course objectives

7.1 General objective	Development of skills, abilities and competencies in the domains of the electromagnetic field and electrical circuit analysis by acquiring fundamental knowledge, for the correct approach and solution of the electromagnetic field problems and electrical circuits problems, in permanent regime (steady state - direct current (dc) and/or single-phase (sinusoidal) and three-phase alternating current (ac)), in transient regime, respectively in permanently periodically non-sinusoidal regime, for the purpose of designing and measuring them for use in concrete applications
7.2 Specific objectives	Ability to address specific issues of electromagnetic fields and electrical circuits Ability to solve specific problems of electromagnetic fields and electrical circuits Ability to use in practical applications the fundamental theorems of electromagnetic fields and electrical circuits

8. Contents

8.1 Lecture	No.hours	Teaching methods	Notes
Introduction to the Theory of the Electromagnetic Field. Electrostatic Field. Specific Laws of the Electrostatic Field. Electric Capacitance - Calculation Methods. Applications. Capacitors connections. Applications. Energies and Forces in Electrostatic Field	3	The courses presentation in electronic form ppt on-line using Microsoft Teams platform	On-line/ Face to face teaching
Electrokinetic Field. Specific Laws of the Electrokinetic Field. Resistance – Methods used to calculate resistance. Applications. Resistors Connections. Applications. Magnetic Field. Specific Laws of the Magnetic Field.	3		
Inductivities - Calculation Methods. Magnetic Circuit. Law Electromagnetic Induction Law. Energies and Forces in Magnetic Field	3		
Introduction to the Theory of Electric Circuit. Elements of Circuit Topology. *Electric Circuits in Steady-state Regime (Direct Current)*	3		
Laws and Theorems used to solve Direct Current Electric Circuits. Applications	3		
Laws and Theorems used to solve Direct Current Electric Circuits. Applications	3		
Electric Circuits in Harmonic Regime (Alternating Current). Periodic Quantities. Sinusoidal quantities. Complex impedance. Equivalent Impedance with and without Coupling	3		
Powers in Harmonic Regime. Resonance in Electrical Circuits (Series, Parallel, Mixt)	3		
Laws and Theorems for solving Electric. Circuits in Alternating Current. Applications	3		
Methods for solving Electrical Circuits in Alternating Current. Applications.	3		
The Theory of Electric Two Port Networks (Quadripoles)	3		
The three-phase alternating current electric circuits	3		
Study of Electrical Circuits in Transitory Regime	3		
Linear Circuits in Non-sinusoidal Regime	3		

Bibliography

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2. R. Ciuoa, V. Topa, The Theory of Electric Circutis, Casa Cartii de Stiinta, 1998
3. E. Simion, T. Maghiar, Electrotehnica, EDP București, 1981
4. C. Sora, Bazele electrotehnicii, EDP București, 1982
5. C. Mocanu, Teoria circuitelor electrice, EDP București, 1979
6. M Iordache, L. Dumitriu, Teoria moderna a circuitelor electrice, Ed. All Educational, 2000
7. Gh. Mîndru, Teoria circuitelor electrice, Ed. UTPRESS Cluj-Napoca, 2004

8. M. Preda, P. Cristea, F. Manea, Bazele electrotehnicii – probleme, EDP București, 1980
9. R. Răduleț, Bazele electrotehnicii – probleme, EDP București, 1981

8.2 Applications (seminar/laboratory/project)	No.hours	Teaching methods	Notes
Labor protection. Presentation of the laboratory and of the equipment	2	The laboratory classes are carried out by the practical realization of the different assemblies for the experimental verification of the course chapters, with the active involvement of the students.	Face to face teaching
Determining the spectrum and equipotential surfaces of an electric field with an electrokinetic model. Electrical model for Laplace's finite difference equation applied to the determination of equipotential surfaces and the spectrum of an electrostatic field.	2		
The study of a magnetic circuit. Drawing a hysteresis cycle and measurement of iron losses with an oscilloscope.	2		
Study of a direct current circuit	2		
The study of resonance phenomena. Passive dipole study.	2		
The study of a passive quadrupole (two ports network).	2		
Laboratory colloquium	2		

Bibliography
1. Păcurar Claudia, Giurgiuman Nicoleta-Adina, Crețu Mihaela, Marian-Răzvan Gliga, Andreica Sergiu-Iulian, Bazele electrotehnicii, Îndrumător de laborator, Editura U.T.Press, Cluj-Napoca, România, ISBN 978-606-737-492-6, 156 pagini, 2020.
2. E. Simion, T.D. Gligor, Gh. Mindru, R. Ciupa, V. Popescu, D. Micu, M. Topa, V. Topa, Bazele electrotehnicii – indrumator de laborator, Atelierul de multiplicare al Institutului Politehnic Cluj-Napoca, 1987.

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

Analyzes electric, magnetic, and electromagnetic phenomena using their quantitative characterizations, and implicitly mathematical modeling of these phenomena, for their technical applications.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Verification of theoretical (T) and applicative knowledge (P)	Theory- Quiz (T) Applications- 2 problems (P)	40% 50%
Laboratory	Laboratory colloquium	Laboratory test(L)	10%
Minimum standard of performance: $L \geq 5 \quad T+P \geq 5;\ N=(0.4T+0.5P+0.1L) \geq 5$			

Date of filling in:		**Title First name NAME**	**Signature**
01.04.2023	Course	Assoc.Prof.Eng.Ec. Claudia PĂCURAR, PhD	
	Applications	Assist.Eng. Sergiu ANDREICA, PhD Student Assist. Eng. Marian GLIGA, PhD Student	

Date of approval by the Department Board ……..

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Head of Departament .....
Prof.dr.ing. Honoriu VĂLEAN

Date of approval by the Faculty Council ……

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Dean
Prof.dr.ing. Liviu Cristian MICLEA