SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Electrical Engineering
1.3	Department	Electrotechnics and Measurements
1.4	Field of study	Electrical Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/ Qualification	Electrical System Cluj-Napoca in English language
1.7	Form of education	Full time
1.8	Subject code	40

2. Data about the subject

2.1	Subject name				Use of electricity (UE)	
2.2	Course responsible/ lecturer				Assoc. Prof. Eng. Anca Miron, PhD.	
2.3	Teachers in charge of Seminars/ Laboratory/ Project				Assoc. Prof. Eng. Anca Miron, PhD.	
2.4 Year of study		III	2.5 Semester	1	2.6 Type of assessment *(E – exam, C – colloquium, V – verification)*	C
2.7 Subject category		*DF – fundamental, DD – in the field, DS – specialty, DC – complementary*				DS
		DI – compulsory, DO – elective, Dfac – optional				DI

3. Estimated total time

3.1 Number of hours per week:	4	of which	3.2 Course	2	3.3 Seminar	0	3.3 Laboratory	2	3.3 Project	0
3.2 Total hours per semester	56	of which	3.5 Course	28	3.6 Seminar	0	3.6 Laboratory	28	3.6 Project	0

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	16
(b) Supplementary study in the library, online and in the field	8
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
(d) Tutoring	4
(e) Exams and tests	6
(f) Other activities	0
3.8 Total hours of individual study *[sum (3.7(a) to 3.7(f))]*	44
3.9 Total hours per semester *[sum of 3.4 and 3.8]*	100
3.10 Number of credit points	4

4. Prerequisites (where applicable)

4.1	Curriculum	Introduction in Electrician Engineering, Physics, Circuits theory
4.2	Competences	-

5. Requirements (where appropriate)

5.1	For the course	Cluj-Napoca
5.2	For the applications	Cluj-Napoca

6. Specific competences

Professional competences	Theoretical skills: • Knowledge of the main types of electricity consumers. • Mastering the mechanisms for transforming electricity into other forms of energy. • Knowing the main types of electrical receivers that carry out this transformation. After completing the course, students will acquire the following skills: • the ability to distinguish between different electrical consumers. • the knowledge of the main characteristics of electrical energy transformation technologies. • the knowledge of the most efficient methods of transforming electricity into other forms of energy for the user. • the ability to master the main theoretical knowledge to approach the design stages of electrical receivers intended for the transformation of electrical energy. At the end of the course, students will be able to: • choose electrical light sources. • choose the optimal network connection scheme for lighting devices. • size the protection installation against accidents by indirect touches. • use different types of electric ovens. • use different sources for electric welding.
Cross competences	The correct choice and use of bibliographic sources, norms, standards and specific methods, under conditions of limited autonomy and qualified assistance, as well as its support with the demonstration of the capacity for qualitative and quantitative evaluation of some technical solutions in the use of electricity.

7. Discipline objectives (based on specific competencies acquired)

7.1	General objective	Development of skills in the field of electricity use.
7.2	Specific objectives	• Characteristics of lighting systems. • Characteristics of heating installations. • Characteristics of welding installations.

8. Contents

8.1. Course (Lectures)		Number of hours	Teaching methods	Additional remarks
1	The power system, types of receivers and consumers, the place of the power consumer in the structure of the power system	2	In the teaching process will be used the multimedia means that are provided in the faculty's classrooms,	video projector
2	Methods of protection to prevent electrocution accidents	2		
3	Electric lighting – sizes and photometric units, methods for generating light	2		
4	Lighting devices with incandescent and discharge electrical lamps	2		
5	LED lighting devices	2		
6	Industrial electrothermal installations – general principles regarding the transformation of electrical	2		

	energy into thermal energy, equivalent electrical schemes, energy indicators		and through an interactive teaching style, the aim will be to attract students to the didactic process to correctly understand the concepts taught.	
7	Resistance heating – direct resistance heating, indirect resistance heating, infrared radiation heating	2		
8	Electromagnetic induction heating - principle, equivalent circuit diagram, indicators, crucible and channel furnaces, volume and surface heating	2		
9	Electric arc heating - principle, electric arc in circuits powered by direct and alternating voltage, priming and stabilization of the arc, types of furnaces, electrical power supply schemes	2		
10	Heating of dielectric materials (capacitive and microwave) - principle, frequency ranges used, equivalent circuit diagram, determination of the power developed in the material, heating of inhomogeneous materials	2		
11	Electric welding - principle, classifications, areas of use, technologies	2		
12	Electric arc welding – types of welding, characteristics of types of welding	2		
13	Pressure welding – types of welding, characteristics of welding types	2		
14	The effects of electricity use on the power system and the environment	2		

Bibliography

[1] Miron, A. Use of electricity. Course notes

[2] The Lighting Handbook, Zumtobel Lighting GmbH, https://www.zumtobel.com/PDB/teaser/EN/lichthandbuch.pdf

[3] Sergio Lupi, Fundamentals of Electroheat: Electrical Technologies for Process Heating, Springer Nature Publishing House, ISBN: 9783319460147

[4] J. Paulo Davim, Welding Technology, Springer Nature Publishing House, ISBN: 9783030639884

8.2. Applications - Laboratory		Number of hours	Teaching methods	Additional remarks
1	Laboratory 1. Electrical labour protection. Presentation of laboratories, Electric quantities characteristic of indirect touches electrocution	4	Exposure and applications	
2	Laboratory 2. Automatic fault current protection. Automatic fault voltage protection	4		
3	Laboratory 3. Installation diagrams for fluorescent tubes. High pressure metal vapor lamps. The supply of different types of electrical light sources	4		
4	Laboratory 4. Automatic control of the outdoor lighting installation.	4		
5	Laboratory 5. Study of dielectric heating, heating with RI, indirect resistance heating, and induction heating.	4		
6	Laboratory 6. The study of the deforming regime produced by a nonlinear receiver. The study of the unbalanced regime	4		

7	Laboratory 7. Verification of acquired knowledge (for the quota in the final grade)	4		

Bibliography

[1] Miron, A, Cziker,A. şi Chindriş,M. Utilizarea energiei electrice. Suport pentru laborator. Editura U.T. PRESS, Cluj-Napoca, 2018 (in Romanian)

9. Alignment of course content with expectations of the epistemic community, professional associations, and representative employers in the field

The skills obtained will be necessary for future graduates who will work in the field of electrical engineering, and in the field of electrical engineering in general.

10. Assessment

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade (%)
10.4 Course	The answer to 4 questions from the material taught in the course	Colloquium	50 %
10.5 Laboratory	Making an electrical assembly	Practical assessment	50 %
10.6 Minimum standard of performance: Understanding of basic concepts and terminology; Problem solving. Recognition of electrical receptors.			

Date of completion	Lecturers	Title/ Surname/ Name:	Signature
September 2024	Course	Assoc. Prof. Eng. MIRON Anca, PhD.	
	Applications Laboratory	Assoc. Prof. Eng. MIRON Anca, PhD.	

Date of approval in the ETHM Department Council

September 2024

Head of Department:
Prof. Eng. MICU Dan Doru, PhD

Date of approval in the Faculty of Electrical Engineering Council

September 2024

Dean:
Assoc. Prof. Eng. CZIKER Andrei, PhD