SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics Beius/ Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject		**Electrical equipments**					
2.2 Holder of the subject		Lecturer dr. ing. Stasac Claudia Olimpia					
2.3 Holder of the academic seminar/laboratory/project		Lecturer dr. ing. Stasac Claudia Olimpia					
2.4 Year of study	3	2.5 Semester	5	2.6 Type of the evaluation	Ex - Examination	2.7 Subject regime	Domain Discipline

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	-/2/-
3.4 Total of hours from the curriculum	56	Of which: 3.5 course	28	3.6 academic seminar/laboratory/project	-/28/-
Distribution of time					48 hours
Study using the manual, course support, bibliography and handwritten notes					20
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					10
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					10
Tutorials					-
Examinations					4
Other activities.					
3.7 Total of hours for individual study	**44**				
3.9 Total of hours per semester	**100**				
3.10 Number of credits	4				

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrotechnics, Electrical Technology
4.2 related to skills	Knowledge of electrical diagram symbols.

5. Conditions (where applicable)

5.1. for the development of the course	The course can be held face-to-face or online
5.2.for the development of the academic seminary/laboratory/project	the laboratory can be carried out face to face or online - Equipment related to laboratory hours - Preparation of the report, knowledge of the notions contained in the laboratory work to be performed (synthesis material); -

	Carrying out all laboratory work.
6. Specific skills acquired	
Professional skills	*- C3. Use of fundamental knowledge of electrotechnics* *- C5. Design and coordination of experiments and tests* *- C6. Diagnosis, troubleshooting and maintenance of electrical systems and components*
Transversal skills	

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ The Electrical Equipment course is designed to present modern interdisciplinary issues regarding the study of electrical equipment. Through the approached topic, the course is meant to allow students to acquire basic knowledge, in the first stage, on the main phenomena that occur in the operation of electrical appliances, and in the second stage of knowledge on the maintenance of electrical equipment . The course is also meant to facilitate students to develop skills and competencies in the issue of correct choice of equipment that is part of electrical installations.
7.2 Specific objectives	▪ The laboratory works are designed to provide future electromechanical engineers with practical skills in the study, maintenance of electrical appliances, construction, research, operation, repair and maintenance of electrothermal installations. The content of the seminar presented is based on the need to deepen the problems presented in the course. Students have the opportunity to identify electrical supply diagrams of electrical equipment, familiarity with modern means of measuring temperature, electrical parameters during the operation of electrical equipment. They will understand the complexity and usefulness and maintenance of these facilities and will treat them as such. Knowledge is useful in developing skills in addressing the specific problems faced by a specialist in electromechanics.

8. Contents*

8.1 Course	Teaching methods Teaching is done "online", or "face-to-face" depending on requirements	No. of hours/ Observations
1. The place and importance of electrical equipment in industrial installations	During the teaching, students' contributions on the specific topics of the course are requested. Some courses are conducted by teaching topics and debating them by students.	2
2. Clasification of the electrical devices	idem	2

3. Electrical contact	idem	2
4. Calculation of resistance and heating of contacts	idem	2
5. Thermal effects in electrical equipments	idem	2
6. Electromagnet as a component of electrical apparatus	idem	2
9. Relays and triggers. Operating characteristics. Constructive types.	idem	2
10 .. Intermediate, current and time relays. Their role, construction and typical patterns of use	idem	2
11. Contactors. Their role, construction and typical patterns of use	idem	2
12. Low voltage circuit breakers. Principles of electric arc extinguishing	idem	2
13. Medium and high voltage circuit breakers. Separators. Role, constructive types	idem	2
14. Modern trends in the construction of electrical equipment	idem	2

Bibliography

[1 C. Stasac, D. Hoble – Electric devices. Fundamentals and applications - University of Oradea Publishing House - 2022

[2]. D. Hoble, C. Staşac - Electrical Apparatus and Equipment - University of Oradea Publishing House - 2004

[3] D. Hoble, C. Cheregi - Electrical Installations - University of Oradea Publishing House - 2004

[4] I. Hortopan - Electrical appliances - EDP 1996

[5] T.Maghiar, D.Hoble, L.Bandici - Installations and use of electricity - University of Oradea Publishing House - 2000

[6] D.Hoble - Electrical appliances: Practical applications - Oradea University Publishing House - 2002

[7] T. Maghiar D. Hoble .S. Paşca, M.Popa - - Installations and use of electricity Laboratory guide - University of Oradea - 1998

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Labor protection standards specific to electrical equipment. Basic notions and concerns study of electrical equipment.	In the first laboratory hour will be presented by the teacher coordinating the laboratory works of the notions related to labor protection specific to electrical equipment.	2
2. Electrical conductors. Constructive types. Calculation of conductors.	Presentation to the students of the prepared report (synthesis material). The laboratory guide can be found in printed format in the Laboratory, and	2

	in the University Library, the students having permanent access to the didactic materials. - Test regarding the theoretical knowledge related to the seminar - Carrying out experimental determinations - Interpretation of the obtained results.	
3. Electrical contacts. The influence of the pressing force.	idem	2
4. The electromagnet. Construction. Operation.	idem	2
5. The electromagnet. The influence of the air gap. Coil cage.	idem	2
6. Fuses.	idem	2
7. Automatic fuses.	idem	2
8. Relays and triggers. Constructive types.	idem	2
9. Intermediate relays.	idem	2
10. Time relays	idem	2
11. Electrical contactors.	idem	2
12. Surveillance relays	idem	2
13. Realization of a complex scheme on the existing modules in the laboratory. Choice of equipment.	idem	2
14. Realization of a complex scheme on the existing modules in the laboratory. Practical realization.	idem	2

Bibliography

[1]. D. Hoble, C. Staşac - Electrical Apparatus and Equipment - University of Oradea Publishing House – 2004
[2] D. Hoble, C. Cheregi - Electrical Installations - University of Oradea Publishing House - 2004
[3] I. Hortopan - Electrical appliances - EDP 1996
[4] T.Maghiar, D.Hoble, L.Bandici - Installations and use of electricity - University of Oradea Publishing House - 2000
[5] D.Hoble - Electrical appliances: Practical applications - Oradea University Publishing House - 2002
[6] T. Maghiar D. Hoble .S. Paşca, M.Popa - - Installations and use of electricity Laboratory guide - University of Oradea – 1998
[7] *** Catalogs of existing laboratory equipment.

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- The content of the subject is in accordance with the one in other national or international universities. In order to provide a better accomodation to the labour market requirements, there have been organized meetings both with representatives of the socio-economic environment and with academic staff with similar professional interest fields.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	-- For grade 5: all	Written examination	75 %

	subjects must be treated to minimum standards; For grades> 5 all subjects must be treated to standards imposed by the grading scale;		
10.6 Laboratory	-- In the last laboratory session the students will present the works performed, respectively the results obtained.	Knowledge assessment test	25 %
10.8 Minimum performance standard: - Carrying out works under the coordination of a teacher, to solve specific problems of the study of electrical equipment and maintenance, maintenance and diagnosis of electrical equipment with the correct assessment of workload, available resources, time required and risks, in conditions of application of occupational safety and health regulations. Principle of operation and maintenance diagnosis, composition of electrical equipment.			

Completion date 29.08.2022 Course owner's signature Signature of the laboratory owner

Lecturer. dr. ing. STAȘAC CLAUDIA OLIMPIA Lecturer dr. ing. STAȘAC CLAUDIA OLIMPIA

Date of endorsement in the Electrical Engineering department:

01.09.2022 Prof.univ. dr. ing.inf.habil. Hathazi Francisc Ioan

Date of endorsement in the Faculty Board:
23.09.2022 Prof.univ.dr.ing.habil. Mircea Gordan

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics (at Beius) / Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject			Electrical installations				
2.2 Holder of the subject			Assoc. prof. Pasca Sorin				
2.3 Holder of the academic seminar/laboratory/project			Assoc. prof. Pasca Sorin				
2.4 Year of study	3	2.5 Semester	6	2.6 Type of the evaluation	Ex - Exam	2.7 Subject regime	Specialized Discipline

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	3	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	-/1/-
3.4 Total of hours from the curriculum	42	of which: 3.5 course	28	3.6 academic seminar/laboratory/project	-/14/-

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	14
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	5
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	14
Tutorials	-
Examinations	3
Other activities.	

3.7 Total of hours for individual study	**33**
3.9 Total of hours per semester	**75**
3.10 Number of credits	**3**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Previous subjects: Theory of electrical circuits, Electric and electronic measurements, Electrical machines, Electrotechnic materials, Electrical equipments
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	Teaching activities will normally take place face to face. If special measures will be imposed in the epidemiological context generated by the COVID-19 pandemic, the courses can be held online.
5.2.for the development of the academic seminary/laboratory/project	

6. Specific skills acquired

Professional skills	▪ **C3.2.** Explanation and interpretation of the operating modes of static, electromechanical converters, electrical and electromechanical equipments ▪ **C3.5.** Design of electromechanical or electrical installations ▪ **C6.2.** Identification and selection of components for operation, maintenance and integration in electromechanical systems
Transversal skills	

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ acquiring basic knowledge of electrical installations, especially low voltage electrical installations
7.2 Specific objectives	▪ skills regarding reading and understanding a technical documentation, with the knowledge of the representation of equipment and apparatus in the diagrams of electrical installations ▪ knowledge of energy characteristics of consumers ▪ knowledge of the characteristics and role of equipment and apparatus in the structure of electrical installations at consumers ▪ knowledge the structure of the different categories of electrical installations, of the variants of equipping the circuits, columns and supply points ▪ knowledge the basics and measures taken to ensure the quality of electricity to consumers, reliable operation of installations and reduction of losses ▪ skills regarding the sizing, choice and adjustment of equipment and apparatus in the structure of electrical installations ▪ knowledge of protection measures against electric shocks, as a principle and as a method of implementation in electrical installations

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Installations for the production, transmission, distribution and use of electricity 1.1 Basic processes related to the use of electricity 1.2 Electric power system 1.3 Effects of electric current on the elements of the electrical installation 1.4 Accidental contact of the elements of the electrical installation with the human body 1.5 Contact of the elements of the electrical installation with the ground	For on-site activity: Presentation with video-projector and additional explanations on the blackboard	2
2. Electrical installations - basics 2.1. Categories of electrical installations 2.2. Elements of the installation - equipments and conductive paths 2.3. The structure of an installation. Electrical circuit - the basic unit of the installation 2.4. Technical documentation for an electrical installation	For the on-line activity: The university's e-learning platform and / or Microsoft Teams, in video-audio conferencing mode, are used	2
3. Quality conditions in the supply of electricity to consumers 3.1. Disturbances in the power supply network 3.2. Electricity quality indicators 3.3. Continuity in power supply		2

4. Transformer stations and substations 4.1. Transformer stations. Primary circuits, secondary circuits, own services and auxiliary installations 4.2. Determination of the number and power of transformers. Aspects of economic functioning 4.3. Medium voltage distribution 4.4. Transformer substations 4.5. Basics of protection by relays	For on-site activity: Presentation with video-projector and additional explanations on the blackboard	4
5. Power supply of industrial equipment and receivers 5.1. Power system components 5.2. Consumer electrical distribution networks 5.3. Diagrams of low voltage electrical networks 5.4. Impedance of the supply path in radial networks and impedance of passive receivers		2
6. Electrical loads in networks 6.1. Power circulation in the alternating current network 6.2. Electrical calculation of loads. Principles for determining the required power 6.3. Coefficient of demand method 6.4. Calculation currents for common receiver circuits and for columns	For the on-line activity: The university's e-learning platform and / or Microsoft Teams, in video-audio conferencing mode, are used	2
7. Conductors used in electrical installations 7.1. Types of conductors in low voltage electrical installations 7.2. Symbolization of conductors and cables 7.3. Maximum permissible stresses for different types of conductors 7.4. Choice of conductor section		2
8. Switching and protection apparatus in electrical installations 8.1. Types of apparatus and their functions 8.2. Switching apparatus. Specific issues. 8.3. Protection of receivers and circuits in low voltage electrical installations. Protection of electrical columns. Conditions of provision. 8.4. Correlation of the characteristics of the devices in the low voltage network. Selectivity		4
9. Power factor compensation in industrial electrical installations. 9.1. Reactive power circulation. Power factor 9.2. Causes and effects of reactive power consumption 9.3. Methods for reducing reactive power flow 9.4. Sizing of capacitor banks and related equipment		2
10. Electric shock protection installations 10.1. Direct touch, indirect touch, step voltage 10.2. Protective measures against electric shock 10.3. Grounding installations - construction, sizing		2
11. Voltage loss in low voltage electrical networks 11.1. Low voltage power line - line impedance, equivalent wiring diagram and calculation diagram 11.2. Voltage drop, voltage loss, voltage deviation - definitions 11.3. Determination of voltage losses in lines with concentrated load, respectively with distributed load, without peak loads 11.4. The influence of peak loads on the calculation of voltage losses 11.5. Checking for voltage loss		2
12. Electrical installations related to buildings		2

Bibliography (selection)

1. D. Comşa, ş. a., *Design of industrial electrical installations* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983
2. P. Dinculescu, F.Sisak, *Electrical Instalations and equipments* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983

3. S. Darie, I. Vădan, *Production, transmission and distribution of electricity* (in Romanian), Technical University Press, Cluj-Napoca, 2000
4. P. Dinculescu, *Low voltage industrial electrical instalations* (in Romanian), Matrix Rom Press, Bucharest, 2003
5. P. Dinculescu, *Schematics of electrical installations: principles of drawing up and reading* (in Romanian), Matrix Rom Press, 2005
6. V. Maier ș.a., *Electric Power Quality* (in Romanian), Technical University Press, Cluj-Napoca, 2012
7. C. Bianchi ș.a., *Design of electric lighting installations* (in Romanian), Technical Publishing House, Bucharest, 1981
8. E. Pietrăreanu, *The electrician's diary* (in Romanian), Technical Publishing House, Bucharest, 1986
9. J. Ignat ș.a., *Low voltage electrical installations and networks* (in Romanian), Matrix Rom, Bucureşti, 2003
10. * * * SCHNEIDER - *Electrical Installation Guide* (in Romanian), Schneider Electric, Bucharest, 2003
11. * * * *Norm for the design, execution and operation of electrical installations related to buildings, I7 – 2011* (in Romanian), Official Gazette of Romania, part I, no. 802 bis, 14.11.2011
12. T. Maghiar, M. Popa, S. Pașca, *Electrical Installations and Electric Power Use. Electrical lighting installations, design guide*, University of Oradea Press, 1998
13. S. Pașca, *Electrical Installations – lecture notes* (electronic)

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Protective measures against electric shock, Part I		2
2. Protective measures against electric shock, Part II		2
3. Experimental determination of grounding resistance		2
4. Ensuring the supplementary power supply to consumers		2
5. Power factor compensation in industrial electrical installations		2
6. Electrical installations for buildings		2
7. Verification of knowledge and evaluation of activity at laboratory classes		2

Bibliography (selection)

1. D. Comșa, et al, *Design of industrial electrical installations* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983
2. P. Dinculescu, F.Sisak, *Electrical Instalations and equipments* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983
3. P. Dinculescu, *Low voltage industrial electrical instalations* (in Romanian), Matrix Rom Press, Bucharest, 2003
4. P. Dinculescu, *Schematics of electrical installations: principles of drawing up and reading* (in Romanian), Matrix Rom Press, 2005
5. S. Pavel, et al, *Applications on Power Quality* (in Romanian), Technical University Press, Cluj-Napoca, 2012
6. * * * SCHNEIDER - *Electrical Installation Guide* (in Romanian), Schneider Electric, Bucharest,2003
7. * * * *Norm for the design, execution and operation of electrical installations related to buildings, I7 – 2011* (in Romanian), Official Gazette of Romania, part I, no. 802 bis, 14.11.2011
8. T. Maghiar, M. Popa, S. Pașca, *Electrical Installations and Electric Power Use. Electrical lighting installations, design guide*, University of Oradea Press, 1998
9. S. Pașca, *Electrical Installations – laboratory works* (electronic)

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- The content of the subject is in accordance with the one in other national or international universities. In order to provide a better accomodation to the labour market requirements, there have been organized meetings both with representatives of the socio-economic environment and with academic staff with similar professional interest fields.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	- exam grade, Ex	- Students will take a written exam, after which they will get the grade Ex; - If special measures will be imposed in the epidemiological context generated by the COVID-19 pandemic, the exam can beheld online, using the e-learning platform of the University of Oradea or the Microsoft Teams platform, in compliance with the requirements imposed by the *Methodology for conducting didactic activities during the academic year*.	75 %
10.5 Laboratory	- the final grade for laboratory activity, L	- the students will take a test (set of questions) on the laboratory works, after which they will obtain the grade TL - another DL grade will be given on the personal laboratory file (complete file, experimental data processing, themes and applications solved correctly) - final grade for the laboratory activity results: $L = (TL + DL) / 2$ - requirements: $TL \geq 5$, $DL \geq 5$	25 %
10.8 Minimum performance standard: - Passing the exam (obtaining the credits) involves: $Ex \geq 5$ and $L \geq 5$ - The final grade is calculated as follows: $N = 0.75 \cdot Ex + 0.25 \cdot L$			

Completion date:
29.08.2022

Signature of the course holder
Assoc. prof. Sorin Paşca
E-mail: spasca@uoradea.ro

Signature of the laboratory holder
Assoc. prof. Sorin Paşca

Date of endorsement in the department:
01.09.2022

Signature of the head of department
Prof. habil. Francisc-Ioan Hathazi
E-mail: francisc.hathazi@gmail.com

Date of endorsement in the Faculty Board:
23.09.2022

Signature of the dean
Prof. habil. Ioan-Mircea Gordan
E-mail: mgordan@uoradea.ro

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	UNIVERSITY OF ORADEA
1.2 Faculty	Faculty of Electrical Engineering and Information Technology
1.3 Department	Electrical Engineering
1.4 Field of study	Electrical Engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	EMB/ Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject		**Microwave technique**					
2.2 Holder of the subject		prof.PhD. Hathazi Francisc – Ioan					
2.3 Holder of the academic seminar/laboratory/project		--- / ---/ prof.PhD. Hathazi Francisc – Ioan					
2.4 Year of study	III	2.5 Semester	V	2.6 Type of the evaluation	Ex	2.7 Subject regime	SD

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3project	1
3.4 Total of hours from the curriculum	42	Of which: 3.5 course	28	3.6 academic seminar/laboratory/project	14

Distribution of time	58h
Study using the manual, course support, bibliography and handwritten notes	10
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	20
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	10
Tutorials	13
Examinations	5
Other activities.	

3.7 Total of hours for individual study	**58**
3.9 Total of hours per semester	**100**
3.10 Number of credits	**4**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Knowledge of mathematics and physics
4.2 related to skills	PC usage, Electrical engineering, Electrotechnical materials, Electrical measurements, Electronics

5. Conditions (where applicable)

5.1. for the development of the course	- attending at least 50% of the course - the course can be held face to face or online
5.2.for the development of the academic seminary/laboratory/project	- mandatory presence at all seminar hours; - the seminars can be held face to face or online

6. Specific skills acquired

Professional skills	**C4.2** Explain the specific techniques for the analysis, modeling and simulation of electrical systems
Transversal skills	**CT3**. Efficient use of information sources and communication resources and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation.

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ The course "Microwave Technique" proposes a familiarization of students in the field of Electrical Engineering, with knowledge in the field of theoretical electrical engineering and to present electromagnetic phenomena in terms of applications in high frequency technology.
7.2 Specific objectives	▪ Being a specialized discipline in electrical engineering, its objective is to present calculation methods, in a unitary framework, which are necessary to solve problems in classical or modern electrical engineering. ▪ The design part familiarizes students with practical aspects regarding the operation of high frequency electrical systems.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Chapter 1. INTRODUCTORY CONSTITUENTS	Free exposure, with the presentation on-line	2 h
Chapter 2. MICROWAVES	Free exposure, with the presentation on-line	4 h
Chapter 3. WAVEGUIDES	Free exposure, with the presentation on-line	8 h
Chapter 4. MICROWAVE GENERATING SOURCES	Free exposure, with the presentation on-line	4 h
Chapter 5. MICROWAVE CIRCUITS	Free exposure, with the presentation on-line	6 h
Chapter 6. APPLICATIONS	Free exposure, with the presentation on-line	4 h
Total		28 h

Bibliography

1. Andrei, H.L., Popovici, D., Cepișcă, C.- Inginerie Electrică Modernă, vol. 1, Editura Electra București, 250 pp.,

2003, ISBN 973-8067-87-1.
2. Hănţilă, I.F.,s.a., Silaghi, M., Leuca, T.-Elemente de circuit cu efect de câmp electromagnetic Editura ICPE, Bucureşti, 1998.
3. William H.Hyat, John A. Buck, - Engineering Electromagnetics, McGraw Hill, 2000
4. Kose,V.,Sivert, J.- Non – Linear Electromagnetic Systems. Advanced Techniques and Mathematical Methods, IOS Press,1998
5. Maghiar, T., Leuca, T., Silaghi, M.,s.a. - Electrotehnică, curs, Editura Universitaţii din Oradea, 1999
6. Rohde, L.U., Jain, G. C. , Poddar, A.K., Ghosh , A. K.- Introduction to Integral Calculus: Systematic Studies with Engineering Applications for Beginners, Wiley, 2012
7. Sora, C.-Bazele electrotehnicii, Editura Didactică şi Pedagogică , Bucuresti, 1982.
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9. Silaghi , A.M., Pantea, M.D., Silaghi, Helga – Electrotehnica industriala, Editura Universităţii din Oradea, 2010, ISBN 978-606-10-0186-6
10. Süsse,R., Marx,B. – Theoretische Elektrotechnik. Varationsrechnung und Maxwellsche gleichungen,Wissenschaftsverlag Mannhei, 1994, ISBN 3-411-1781-2
hhtp://prola.aps.org

8.2 Academic seminar/laboratory/project	Teaching methods	No. of hours/ Observations
1. General principles on microwave devices and equipment 2. Behavior of dielectric materials in the microwave field and theoretical considerations regarding the microwave heating mode 3. Presentation of the phenomenon corresponding to losses in dielectric materials 4. Drying and heating of dielectrics in the microwave field. 5. Microwave generators and their propagation mode 6 Modeling of electromagnetic and thermal phenomena in the resonant cavity and the sample body 7. Design of microwave generators 8. Design of output circuits and protection and safety circuits. Magnetic circuit design 9. Realization of the assembly scheme for a microwave drying installation 10. Teaching and supporting the project	The students receive the design theme and the design methodology and under the guidance of the teacher they carry out the project stages, online. Free presentation and discussions based on the topics that students have to prepare for that time, online.	4 h 4h 4h 4h 4h 4h 4h

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- The content of the discipline is found in the curriculum of Electrical Engineering and Computers , Electrical or Electromechanical Systems and other university centers in Romania that have accredited these specializations, so knowledge of their basic notions in Electrical Engineering is a stringent requirement of employers in the field (Plexus, Faist Mekatronics, Celestica, Comau, GMAB etc) from the Oradea Industrial Park area.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	Minimum required conditions for passing the exam (mark 5): it is necessary to know the fundamental notions required in the subjects, without presenting details on them 1pt. - ex officio - attendance at the course	Questioner on line with 9 subjects,online	80%

	4PT. - 4 medium-level subjects - For 10: 1pt. - ex officio - attendance at the course 9PT. - 9 medium-level subjects		
10.5 Project	- for 6 the student has to go through the design stages - for 10 it is necessary to go through all the design stages, with the completion of calculations and wiring diagrams.	Free presentation with interactive discussion, on line. Finally, each student receives a grade, separate from the exam, which represents a share of 20% of the final grade, online.	20 %
10.6 **Final exam note:**	**Nfe**=0,8**Nse**+0,2**Np**, **Np**≥6		
10.7 Minimum performance standard: Course:- knowing the construction parts and the principle of operation of different electrical equipment. - solving and explaining problems of medium complexity, associated with fundamental and engineering disciplines, specific to engineering sciences. - participating in at least half of the courses. Project: Carrying out a work / project, as a leader in a multidisciplinary team and responsibly distributing tasks specific to subordinates, adopting a positive attitude and respect for team members. The ability to make such an installation practically.			

Completion date: 29.08.2022

Date of endorsement in the department:01.09.2022

Date of endorsement in the Faculty Board: 23.09.2022

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	**ELECTRICAL ENGINEERING**
1.4 Field of study	**ELECTRICAL ENGINEERING**
1.5 Study cycle	**Bachelor (1st cycle)**
1.6 Study program/Qualification	**ELECTROMECHANICS (at Beius)/ Bachelor of Engineering**

2. Data related to the subject

2.1 Name of the subject				**ELECTRICAL MACHINES II**			
2.2 Holder of the subject				**Associate professor dr.eng. MOLNAR CARMEN OTILIA**			
2.3 Holder of the academic laboratory				**Associate professor dr.eng. MOLNAR CARMEN OTILIA**			
2.4 Year of study	**III**	2.5 Semester	**5**	2.6 Type of the evaluation	**Ex**	2.7 Subject regime	**D**

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	**3**	of which: 3.2 course	**2**	3.3 academic laboratory	**1**
3.4 Total of hours from the curriculum	**42**	Of which: 3.5 course	**28**	3.6 academic laboratory	**14**
Distribution of time					**58**
Study using the manual, course support, bibliography and handwritten notes					**14**
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					**14**
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					**14**
Tutorials					**4**
Examinations					**12**
Other activities.					-

3.7 Total of hours for individual study	**58**
3.9 Total of hours per semester	**100**
3.10 Number of credits	**4**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrical machines I
4.2 related to skills	Appropriate application of fundamental knowledge of electrical machines

5. Conditions (where applicable)

5.1. for the development of the course	The course takes place in the amphitheater with the modern techniques available: video projector, screen, slides and laptop, blackboard. Attendance at classes, minimum 50%
5.2.for the development of the academic seminary /laboratory/project	Mandatory attendance at all laboratories; The students come with their laboratory works A maximum of 1 work can be recovered during the semester; - Failure to attend laboratory hours leads to the restoration of the discipline - The laboratory where the practical activity is carried out has specific stands, with modules related to the practical works. There are also digital and analog measuring devices for currents, voltages, resistances, revolutions and powers)

6. Specific skills acquired	
Professional skills	□ C3. Adequate application of knowledge on the construction of electrical machines, knowledge of their operation, knowledge of electromagnetic and mechanical phenomena specific to electrical machines, electromechanical, electrical equipment and electromechanical drives □ C3.1 Description of the principles of operation of single and three-phase transformers, of direct current electrical machines, of asynchronous and synchronous electrical machines. Understanding and explaining electrical and electronic equipment containing electrical machines □ C3.2 Explanation and interpretation of the operating regimes of electrical machines, of the electrical and electromechanical equipment of which they are part. □ C3.3 Identification of electromechanical systems according to their composition; mathematical modeling, as well as their kinematic and dynamic description
Transversal skills	- CT1. Identification of the objectives to be achieved, available resources, conditions to complete them, working stages, working times, associated deadlines and risks

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ The course "Electrical machines I" is addressed to students from the ELLECTROMECHANICS study program. It is a fundamental specialized discipline that aims to present some theoretical knowledge in the field of electrical machines as well as their specific phenomena in terms of technical applications.
7.2 Specific objectives	• Acquiring information and knowledge on: the place and role of electrical machines in current and modern industry; construction, behavior, structure and operation of electrical machines in a complex system; organization, endowment and maintenance of the systems of which the electrical machines are part; • □ The laboratory works acquaint the students with the practical aspects regarding the operation of electrical machines, with practical aspects regarding the establishment of specific regimes in the laboratory (starting, braking, changing the speed) and ensure the understanding of the basic problems regarding these equipments of the electrical industry.

8. Contents*

8.1 Course	Teaching methods	No. of hours
Chapter 7. Special electric machines Special electrical induction machines Asynchronous linear motor (MAL) *Asynchronous linear motor with short inductor* *The mechanical characteristic of the MAL*	Video projector, slides Interactive blackboard or online teaching. The courses are carried out by teaching the subjects and involving the students in specific dialogues.	2
Two-phase asynchronous machines (MSAB) *Constructive particularities of MSAB* *Ways to order an MSAB* *The principle of operation of the two-phase asynchronous servo motor.* *Mechanical characteristics* Shielded pole micromotor (MPE)		2
Special synchronous electric machines Synchronous stepper motors (MPP) *Constructive features of the MPP* *Reactive stepper motor* *Reactive stepper motor reducer* *Linear hybrid stepper motor* *Permanent Magnet Synchronous Machines (PMMS)*		2
Special electric d.c. machines (MCC) DC motors with static commutation (MCS) DC motors with rotor disc (MCD) *Constructive features and their applications*		2
DC motors with cup rotor (MCP) *Constructive particularities and their applications* **Chapter 8. Special electrical transformers** The three-winding transformer *Functional equations and constructive features*	Video projector, slides Interactive blackboard or online teaching. The courses are carried out by teaching the subjects and involving the students in specific dialogues.	2
The three-winding transformer *Equivalent diagram of the three-winding transformer* *Simplified phasor diagram of the three-winding transformer*		2
Transformers for changing the number of phases		2

Transforming the three-phase system (m =3) into a two-phase system (m=2) of voltages *Changing the number of phases from m = 3 to m = 6* *Changing the number of phases from m = 3 to m = 12* *Connection diagrams*		
Electric measurement transformers *Current transformers (CT)* *Voltage transformers (TT)* Rotary transformers (TERs)		2
Transforming transformers Impulse transformers Transformers for voltage regulation *Adjustment in stages* *The adjustment continues*	Video projector, slides Interactive blackboard or online teaching. The courses are carried out by teaching the subjects and involving the students in specific dialogues.	2
Chapter 9. Electrical amplifier machines Introduction Self-excited amplifier electric machines Cascade connection of amplifier machines		2
Cross-field amplifying electric machines (Amplidina, Metadina) The use of electric amplifier machines in automatic regulation schemes		2
Chapter 10. Other special electric machines Tachogenerators *The principle of operation, construction* Alternating current tachogenerators DC tachogenerators		2
Machines for synchronous transmission systems Magnesine Selsines *Block diagram of an automatic positioning system* *The principle of operation of selsins* *Equations in electromotive voltages, currents, magnetic fields with sinusoidal distribution in space* *Selsines with contact rings and brushes*		2
14. Concluding the course with a recapitulation of the studied theoretical aspects and preparing the details regarding the examination		2

Bibliography

1. Constantin Bălă – Maşini electrice - Ed. Didactic şi Pedagogică, Bucureşti 1982.
2. Biró Károly – Maşini şi acţionări electrice - Litografia IPC-N, Cluj 1987.
3. Ioan Boldea – Transformatoare şi maşini electrice - Ed. Didactică şi Pedagogică, Bucureşti 1994.
4. Aurel Câmpeanu, Vasile Iancu, M. Rădulescu - Maşini în acţionări electrice - Ed. Scrisul Rom, Craiova, 1996.
5. Aurel Câmpeanu – Maşini electrice, Ed. Scrisul Românesc, 1977.
6. Al. Fransua, R. Măgureanu – Maşini şi acţionări electrice. Elemente de execuţie, Ed. Tehnică, Bucureşti, 1986.
7. Ioan Felea – Maşini şi acţionări electrice, Litogr. Univ. din Oradea, 1994.
8. Teodor Leuca – Electrotehnică şi maşini electrice, Institutul de subingineri Oradea, 1988.
9. **Carmen O. Molnar** – Maşini electrice. Note de curs, Forrmat electronic, Oradea 2020.
10. **Carmen O. Molnar** – Maşini electrice. Îndrumător de laborator, Oradea 2018, pag. 212.
11. **Carmen O. Molnar** - Transformatorul electric. Constructie, teorie, proiectare. Editura Universităţii din Oradea, 2010, pag.121. ISBN 978-606-10-0023-4.
12. **Carmen O. Molnar** - Teoria câmpului electromagnetic, Editura Universităţii din Oradea, 2005
13. Teodor Maghiar, Teodor Leuca, Marius Silaghi, Mircea Pantea, Darie Şoproni – Electrotehnică industrială. Îndrumător de laborator, Editura Universităţii din Oradea, 2001
14. Leuca T., **Carmen Otilia Molnar**, Arion M. N. – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014, pag. 472, ISBN 978-606-10-1284-8

8.2 Laboratory	Teaching methods	No. of hours
1. Instructions for work safety technique and methodology for performing laboratory work.	- Presentation of the paper (synthesis material); - Test on the theoretical knowledge acquired during the laboratory; - Interpretation of the results.	2
2. Direct current generator with separate excitation. Operating characteristics		2
3. The three-phase asynchronous motor with the rotor in short circuit.	- Presentation of the	2

Operating characteristics	paper (synthesis material); - Test on the theoretical knowledge acquired during the laboratory; - Interpretation of the results.	
4. Determination of groups of connections to the three-phase transformer		2
5. The no-load and short-circuit test of the three-phase transformer		2
6. Operation of the three-phase transformer under load		2
7. Verification of the acquired knowledge and conclusion of the situation at the laboratory. Recovery of laboratory work	- presenting and handing out the laboratory papers; - the recovery of one missed laboratory is allowed.	2

Bibliography

1. **Carmen Molnar** – Masini electrice. Note de curs Oradea, 2020.
2. **Carmen Molnar** – Maşini electrice. Îndrumător de laborator, Format electronic, Oradea 2018, pag. 212.
3. **Carmen Molnar** - Transformatorul electric. Constructie, teorie, proiectare. Editura Universităţii din Oradea, 2010, pag.121. ISBN 978-606-10-0023-4.

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

 The content of the discipline is adapted to the requirements imposed by the labor market, and is agreed by the social partners, professional associations and employers in the field related to the bachelor program.
 The content of the discipline is found in the curriculum of Electro mechanics and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.), and knowledge types of electrical machines and how they are operated and designed is a stringent requirement of employers.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	In the last course students receive an exam topic which is divided into three parts as follows: the first part (1/2 of the subjects) contains easy level subjects; the second part (1/4 of the subjects) will be medium level subjects and the third part (1/4 of the subjects) will contain difficult level subjects.	Written exam Students receive 1 light level subject and 1 medium level subject to solve. Exam written in the exam room or online with internet connection. Oral examination Students who have obtained the written exam grade 7 are entitled to take the oral examination where each student draw a ticket 1 Level subjects difficult to be submitted to the board in front of colleagues in the room. Oral exam in the exam room or online with internet connection	70 %
10.5 Laboratory	For note 5, Recognition of the stands used to carry out laboratory works, without presenting details on them For note 10, detailed knowledge of how to perform all laboratory work	Students take a test of all laboratory work, in the laboratory or online with internet connection; Each student receives a grade for laboratory work during the semester and for the laboratory work file.	30%

10.6 Minimum performance standard:
Description of operating principles of transformers
Basic knowledge of the construction and operation of electrical machines
Explanation and interpretation of operating modes, phenomena that occur in the operation of electrical machines, electrical and electromechanical equipment
Proper use of electrical machines and monitoring of electromechanical systems

Completion date:
29 Aug. 2022

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Date of endorsement in the department:
1 Sept. 2022

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E-mail: francisc.hathazi@gmail.com

Date of endorsement in the Faculty Board:

23 Sept. 2022

Prof.univ.dr.ing.habil. Mircea Ioan GORDAN
E-mail: mgordan@uoradea.ro

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	**ELECTRICAL ENGINEERING**
1.4 Field of study	**ELECTRICAL ENGINEERING**
1.5 Study cycle	**Bachelor (1st cycle)**
1.6 Study program/Qualification	**ELECTROMECHANICS (at Beius)/ Bachelor of Engineering**

2. Data related to the subject

2.1 Name of the subject				**ELECTRICAL MACHINES II -Project**			
2.2 Holder of the subject							
2.3 Holder of the academic project				**Associate professor dr.eng. MOLNAR CARMEN OTILIA**			
2.4 Year of study	**III**	2.5 Semester	**5**	2.6 Type of the evaluation	**Vp**	2.7 Subject regime	**I**

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	**1**	of which: 3.2 course	**-**	3.3 academic project	**1**
3.4 Total of hours from the curriculum	**14**	Of which: 3.5 course	**-**	3.6 academic project	**14**
Distribution of time					**61**
Study using the manual, course support, bibliography and handwritten notes					**14**
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					**14**
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					**24**
Tutorials					**4**
Examinations					**5**
Other activities.					-

3.7 Total of hours for individual study	**61**
3.9 Total of hours per semester	**75**
3.10 Number of credits	**3**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrical machines I, Electrical machines II
4.2 related to skills	Appropriate application of fundamental knowledge of electrical machines

5. Conditions (where applicable)

5.1. for the development of the project	The project takes place in the amphitheater with the modern techniques available: video projector, screen, slides and laptop, blackboard. Attendance at classes, minimum 50%

6. Specific skills acquired	
Professional skills	□ C3. Adequate application of knowledge on the construction of electrical machines, knowledge of their operation, knowledge of electromagnetic and mechanical phenomena specific to electrical machines, electromechanical, electrical equipment and electromechanical drives □ C3.1 Description of the principles of operation of single and three-phase transformers, of direct current electrical machines, of asynchronous and synchronous electrical machines. Understanding and explaining electrical and electronic equipment containing electrical machines □ C3.2 Explanation and interpretation of the operating regimes of electrical machines, of the electrical and electromechanical equipment of which they are part. □ C3.3 Identification of electromechanical systems according to their composition; mathematical modeling, as well as their kinematic and dynamic description

Transversal skills	- CT1. Identification of the objectives to be achieved, available resources, conditions to complete them, working stages, working times, associated deadlines and risks

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ The "Electrical Machines II" project is addressed to students from the Electromechanics study program. It is a specialized discipline that presents some theoretical knowledge in the field of electric machines as well as their specific phenomena from the point of view of technical applications.
7.2 Specific objectives	• Acquiring information and knowledge regarding: the place and role of electric machines in the current and modern industry; the construction, behavior, structure and operation of electric machines in a complex system; the organization, equipment and maintenance of the systems of which the electric machines are a part; • The laboratory works acquaint the students with the practical aspects regarding the operation of electrical machines, with practical aspects regarding the establishment of specific regimes in the laboratory (starting, braking, changing the speed) and ensure the understanding of the basic problems regarding these equipments of the electrical industry.

8. Contents*

8.1 Project	Teaching methods	No. of hours
Three-phase electric transformer Project theme. Initial data. Bibliography Calculation of the magnetic circuit.	Video projector, slides Interactive blackboard or online teaching. The courses are carried out by teaching the subjects and involving the students in specific dialogues.	2
Definition of nominal sizes. Magnetic circuit section. Determination of the number of turns of the windings.		2
Determining the dimensions of the conductors and the window The mass of the windings and the losses in the windings and in the magnetic circuit. No load current.		2
The performance. Voltage drops and transformer parameters Checking the heating transformer		2
Checking the mechanical demands Plotting the operating characteristics of the transformer (external characteristic, yield characteristic)	Video projector, slides Interactive blackboard or online teaching. The courses are carried out by teaching the subjects and involving the students in specific dialogues.	2
Analysis of special regimes. Connecting the electric transformer to the network in idle state. Sudden three-phase short circuit at the secondary terminals. Deducing the connection diagram of the transformer		2
The end of the project. Verification and delivery		2

Bibliography

1. **Carmen O. Molnar** – Maşini electrice. Notite de curs, Oradea 2016.
2. **Carmen O. Mo**lnar – Maşini electrice. Îndrumător de laborator, Oradea 2010, pag. 212.
3. **Carmen O. Molnar** - Transformatorul electric. Constructie, teorie, proiectare. Editura Universităţii din Oradea, 2010, pag.121. ISBN 978-606-10-0023-4
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9. Teodor Leuca – Electrotehnică şi maşini electrice, Institutul de subingineri Oradea, 1988.
10. **Carmen O. Molnar** - Teoria câmpului electromagnetic, Editura Universităţii din Oradea, 2005
11. Stefan Nagy, Teodor Leuca – Electrotehnică industrială. Aplicaţii practice. Editura Univ. din Oradea, 2003.
12. Teodor Maghiar, Teodor Leuca, Marius Silaghi, Mircea Pantea, Darie Şoproni – Electrotehnică industrială. Îndrumător de laborator, Editura Universităţii din Oradea, 2001

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

 The content of the discipline is adapted to the requirements imposed by the labor market, and is agreed by the social partners, professional associations and employers in the field related to the bachelor program.

□ The content of the discipline is found in the curriculum of Electro mechanics and other university centers that have accredited these specializations (Technical University of Cluj-Napoca, University of Craiova, "Politehnica" University of Timisoara, Gh. Asachi University of Iasi, etc.), and knowledge types of electrical machines and how they are operated and designed is a stringent requirement of employers.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Project	In the last course students receive an exam topic which is divided into three parts as follows: the first part (1/2 of the subjects) contains easy level subjects; the second part (1/4 of the subjects) will be medium level subjects and the third part (1/4 of the subjects) will contain difficult level subjects.	Verification along the way	100 %
10.5 Minimum performance standard: Description of operating principles of transformers Basic knowledge of the construction and operation of electrical machines Explanation and interpretation of operating modes, phenomena that occur in the operation of electrical machines, electrical and electromechanical equipment Proper use of electrical machines and monitoring of electromechanical systems			

Completion date:
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SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics at Beius / Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject			**Electromagnetic compatibility**				
2.2 Holder of the subject			prof.PhD.Hathazi Francisc – Ioan				
2.3 Holder of the academic seminar / laboratory / project			---/ --- / PhD. student Covaciu Mihaela				
2.4 Year of study	III	2.5 Semester	V	2.6 Type of the evaluation	Ex.	2.7 Subject regime	Domain Discipline (DD)

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	- / - / 2
3.4 Total of hours from the curriculum	56	of which: 3.5 course	28	3.6 academic seminar/laboratory/project	- / - / 28
Distribution of time					44 hours
Study using the manual, course support, bibliography and handwritten notes					10
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					10
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					10
Tutorials					4
Examinations					10
Other activities.					---

3.7 Total of hours for individual study	**44**
3.9 Total of hours per semester	**100**
3.10 Number of credits	**4**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	---
4.2 related to skills	Competences corresponding to the first 3 years of preparation for the degree in Electrical Engineering

5. Conditions (where applicable)

5.1. for the development of the course	The course can be taken face-to-face or online. Laptop, video projector, magnetic board, free speech.
5.2.for the development of the academic seminary/laboratory/project	- / - / The project can be held face-to-face or online. Computer network with workstation for each student, access to software that is studied in the course, network access to the Internet

6. Specific skills acquired

Professional skills	• C.1. Adequate application of basic knowledge of mathematics, physics, specific chemistry, in the field of electrical engineering; • C.3. Operation with fundamental concepts in electrical engineering.

Transversal skills	• CT.1. – Identifying the objectives to be achieved, the available resources, the conditions for their completion, the work stages, working hours, deadlines and related risks; • CT.2. – Identify roles and responsibilities in a multidisciplinary team and apply effective relationship and work techniques within the team

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	• It addresses the notions regarding electromagnetic compatibility, sources of disturbances, coupling mechanisms and anti-disturbance measures, passive elements for antiparasitic, norms and standards of electromagnetic compatibility, as well as elements related to concrete industrial applications.
7.2 Specific objectives	• anti-disturbance design of a circuit; • recognition of electromagnetic interference problems and diagnosis of the cause

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course 1. Electromagnetic compatibility field. Disturbing signals. Levels of disturbance.	Laptop, video projector, IQ Board, free speech	2
Course 2 Sources of natural disturbances. Solar radiation. Nuclear electromagnetic pulse.	Laptop, video projector, IQ Board, free speech	2
Course 3 Sources of disturbances caused by human activities. Reverse band disturbances. Radio transmitters. Industrial and medical frequency generators.	Laptop, video projector, IQ Board, free speech	2
Course 4 Sources of broadband interference. Manifold engines. Electronic power converters. Gas discharge lamps. Car ignition systems.	Laptop, video projector, IQ Board, free speech	2
Course 5 Transient phenomena. Electrostatic discharges. Inductance switching. Transient phenomena in electrical networks. High voltage tests.	Laptop, video projector, IQ Board, free speech	2
Course 6 Types of couplings in circuits with concentrated constants. Galvanic couplings, inductive couplings, capacitive couplings.	Laptop, video projector, IQ Board, free speech	2
Course 7 Types of couplings in circuits with distributed constants. Common impedance couplings, magnetic field couplings, electric field couplings.	Laptop, video projector, IQ Board, free speech	2
Course 8 Flat electromagnetic wave coupled with transmission lines. Multi-line lines	Laptop, video projector, IQ Board, free speech	2
Course 9 Plane wave programming in environments with different properties. Plane wave reflection and refraction.	Laptop, video projector, IQ Board, free speech	2
Course 10 The penetration of the plane wave into conductive environments. Screen effect.	Laptop, video projector, IQ Board, free speech	2
Course 11	Laptop, video projector, IQ	2

Electromagnetic screen theory. Screen enclosure materials and accessories.	Board, free speech	
Course 12 Procedures used in electromagnetic compatibility. Earthing and grounding. Filters. Ferrite rings.	Laptop, video projector, IQ Board, free speech	2
Course 13 Surge arresters. Differential transmissions and twisted pair cables. Shielding. Optocouplers and optical filters.	Laptop, video projector, IQ Board, free speech	2
Course 14 Circuit design from the EMC point of view	Laptop, video projector, IQ Board, free speech	2

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1. Hathazi Francisc – Ioan – Compatibilitate electromagnetică – Note de curs, - în curs de editare;
2. Schwab, A. - Compatibilitate Electromagnetica. Bucuresti, 1996.
3. Hortopan, Gh., - Principii si tehnici de compatibilitate electromagnetica, Bucuresti, 2005.
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8. Perez, M. – Handbook of Electromagnetic Comatibility, Academic Press, 1995, ISBN 0-12-550710-0
9. Williams, T. - EMC for Product Designers, Newness, Oxford, 1999, ISBN 0-7506-2466-3.
10. Tsaliovich, A., - Electromagnetic Shielding Handbook for Wired and Wireless EMC Applications , Kluwer Academic Publishers, 1999.

8.2 Seminar	Teaching methods	No. of hours/ Observations

8.3 Laboratory	Teaching methods	No. of hours/ Observations

Bibliography

1. Răduleţ, R. - Bazele electrotehnicii, Probleme, vol. I,II,III, Ed. Did. şi Ped., Bucureşti, 1981.
2. Leuca, T., Maghiar, T. - Electrotehnică, Probleme, vol.IV, Litografia Univ. din Oradea, 1994.
3. Arion Mircea – Note de seminar – În curs de apariţie
4. Leuca, T. - Bazele electrotehnicii - îndrumător de laborator, litografiat Univ. din Oradea, 1991
5. Molnar Carmen, Arion M. – Electrotehnică. Aplicaţii practice – Editura Universităţii din Oradea, 2003.
6. Arion Mircea – Teoria circuitelor electrice II - Notiţe de Laborator – în curs de apariţie;

8.4 Project	Teaching methods	No. of hours/ Observations
Topic 1 – Analysis of electromagnetic pollution generated by induction furnaces.	Laptop, video projector, free speech, internet connection	
Topic 2 – Analysis of electromagnetic pollution generated by microwave ovens. Industrial ovens / domestic ovens.	Laptop, video projector, free speech, internet connection	
Topic 3 – Harmonic pollution analysis generated by three-phase microwave ovens.	Laptop, video projector, free speech, internet connection	
Topic 4 – Analysis of electromagnetic pollution in Oradea due to trams.	Laptop, video projector, free speech, internet connection	
Topic 5 – Analysis of harmonic pollution generated by air conditioners.	Laptop, video projector, free speech, internet connection	
Topic 6 – Harmonic pollution analysis generated by induction hobs.	Laptop, video projector, free speech, internet connection	
Topic 7 – Harmonic pollution analysis generated by DIY appliances.	Laptop, video projector, free speech, internet connection	
Topic 8 – Harmonic pollution analysis generated by different lighting fixtures.	Laptop, video projector, free speech, internet connection	
Topic 9 – Analysis of techniques and methods for reducing electromagnetic interference.	Laptop, video projector, free speech, internet connection	
Topic 10 – Analysis of electricity quality indicators.	Laptop, video projector, free	

Issues and improving the quality of electricity.	speech, internet connection	

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- The content of the discipline is in accordance with what is taught in other profile faculties both from the University of Oradea and from other university centers in the country and abroad. For a better adaptation to the requirements of the labor market of the content of the discipline, meetings were held both with representatives of the business environment and with teachers from pre-university education.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	Oral examination	The evaluation can be done face-to-face or online. Oral examination of students	70 %
10.5 Seminar	---	---	---
10.6 Laboratory	---	---	---
10.7 Project	Final evaluation test	The evaluation can be done face-to-face or online. Oral assessment - test, report.	30%
10.8 Minimum performance standard: • Carrying out the works under the coordination of a teacher, in order to solve specific problems in the electrical field with the correct evaluation of the workload, resources available for the necessary time to complete the risks, under the conditions of application of occupational safety and health norms.			

Completion date:
29.08.2022

Date of endorsement in the department:
01.09.2022

Date of endorsement in the Faculty Board:
23.09.2022

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	DEPARTMENT OF ELECTRICAL ENGINEERING
1.4 Field of study	ELECTRICAL ENGINEERING
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electrical Systems Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject			**USE OF ELECTRICAL ENERGY**				
2.2 Holder of the subject			**Conf.dr.ing. BANDICI LIVIA**				
2.3 Holder of the academic seminar / laboratory / project			**Conf.dr.ing. BANDICI LIVIA – Project** **Şef lucr.dr.ing. GAL TEOFIL - Laboratory**				
2.4 Year of study	IV	2.5 Semester	8	2.6 Type of the evaluation	Ex	2.7 Subject regime	DS

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	6	of which: 3.2 course	2	3.3 laboratory project	1 1
3.4 Total of hours from the curriculum	56	Of which: 3.5 course	28	3.6 laboratory project	14 14
Distribution of time					hours
Study using the manual, course support, bibliography and handwritten notes					**5**
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					**5**
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					**5**
Tutorials					**4**
Examinations					**3**
Other activities.					**-**

3.7 Total of hours for individual study	**22**
3.9 Total of hours per semester	**78**
3.10 Number of credits	**3**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrical engineering, Electrical installations
4.2 related to skills	Knowledge of the symbols, specific graphics, electrical diagrams.

5. Conditions (where applicable)

5.1. for the development of the course	- Video projector, computer. - The course can be held face to face or online.
5.2.for the development of the academic seminary/laboratory/project	- Equipment related to laboratory hours; - Preparation of the report, knowledge of the notions contained in the laboratory work to be performed (synthesis material); - Carrying out all laboratory work. - The laboratory can be held face to face or online.

6. Specific skills acquired	
Professional skills	**C3. Adequate application of knowledge on energy conversion, electromagnetic and mechanical phenomena specific to static, electromechanical converters, electrical equipment, and electromechanical drives** **C.5. Automation of electromechanical processes**

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	The course "Use of electrical energy" aims to familiarize the students with the study and usefulness of equipment used in lighting systems, respectively in welding. Students have the opportunity to get acquainted with various lighting and welding installations, learn practical skills in their construction, sizing, operation, and maintenance.
7.2 Specific objectives	The laboratory works are designed to provide future engineers with practical skills in the design, construction, research, operation, repair, and maintenance of lighting and welding installations.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
I. General concepts on the use of electrical energy	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
II. Production of light radiation 2.1. Light radiation 2.2. Light generating phenomena 2.3. Photometric quantities and units	Idem	2
2.4. Behaviour of light in contact with different materials 2.5. Photometric measurements	Idem	2
III. Electrical light sources 3.1. Classification of light sources 3.2. Incandescent light sources	Idem	2
3.3. Light sources with discharges	Idem	2
3.4. Light sources with gas discharge	Idem	2
IV. Luminaires and equipment used in lighting systems 4.1. Luminaires 4.2. Characteristics of luminaires 4.3. Classification of luminaires	Idem	2
4.4. Luminaires for incandescent filament lamps 4.5. Luminaires for hollow fluorescent lamps	Idem	2
4.6. The main characteristics of luminaires for lamps with high pressure mercury vapour discharge and fluorescent balloon 4.7. Projectors	Idem	2
V. Electrical welding of metals 5.1. Classification of joints 5.2. The phenomenology of the electric arc	Idem	2
5.3. Study patterns of the electric arc in welding processes	Idem	2
5.4. The stability of the source-electric arc system 5.5. The transfer of material in the welding process with fused electrode	Idem	2
5.6. Welding processes 5.6.1. Manual arc welding, with wrapped electrode 5.6.2. Arc welding in controlled atmosphere, with fused electrode	Idem	2
5.6.3. Arc welding in controlled atmosphere 5.6.4. Wrapped arc welding, with fused electrode	Idem	2

Bibliography

1. Livia Bandici, Dorel Hoble - *Utilizări ale energiei electrice în echipamentele de iluminat şi sudură*. Editura Universităţii din Oradea, 2009.
2. Livia Bandici, Dorel Hoble – *Utilizări ale energiei electrice*. Editura Universităţii din Oradea, 2007.
3. C. Bianchi, ş.a – *Sisteme de iluminat interior şi exterior. Concepţie, calcul, soluţii*. Editura MatrixRom, Bucureşti, 2014.
4. C. Bianchi, ş.a – *Proiectarea instalaţiilor de iluminat*. Editura Tehnică, Bucureşti, 1981.
5. C. Bianchi – *Luminoteca. Aspecte fundamentale şi applicative, Vol. I.*. Editura Tehnică, Bucureşti, 1990.
6. T.Maghiar, D.Hoble, L.Bandici – *Instalaţii şi utilizarea energiei electrice*. Editura Universităţii din Oradea, 2000.
7. Th. Miclescu, ş.a. – *Utilizări ale energiei electrice.* Editura Didactică şi Pedagogică, Bucureşti, 1980.
7. I. Şora – *Utilizări ale energiei electrice*. Editura Facla, Timişoara, 1984.
8. Marilena Ungureanu, M. Chindriş, I. Lungu – *Utilizări ale energiei electrice*. Editura Didactică şi Pedagogică, Bucureşti, 1999.
9. Şurianu F.D. – *Utilizarea energiei electrice în industrie şi mari consumatori.* Editura MIRTON, Timişoara, 1997.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the works and the laboratory for the use of electrical energy. Specific labor protection rules	In the first laboratory hour, the notions related to labor protection specific to electrical lighting and welding installations will be presented by the teacher coordinating the laboratory works. In the second part of the laboratory a theoretical application will be solved.	2
2. Notions of photometry. Applications	Presentation by students of the report prepared (synthesis material). Solving a theoretical application. Interpretation of the obtained results.	2
3. Experimental determination of the characteristics of lighting fixtures	- Presentation by students of the report prepared (synthesis material); - Test regarding the theoretical knowledge related to the laboratory; - Carrying out experimental determinations; - Interpretation of the obtained results.	2
4. Experimental study of incandescent lamps. Modification of the energetic and functional parameters of the incandescent lamp to variations of the voltage of the electric supply network	Idem	2

5. Experimental study of low pressure gas and metal vapor discharge lamps	Idem	2
6. Experimental study of lamps with high pressure gas and metal vapor discharges	Idem	2
7. New trends in electric lighting. LED lamps. Light panels	Idem	2
8. Modification of the luminous flux emitted by the electric lamp	Idem	2
9. Electric arc in alternating current	Idem	2
10. Sizing of an electric arc welding transformer - part I	Idem	2
11. Sizing of an electric arc welding transformer - part II	Idem	2
12. Sizing of an electric arc welding transformer - part III	Idem	2
13. Experimental study of the welding transformer with adjustable magnetic shunt	Idem	2
14. Evaluation of the knowledge acquired during the laboratory hours. Recovery of one missed laboratory.	Handing in and presenting the laboratory papers and. Recovery of a missed laboratory.	2

Bibliography

1. Livia Bandici, Dorel Hoble - *Utilizări ale energiei electrice în echipamentele de iluminat şi sudură*. Editura Universităţii din Oradea, 2009.
2. Livia Bandici, Dorel Hoble, Claudiu Mich – *Utilizarea energiei electrice. Proiectare în sistemele de utilizare*. Editura Universităţii din Oradea, 2010.
3. Livia Bandici, Dorel Hoble – *Utilizări ale energiei electrice*. Editura Universităţii din Oradea, 2007.
4. C. Bianchi, ş.a – *Sisteme de iluminat interior şi exterior. Concepţie, calcul, soluţii*. Editura MatrixRom, Bucureşti, 2014.
5. C. Bianchi, ş.a – *Proiectarea instalaţiilor de iluminat*. Editura Tehnică, Bucureşti, 1981.
6. C. Bianchi – *Luminoteca. Aspecte fundamentale şi aplicative, Vol. I.*. Editura Tehnică, Bucureşti, 1990.
7. T Maghiar, D Hoble, S Pașca, M Popa – *Instalaţii şi utilizarea energiei electrice –Indrumător de laborator.* Editura Universităţii din Oradea 1995.
8. Th. Miclescu, ş.a. – *Utilizări ale energiei electrice*. Editura Didactică şi Pedagogică, Bucureşti, 1980.
9. I. Șora – *Utilizări ale energiei electrice*. Editura Facla, Timişoara, 1984.

8.3 Project	Teaching methods	No. of hours/ Observations
Topic: Design of the electrical lighting installation related to an enclosure where industrial activity is carried out. Bibliography. Project content Chapter I. Interior lighting systems and conditions for achieving a comfortable light microclimate Chapter II. Optimal lighting solutions used in structural and civil engineering. Chapter III. Sizing of interior lighting installations. Chapter IV. Lighting system design. Conclusions		
Presentation of the project theme. Getting started with electrical lighting installations	Discussions on how to write the project.	2
Assignment of initial design data. Norms, guides, and related technical prescriptions	Brief approach to the main problems related to interior lighting systems and the optimal conditions for achieving a comfortable light microclimate.	2
Establishing the conditions imposed on the electrical lighting installation. Choosing the type of source	Explanations on choosing the optimal lighting solutions.	2
Photometric calculation by the use factor method. Sizing of the interior lighting installation	Explanations on choosing the optimal lighting	2

	solutions.	
Quantitative and qualitative checks. Point-by-point calculation	In the first part of the meeting there will be a verification of the theoretical part presented by the students. In the second part there will be a presentation of the notions related to the sizing of lighting installations.	2
Sizing of the outdoor lighting installation of the building	Presentation of calculation equations	2
Final evaluation of the project	Presenting and handing in the elaborated project.	2

Bibliography

1. Livia Bandici, Dorel Hoble, Claudiu Mich – *Utilizarea energiei electrice. Proiectare în sistemele de utilizare*. Editura Universităţii din Oradea, 2010.
2. Livia Bandici, Dorel Hoble - *Utilizări ale energiei electrice în echipamentele de iluminat şi sudură*. Editura Universităţii din Oradea, 2009.
3. Livia Bandici, Dorel Hoble – *Utilizări ale energiei electrice*. Editura Universităţii din Oradea, 2007.
4. C. Bianchi, ş.a – *Sisteme de iluminat interior şi exterior. Concepţie, calcul, soluţii*. Editura MatrixRom, Bucureşti, 2014.
5. C. Bianchi, ş.a – *Proiectarea instalaţiilor de iluminat*. Editura Tehnică, Bucureşti, 1981.
6. C. Bianchi – *Luminoteca. Aspecte fundamentale şi applicative, Vol. I.*. Editura Tehnică, Bucureşti, 1990.
7. T Maghiar, D Hoble, S Paşca, M Popa – *Instalaţii şi utilizarea energiei electrice –Indrumător de laborator.* Editura Universităţii din Oradea, 1995.
8. T.Maghiar, D.Hoble, L.Bandici – *Instalaţii şi utilizarea energiei electrice*. Editura Universităţii din Oradea, 2000.
9. Th. Miclescu, ş.a. – *Utilizări ale energiei electrice*. Editura Didactică şi Pedagogică, Bucureşti, 1980.
10. I. Şora – *Utilizări ale energiei electrice*. Editura Facla, Timişoara, 1984.

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

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10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.1 Course	- For grade 5: all subjects must be treated to minimum standards; For grades > 5 all subjects must be treated to maximum standards;	The evaluation can be done face to face or online. In order to pass the exam, each subject must be treated for at least grade 5.	60 %
10.2 Laboratory	In the last laboratory class, the students will present the laboratory works performed, i.e. the results obtained.	To be allowed to take part in the exam, all laboratory works must be performed. - laboratory = 20% of the value of the exam grade.	20%
10.3 Project	The project will be handed in during the last week of classes. Students will present the project in front	For grade 6 - the elaborated project respects the format imposed by the elaboration procedure, i.e. the obtained	20 %

	of the teacher, the other students having the opportunity to intervene during the presentation.	results are close to the real ones; For grade 10 - the project is elaborated to maximum standards.	
10.8 Minimum performance standard: Design of components of a low complexity electrical system. Development and testing of an electrical system analysis program. Solving problems specific to electrical installations, correct assessment of workload, available resources, risks in the conditions of the application of occupational safety and health standards.			

Completion date:
29.08.2022

Date of endorsement in the department:
01.09.2022

Date of endorsement in the Faculty Board:

23.09.2022

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	DEPARTMENT OF ELECTRICAL ENGINEERING
1.4 Field of study	ELECTRICAL ENGINEERING
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics Beiuş Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject		**ELECTROTHERMICS**					
2.2 Holder of the subject		**Conf.dr.ing. BANDICI LIVIA**					
2.3 Holder of the academic seminar / laboratory / project		**Şef.lucr.dr.ing. GAL TEOFIL – Laboratory**					
2.4 Year of study	IV	2.5 Semester	7	2.6 Type of the evaluation	Ex	2.7 Subject regime	DS

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	3	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	1
3.4 Total of hours from the curriculum	42	Of which: 3.5 course	28	3.6 academic seminar/laboratory/project	14

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	5
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	5
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	-
Tutorials	1
Examinations	3
Other activities.	-

3.7 Total of hours for individual study	**14**
3.9 Total of hours per semester	**56**
3.10 Number of credits	2

4. Pre-requisites (where applicable)

4.1 related to the curriculum	(Conditions)
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	- Video projector, computer; - The course can be held face to face or online; - Attendance: at least 50% of the courses.
5.2.for the development of the academic seminary/laboratory/project	- The laboratory can be held face to face or online; - The equipment related to the laboratory class; - Preparation of the report (synthesis material);

	- Carrying out all laboratory works; - The recovery of one missed laboratory is allowed; - Attendance at laboratory classes: less than 70% leads to the restoration of the discipline.
6. Specific skills acquired	
Professional skills	**C.3. Appropriate application of energy conversion knowledge, electromagnetic and mechanical phenomena specific to static, electromechanical converters, electrical equipments and electromechanical drives**

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	The course "Electrothermics" aims to familiarize students with the study and utility of electrothermal equipment. Being a specialized discipline, its object is to present in a uniform framework the electrothermal equipment for the conversion of electric energy into heat, especially those specific to the industrial field. Students have the opportunity to familiarize themselves with various electrothermal installations, to acquire practical skills regarding the building, sizing and operating of electrothermal installations, with the possibility to execute, maintain, exploit and repair them.
7.2 Specific objectives	The laboratory is designed to provide future electromechanical engineers with practical skills in designing, building, researching, operating, repairing and maintaining electrothermal installations. The contents of the presented laboratory works are based on the need to deepen the problems presented in the course. Students have the possibility of identifying electrical circuits for electrothermal installations, to familiarize themselves with modern means of temperature measurement, of electrical parameters during electrothermal processes. They will understand the complexity and usefulness of these facilities and treat them as such. Knowledge is useful in forming skills to address specific issues faced by a specialist in the field of electromechanics.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
I. General problems with electrothermal installations	Projector. Intercalated student contributions are requested on subject-specific topics. Platforma e-learning a University of Oradea (https://e.uoradea.ro). Some courses take place by teaching subjects and student debates.	2
II. Materials used in the construction of electrothermal equipment 2.1. Refractory materials 2.2. Heat insulating materials 2.3. Resistive materials 2.4. Materials for electrodes of electric arc furnaces **III. Heat transfer in electrothermal equipment** 3.1. Thermal conduction. 3.2. Thermal convection. 3.3. Thermal radiation. 3.4. Means for measuring temperature	Idem	2
IV. Electrical heating heaters 4.1. Classification of heating systems with electrical resistance 4.2. Heaters	Idem	2

4.3. Main features of electrical resistance heating systems 4.3.1. Constitutive elements 4.4.1. Discontinuous direct-heating systems. 4.4.2. Continuous direct-heating systems		
4.4.3. Direct heating ovens 4.4.3.1. Furnaces for grafting and for production of carborundum 4.4.3.2. Glass melting furnaces 4.4.3.3. Furnaces for the extraction and refining of aluminum 4.4.3.4. Installations for direct water heating	Idem	2
4.5. Installations with electrical resistance with indirect heating 4.6. Laboratory electric furnaces	Idem	2
4.7. Home appliances 4.8. Infrared heating	Idem	2
V. **Electric arc furnaces** 5.1. Classification and areas of use 5.2. The electric arc 5.3. Electric arc furnaces with direct action for steel melting	Idem	2
5.4. Electric arc furnaces power at continuous voltage 5.5. Electric arc and resistance furnaces. 5.6. Vacuum melting electric arc furnaces 5.7. Flow layer melting furnaces 5.8. Plasma heating installations	Idem	2
VI. Electromagnetic induction heating 6.1. The principle of heating by electromagnetic induction 6.2. The penetration of the electromagnetic field and the power transmitted to the piece. The influence of material characteristics on penetration depth	Idem	2
6.3. Electrical parameters of the inductor-body system 6.4. Energy indicators of electromagnetic induction heating 6.5. Electrical equipment for electromagnetic induction heating	Idem	2
6.6. Applications of electromagnetic induction heating 6.6.1. Melting pot induction furnaces for metals 6.6.2. Channel induction furnace for melting metals	Idem	2
6.6.3. Deep heating by electromagnetic induction 6.6.4. Cross-flow heating 6.6.5. Surfacing 6.6.6. Special applications of induction heating	Idem	2
VII. **Heating of dielectric materials** 7.1. General notions on dielectric heating	Idem	2
7.2. Capacitive heating	Idem	2

Bibliography

[1]. Livia Bandici. *Electrotermie. Teorie şi aplicaţii.* Editura Universităţii din Oradea, 2016.
[2]. Livia Bandici, *Electrotermie*. Editura Universităţii din Oradea, 2004.
[3]. Livia Bandici, D. Hoble. *Electrotermie. Îndrumător de laborator*. Editura Universităţii din Oradea, 2000.
[4]. Livia Bandici, *Electrotermie – Aplicaţii*. Editura Universităţii din Oradea, 2003.
[5]. D. Comşa, *Instalaţii electrotermice industriale*. Editura Tehnică Bucureşti, 1986.
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[7]. A.E. Sluhoţki, S.E. Râşkin – *Inductoare pentru încălzirea electrică*. Editura Tehnică Bucureşti, 1983.
[8]. V. Fireţeanu, *Electrotermie*. Culegere de aplicaţii. Editura Politehnică Bucureşti, 1991
[9]. V. Fireţeanu, *Procesarea electromagnetică a materialelor*. Editura Politehnică Bucureşti, 1995.
[10]. Șora, V.Conta, D.Popovici, *Utilizări ale energiei electrice*. Editura Facla, 1983.
[11]. M. Ungureanu, M. Chindriş, I. Lungu, *Utilizări ale energiei electrice.* Editura Didactică şi Pedagogică Bucureşti, 1999.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Work safety standards specific to electrothermal installations. Transmission of heat. Theoretical Applications.	In the first hour of the laboratory, the coordinating teacher will present the laboratory works, the notions related to work	2

	safety, specific to electrothermal installations. In the second part of the laboratory, a theoretical application on the transmission of heat will be made.	
2. Means of temperature measurement. Experimental determinations. Study of the instantaneous water heating system. Experimental determinations.	Presentation of the written report (synthesis material) by the students; Test on the theoretical knowledge aquired during the laboratory. Interpretation of the results.	2
3. Study on the resistor furnace with indirect heating used for heat treatments. Experimental determinations.	Idem	2
4. Study on the infrared heating installation. Experimental determinations.	Idem	2
5. Study on the channel induction furnace. Experimental determinations.	Idem	2
6. Study on the induction heating installation for surface hardening of metals. Experimental determinations.	Idem	2
7. Assessment of the knowledge acquired during the laboratory classes.	- presenting and handing out the laboratory papers; - the recovery of one missed laboratory is allowed.	2

Bibliography

[1]. Livia Bandici, D. Hoble. *Electrotermie. Studii teoretice şi aplicative.* Editura Universităţii din Oradea, 2009.
[2]. Livia Bandici, *Electrotermie*. Editura Universităţii din Oradea, 2004.
[3]. Livia Bandici, D. Hoble. *Electrotermie. Îndrumător de laborator*. Editura Universităţii din Oradea, 2000.
[4]. Livia Bandici, *Electrotermie – Aplicaţii*. Editura Universităţii din Oradea, 2003.
[5]. D. Comşa, *Instalaţii electrotermice industriale*. Editura Tehnică Bucureşti, 1986.
[6]. N. Golovanov, I. Şora, ş.a. – *Electrotermie şi Electrotehnologii*. Vol. I. Editura Tehnică, Bucureşti, 1997.

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

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10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard For grades> 5 all subjects must be treated to maximum standards		

10.5 Laboratory	Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard		
10.6 Minimum performance standard: Design of components of a low complexity electrical system. Solving problems specific to electrothermal installations, with the correct evaluation of the workload, of the available resources, of the necessary completion time and of the risks, in conditions of application of the norms of safety and health at work. Principle of operation and composition of electrothermal installations.			

Completion date:
29.08.2022

Date of endorsement in the department:
01.09.2022

Date of endorsement in the Faculty Board:

23.09.2022

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	DEPARTMENT OF ELECTRICAL ENGINEERING
1.4 Field of study	ELECTRICAL ENGINEERING
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics Beiuş Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject				**ELECTROTHERMICS**			
2.2 Holder of the subject				**Conf.dr.ing. BANDICI LIVIA**			
2.3 Holder of the academic seminar / laboratory / project				**Conf.dr.ing. BANDICI LIVIA – Project**			
2.4 Year of study	IV	2.5 Semester	7	2.6 Type of the evaluation	Cv	2.7 Subject regime	DS

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	1	of which: 3.2 course		3.3 academic seminar/laboratory/project	1
3.4 Total of hours from the curriculum	14	Of which: 3.5 course	14	3.6 academic seminar/laboratory/project	14

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	**5**
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	**5**
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	**-**
Tutorials	**1**
Examinations	**1**
Other activities.	**-**

3.7 Total of hours for individual study	**12**
3.9 Total of hours per semester	**26**
3.10 Number of credits	1

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrical engineering, Electrical engineering, Electrical installations
4.2 related to skills	Knowledge of symbols, specific graphics, electrical diagrams.

5. Conditions (where applicable)

5.1. for the development of the course	-Video projector, computer; - The project can be carried out face to face or online.
5.2.for the development of the academic seminary/laboratory/project	- Equipment related to the development of project hours - calculation technique; - Preparation of the theoretical report related to the project theme; - The project can be carried out face to face or online.

6. Specific skills acquired	
Professional skills	**C.3. Appropriate application of energy conversion knowledge, electromagnetic and mechanical phenomena specific to static, electromechanical converters, electrical equipments and electromechanical drives**

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	The course "Electrothermics" aims to familiarize students with the study and utility of electrothermal equipment. Being a specialized discipline, its object is to present in a uniform framework the electrothermal equipment for the conversion of electric energy into heat, especially those specific to the industrial field. Students have the opportunity to familiarize themselves with various electrothermal installations, to acquire practical skills regarding the building, sizing and operating of electrothermal installations, with the possibility to execute, maintain, exploit and repair them.
7.2 Specific objectives	The suggested themes are designed to provide future engineers with practical skills in designing, building, researching, operating, repairing and maintaining electrothermal installations. Knowledge is useful in forming skills to address specific issues faced by a specialist in electrical engineering.

8. Contents*

8.1 Project	Teaching methods	No. of hours/ Observations
Suggested themes: 1. The calculation of the parameters of an electric furnace with indirect heating resistors. 2. The calculation of the parameters of an infrared heating installation for heating a vat. 3. Designing an inductor for the electromagnetic induction heating of a cylindrical vat. 4. The calculation of the parameters of an inductor using two frequencies for heating steel bars. 5. The calculation of the parameters of an electromagnetic induction melting furnace. 6. The calculation of the parameters of an installation for gluing wood rods by radio frequency heating. 7. The calculation of the parameters of an inductor for heating a cylindrical vat.	Choice of theme. Discussions on how to elaborate the project.	2
I. General notions on the heating process II. Materials used in the construction of the installation	A brief approach to the main issues related to the design and choice of materials used in the construction of the installation.	2
III. The theoretical foundations of the calculation of the equipment	Explanations on how to calculate the main electrical quantities and methods of determination.	2
IV. The calculation of the parameters of the electrothermal equipment 4.1. The electrical parameters of the system 4.2. Determination of the thermal parameters	In the first part of the meeting, a review of the theoretical part presented by the students will be made. In the second part, a	2

	presentation of the concepts related to the calculation of the electrical and thermal parameters will be made.	
4.4. Determination of the equivalent parameters of the heating assembly and energy indicators 4.5. Determination of the capacitor battery to compensate for the power factor of the installation	In the first part of the meeting, a review of the calculations presented by the students until this stage will be carried out. In the second part, a presentation of how to calculate the equivalent parameters and the energy indicators of the heating equipment is made.	2
4.6. Determination of heating efficiency 4.7. The equivalent electrical scheme of the whole assembly. Conclusions	During the first part of the meeting, a review of the calculations presented by the students will be made. In the second part, a presentation of how to calculate the efficiency of the processing, respectively the mode of drawing the equivalent electric scheme will be made.	2
Final project evaluation	Defence and handing out of the elaborated project.	2

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9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

The content of the project themes is adapted and satisfies the requirements imposed by the labor market, being agreed by the social partners, professional associations and employers in the field related to the bachelor program.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.1 Project	Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard	The evaluation can be done face to face or online.	Distinct grade from the one obtained at the exam.
10.2 Minimum performance standard: Design of components of a low complexity electrical system. Students have the opportunity to solve problems specific to electrothermal installations, the correct evaluation of the workload, of the available resources, of the necessary time.			

Completion date:
29.08.2022

Date of endorsement in the department:
01.09.2022

Date of endorsement in the Faculty Board:

23.09.2022

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	**Department of Electrical Engineering**
1.4 Field of study	**Electrical Engineering**
1.5 Study cycle	**Bachelor (1st cycle)**
1.6 Study program/Qualification	**ELECTROMECHANICS (at Beius) / Bachelor of Engineering**

2. Data related to the subject

2.1 Name of the subject		**RENEWABLE SOURCES**					
2.2 Holder of the subject		Prof. univ. dr. ing. habil. IOAN MIRCEA GORDAN					
2.3 Holder of the academic seminar/laboratory/project		Prof. univ. dr. ing. habil. IOAN MIRCEA GORDAN					
2.4 Year of study	IV	2.5 Semester	8	2.6 Type of the evaluation	EX	2.7 Subject regime	SD

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	-/2/-
3.4 Total of hours from the curriculum	56	Of which: 3.5 course	28	3.6 academic seminar/laboratory/project	-/28/-
Distribution of time					22 hours
Study using the manual, course support, bibliography and handwritten notes					7
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					5
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					5
Tutorials					-
Examinations					5
Other activities.					-

3.7 Total of hours for individual study	**22**
3.9 Total of hours per semester	**78**
3.10 Number of credits	**3**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Basic knowledge of mathematics, physics, chemistry specific to the field of electrical engineering.
4.2 related to skills	Extensive knowledge of chemistry and physics, but also electrical engineering

5. Conditions (where applicable)

5.1. for the development of the course	The course takes place in the amphitheater, being presented through free speech, an amphitheater that also has a Video Projector, Screen, Blackboard for presentation.
5.2.for the development of the academic seminary/laboratory/project	The practical applications are made using the modern working means existing in the laboratory (Experimental stands, DEGEM workstations, high-performance and current measuring devices, modeling software, etc.).

	Students must have on them the reports they have presented that they will present at the end when they want and take the two tests (theoretically and practically), which may or may not give them the right to participate in the exam. It will be possible to recover only 20% of the works without fee and with the same fee.

6. Specific skills acquired	
Professional skills	▪ **C3. Analysis and development of applications for optimizing industrial processes of electrical engineering using specific software.** - Description of the operating principles of transformers, static converters, electromechanical, electrical equipment, the main sources of electromagnetic disturbances, as well as the rules on electromagnetic compatibility (EMC) of electrical and electronic equipment. - Explaining and interpreting the operating regimes of static and electronic converters, electrical and electromechanical equipment. - Identification of electromechanical systems according to their composition; mathematical modeling, as well as their kinematic and dynamic description. - Assessing the quality and functional performance of electromechanical systems by specific methods. - Design of electromechanical or electrical installations. - Design of an electromechanical installation of low complexity.
Transversal skills	

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	- The course "Renewable Sources" aims to present energy phenomena in terms of technical applications and is addressed to students in the engineering department, both in electrical engineering and economic engineering in the electrical field. - Being a fundamental specialized discipline, its object is to present in a unitary framework, natural phenomena and resources as well as some applications in this field, necessary for knowing how to design and apply them.
7.2 Specific objectives	- Knowledge, understanding of basic concepts, theories and methods of the field and area of specialization; their proper use in professional communication. - Use of basic knowledge to explain and interpret various types of concepts, situations, processes, projects, etc. associated with the domain. - Application of some basic principles and methods for solving well-defined problems / situations, typical of the field in conditions of qualified assistance. - Appropriate use of standard evaluation criteria and methods to assess the quality, merits and limitations of processes, programs, projects, concepts, methods and theories. - In addition to the skills offered by laboratory meetings in the field of electrical engineering, they also offer the possibility of evaluating errors in experimental determinations, but also the best possible collaboration with colleagues in teamwork. - experimental verification of the basic relations for physical systems encountered in industrial practice and their simulation with the help of software; - performing calculations and determinations; - formation of skills in the energy field by highlighting the phenomena and methods of conversion in terms of conversion of solar, wind, nuclear, geothermal energy, etc. a. in electricity.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Introduction and presentation of the objectives pursued in progress. 1.1. Types of energy and their efficiency.	Interactive lecture; exposure; video projector presentation	2 hours
2. Solar energy. 2.1. Resources and storage. 2.2. Mathematical description of the photovoltaic effect.	Interactive lecture; exposure; video projector presentation	2 hours
3. Solar cells.	Interactive lecture; exposure; video projector presentation	2 hours

3.1. Concentration of solar radiation. 3.2. Solar energy conversion. 3.3. Fusion reaction. 3.4. Seasonal variation. 3.5. The advantages of solar thermal energy.		
4. Wind energy. 4.1. Conversion of wind energy into electricity. 4.2. Implementing wind energy. 4.3. Characteristics of the wind source and the available energy potential.	Interactive lecture; exposure; video projector presentation	2 hours
5. Development of wind engineering. 5.1. Wind energy in Romania. 5.2. Construction of wind generators. 5.3. Advantages and disadvantages of using wind energy.	Interactive lecture; exposure; video projector presentation	2 hours
6. Wind turbines. Basic principles. 6.1. Calculation of estimated powers at a certain speed. 6.2. Calculation of wind energy produced, its cost and design solutions.	Interactive lecture; exposure; video projector presentation	2 hours
7. Energy of seas and oceans. 7.1. The energy potential of the oceans. 7.2. Flow and ebb energy. 7.3. Energy resources of ocean waters and seas. 7.4. Forms of hydraulic energy and applications.	Interactive lecture; exposure; video projector presentation	2 hours
8. Geothermal energy. 8.1. The geothermal potential in Romania. 8.2. Heat pumps.	Interactive lecture; exposure; video projector presentation	2 hours
9. Geothermal systems. 9.1. Direct uses of geothermal water. 9.2. Direct use of Geothermal Energy. 9.3. The advantages of the system.	Interactive lecture; exposure; video projector presentation	2 hours
10. Hydrogen. 10.1. Hydrogen and electricity in transport. 10.2. Fuel cells. 10.3. Hydrogen storage. 10.4. Conclusions.	Interactive lecture; exposure; video projector presentation	2 hours
11. Fuel cells. 11.1. Basic parameters and fundamental problems. 11.2. Types of CEC. 11.2. Types of electric cells and electric car.	Interactive lecture; exposure; video projector presentation	2 hours
12. Thermoelectric conversion. 12.1. Thermoelectric effects. The Seebeck, Peltier and Thomson effect. 12.2. Characteristics of thermoelectric converters. 12.3. Thermodynamic analysis of thermoelectric phenomena.	Interactive lecture; exposure; video projector presentation	2 hours
13. Nuclear energy. 13.1. Fission and fusion nuclear reactions. 13.2. Fusion reactions and reactors. 13.3. The nuclear reactor. 13.4. Manufacture of nuclear fuel.	Interactive lecture; exposure; video projector presentation	2 hours
14. The current stage of installation of nuclear power plants 14.1. Nuclear reactor safety and major accidents 14.2. Reprocessing of spent nuclear fuel 15. Exam topics	Interactive lecture; exposure; video projector presentation	2 hours
Bibliography 1. Mircea Pantea, Noi surse de energie regenerabile Volumul 1 ISBN: 978-973-759-580-5, ISBN Vol 1. 978-973-759-581-2, 2008. 2. Hall D. O., House J., Biomasa ca şi combustibil modern, Congresul mondial ISES, Budapesta, 1993. 3. Ursu I., Fizica şi tehnologia materialelor nucleare, Editura Academiei RSR, Bucureşti, 1982. 4. Buta A., Energetică generală şi conversia energiei, Institutul Politehnic "Traian Vuia" Timişoara, Facultatea de Electrotehnică, 1982. 5. Niţu, V., ş. a., Energetică generală şi conversia energiei, Ed. Didactică şi Pedagogică, Bucureşti, 1980. 6. Tomescu F. M., Conversia energiei şi surse, Institutul Politehnic Bucureşti, 1975.		
8.2 Academic laboratory	Teaching methods	No. of hours/

		Observations
1. Presentation of the topic and the laboratory.	Practical application. Discussions	2 hours
2. EB-114 board training module. Light-dependent resistance. (LDR).	Practical application. Discussions	2 hours
3. Study of the photodiode.	Practical application. Discussions	2 hours
4. Study of the phototransistor.	Practical application. Discussions	2 hours
5. Study of photovoltaic panels.	Practical application. Discussions	6 hours
6. The study of the conversion of geothermal energy into electricity.	Practical application. Discussions	6 hours
7. Measurement of solar radiation intensity.	Practical application. Discussions	6 hours
8. Final laboratory verification.		2 hours

Bibliography

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2. Buta A., Energetică generală şi conversia energiei, Institutul Politehnic "Traian Vuia" Timişoara, Facultatea de Electrotehnică, 1982
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12. www.dual-art.ro
13. http://re.jrc.ec.europa.eu/pvgis/apps3/pvest.php

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- - The content of the discipline is adapted and satisfies the requirements imposed on the labor market, being agreed by the social partners, professional associations and employers in the field related to the bachelor program. The content of the discipline is found in the curriculum of the ELECTROMECHANICS specialization and from other university centers in Romania that have accredited this specialization, so the knowledge of the basic notions is a stringent requirement of the employers in the field.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	Active participation in developed discussions. Documented arguments. Providing relevant solutions to the issues under debate. Knowledge of the basics on all topics covered.	Oral, online or written assessment. Discussions. Argue.	70%
10.5 Academic seminar	--	--	--
10.6 Laboratory	Written test marked with a minimum of 5. Practical realization of all the requirements imposed by the laboratory work. Well-documented arguments. Reading the required bibliography.	Written test. Practical test. Online test. Discussions. Argue.	30%
10.7 Project	--	--	--
10.8 Minimum performance standard:			

- obtaining a grade of 5 in each laboratory test; participation and fulfillment of all requirements imposed by each laboratory work; obtaining a grade of 5 in the course tests, as an arithmetic mean of the grades obtained in this type of activity. Knowledge of the basics on all the topics taught.

Completion date:	29.08.2022
Date of endorsement in the department:	01.09.2022
Date of endorsement in the Faculty Board:	23.09.2022

DISCIPLINE SHEET

1. Facts about the program

1.1 Highereducation institution	**UNIVERSITY OF ORADEA**
1.2 Faculty / Department	**FACULTY OF ELECTRICAL** ENGINEERING **ANDINFORMATION** TECHNOLOGY
1.3 Chair	**ELECTRICAL ENGINEERING**
1.4 Field of study	**ELECTROMECHANICS**
1.5 Cycle of studies	**LICENȚĂ**
1.6 Study program/qualification	**ELECTROMECHANICAL BEIUȘ**

2. Discipline data

2.1 Name of the discipline				**OPERATION AND MAINTENANCE OF ELECTROMECHANICAL** SYSTEMS			
2.2 The holder of the course activities				**Șef lucrări.dr.ing. Gal Teofil Ovidiu**			
2.3 Holder of laboratory/project activities				**Șef lucrări.dr.ing. Gal Teofil Ovidiu**			
2.4 Year of study	**IV**	2.5 Semester	**7**	2.6 Type of assessment	**VP**	2.7 Discipline regime	**Ds**

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

3.1 Număr de ore pe s ă pt ă ă r o ă ăă	**42**	of which: 3.2 course	**2**	3.3 laboratory/project	**1**
3.4 Total hours ofthe learning plan	**42**	of which: 3.5 course	**28**	3.6 laboratory/project	**14**
Distribution ofthetime fund for hours					**62**
Studyby textbook, course support, bibliography andnotes					**20**
Additional documentation inthe library, on specialized electronic platforms andin the field					**10**
Preparation of seminars/laboratories, themes, papers, portfolios and essays					**15**
Tutoriat					**7**
Examinecountries					**10**
Other activitiesi.....					

3.7 Total individual study hours	**62**
3.9 Total hours per semester	**104**
3.10 The numberof creditis	**4**

4. Preconditions (where applicable)

4.1 curriculum	Knowledge of electrical engineering, electric sources, mathematics and physics
4.2 of competiționțe	

5.Conditions (where applicable)

5.1. course development	- "The course can be held face to face or online" - Attendance at least 50% of the courses
5.2. of laboratory /project development	- "The seminar/laboratory/project can be held face-to-face or online" - Mandatory presence at all laboratory hours; - The students come with the laboratory works reviewed - A maximum of 2 papers can be recovered during the semester (30%); - The frequency at laboratory classes below 70% leads to the restoration of the discipline.

6. Specific competences acquired

Professional skills	**C.6.** Carrying out the exploitation, maintenance, service, system integration activities **C6.2** Identification and selection of components for operation, maintenance and integration in electromechanical systems **C6.3** Commissioning, in-service testing, fault analysis and troubleshooting of electromechanical systems **C6.4** Use of methods and technical means to increase the reliability of electromechanical systems
Cross-sectional	CT 1. Identifying the objectives to be achieved, the available resources, the conditions for their completion, the working stages, the working times, the deadlines for achievement and the related risks.

7. Objectives of the discipline (based on the grid of specific competences accumulated)

7.1 The general objective of the discipline	▪ The course "Systems operation and maintenance" aims to present the electromechanical systems from the point of view of the applications in technique and is addressed to the students from the engineering departments the profile ofgeneral lectromechanics and electrotechnics.
7.2 Specific objectives	▪ Being a specialized discipline, its object is the presentation in a unitary framework of the methods of integration, repair, assembly, quality control, lubrication andexploitation of electromechanical systems in general. ▪ In addition to the formation of skills in the field of exploitation of electromechanical systems of their repair, as well as the functioning of the electromechanical systems, in addition to the formation of some skills in the field of exploitation of the electromechanical systems, as well as the modalities of the functioning ofthe electromechanical systems. ▪ The technical documentation must accompanythe installation throughout its existence, starting with the design phase, thus providing information both on the equipment and component parts and on the assembly, commissioning, operation and maintenance of thisdoor.

8. Conţinuturi

8.1.Curs	Teaching methods	Observaţii
CAP.1 Maintenance systems and repair systems. 1.1. General. 1.2. Maintenance and repair systems. 1.2.1. Corrective maintenance systems. 1.1.2. Preventive maintenance systems planned. 1.1.3. Palliative maintenance and repair systems. 1.3. Content of the technical-economic analysis. 1.4. Causes of failure of the electromechanical equipment. 1.5. Technical problems of operation, maintenance and repair of electrical equipment. 1.6. Heating of electrical equipment and appliances. 1.7. Influence of short-circuit currents on electrical installations. 1.8. Electrical contacts .	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours 2h
Head. 2. Basis for keeping productive fixed funds in operation. 2.1. Friction of electromechanical systems. 2.2. Wear of electromechanical systems.		2 hours
Head. 3. **Repairs of electromechanical systems**. 3.1. Receipt for repair.		

3.2. Disassembly for repair. 3.3. Repair of the main mechanical subassemblies of machinery, machinery and installations. 3.4. Repair of the main electrical components of machines, equipment and installations. _____ 3.5. Operation of maintenance and repair of rotating electric machines. 3.6. Organization of repairs to rotating electric machines. _____ 3.7. Practical works that can be carried out for the repairs of the rotating electric motors. 3.8. Tests of electric cars after repairs. 3.9. Coupling of electric motors. _____ 3.10. Repair of control elements. 3.11. Operation, maintenance and repair of starting and adjusting devices. 3.12. Operation, maintenance and repair of electrical mechanisms. 3.13.Operation and maintenance of electromagnetic couplings and brakes. 3.14. Operation, maintenance and repair of transformers. 3.15. Handling of parts in the repair flow	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours _____ 2h _____ 2h _____ 2h
CAP.4. Installation of electromechanical systems. 4.1.Installation after repair of mechanical and electrical components. 4.2.Mounting of the mechanisms of transmission of the rotational movement. 4.3.Mounting of mechanisms with translational motion.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2h
4.4.Mounting of parts that guide surfaces. 4.5.Installation of hydraulic and pneumatic installations. 4.6.Installation of electrical equipment. 4.7. Reception after repairs.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2h
Head. 5. Quality control of electromechanical systems. 5.1. Quality control and dimensions of parts at repairs. 5.2. Control of installation after repair. 5.3. Tests and tests after interventions. 5.4. Painting of repaired machines and equipment.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2h
Head. 6. Operation of electromechanical systems. 6.1. Operation and maintenance of repaired machines, equipment and installations. 6.2. Fixing on the foundation of machines and installations.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2h
Head. 7. Anointing of electromechanical systems . 7.1. Mineral oils. 7.2. Greases of consistency .	Free exposure, with the presentation of the course on the video projector and on the blackboard	2h
7.3. Solid lubricants . 7.4. Autolubrefianţii. 7.5. Choice of lubricants for lubrication.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2h
7.6. Lubrication systems and devices. 7.7. Determination of lubricant requirements.	Free exposure, with the	2h

7.8. Oraganizarea operaţiei de lubrefiere .	presentation of the course on the video projector and on the blackboard	

1. P. Andrei – "Operation and maintenance of machines, equipment and installations in the mechanical workshop, Bucharest 1972.
2. C. Cruceru , T Maghiar , A Lezeu , V. Stanilă. – "Technology of repair and maintenance of electromechanical equipment", Didactic and Pedagogical Publishing House, Bucharest 1982
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8.2. Laboratory	Teaching methods	Observaţii
1. Norms of work safety technique for electromechanical equipments. Technical problems of operation, maintenance, and repair of electrical equipment.	Students receive the papers for the laboratory at least a week in advance, study them, record them and give a test from the theoretical side at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher. Free presentation on how to make the montages and check them after the students have made the editing.	2 hours
2. Operation, maintenance and repair of rotating electric machines.		2 hours
3. Getting the exploitation of the bent sheet metal press.		2 hours
4. Operation and maintenance of the pump in the installations.		2 hours
5. Notions of exploitation andmaintenance of the guillotine type scissors.		2 hours
6. Analysis and verification of geometric accuracy of machine tools.		2 hours
7. Measurement of working accuracy at MUCN by executing a nose type sample piece.		

9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program

- The content of the discipline is found in the curriculum of the specialization of lectromecaithat from other university centers in Romania that have accredited a state of specialization, so knowing the basic notions of Exploitation and Maintenance of Electromechanical Systems is a stringent requirement of employers in the field (IAMT , Stimin Industry, Țecor Industry, Transilvania General Import Export with the platforms from Sudrigiu, Rieni and Ștei , Celestica, Comau, GMAB etc.) in the area of Oradea city and in the area of Oradea Industrial Park as well as in Bihor County.

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade

10.4 Course	The examination is done scris and orally . Exam tickets will contain at least 3 theory topics **Written** **Note 5.** 1pt. - ex officio - attendance at the course 4pt. – 2 subjects of medium level **Note 7.** Full Note 5 and extra 2pt. – applications from laboratories **Orally. Note 10** Full Note 7 and extra 3pt. - 1 subject of difficult level	"The assessment can be done face-to-face or online" **Examination scris** Students each receive for resolution a form with questions with 3 variants of answer and applications (a total of 10 points you). Grille-type variant.	80 %
10.5 Laborator	- For note 5, he must know how to measure a current, a voltage and read a simple electrical diagram, as well as to adjust his meter on the respective fields. - Notes6 (six) and 7 (seven) increase the complexity of the electrical diagrams of the equipment on which they have not worked. - For the notes 8(eight), 9(nine) and 10(ten) in addition to the above, they must be able to discover a defect or a phenomenon of wear occurring in an electromechanical e equipment, to be able to find out the short circuit current on different circuits, as well as to be able to determine the value of a current on a portion of the circuit without knowing the voltage and without measuring it directly.	"The assessment can be done face-to-face or online" **Test + practical application** The students receive a theory test consisting of 5 questions from the theoretical part ofthe papers that are quoted with two pointse, solving each of the questions, after which if they have obtained at least the grade 5 (five), they can continue with the evaluation on the practical applications. This results in an average forlaboratory activity that will have a weighting in the final grade of the exam	20%
10.6 Project			
10.7 Minimum performance standard			
Course: - Knowledge of the constructive parts and of the principle of operation of various electr omechanical equipments. - The ability to identify a certain type of defect or wear occurred in an electromechanical equipment. - Participation in at least half of the courses. **Laboratory:** - The ability to design and read an electrical diagram. - The ability to perform the troubleshooting of a defect occurring in an electromechanical equipment. - Participation in all laboratory work.			

Date of completion : Signature of the course holder : Signature of the laboratory holder

29.0 8.202 2 Lecturer dr.ing. Teofil Ovidiu Gal Head of works dr.ing. Ovidiu Gal Theophilus

Email: tgal@uoradea.ro

Date of approval in the department: Signature of the Director of Department

01.09.2022 Prof.univ.dr.ing.inf. Hathazi Francis – John

Date of approval in the Faculty Council: Signature of Dean
23.09.2022 Prof.univ.dr. habil. Mircea Ioan nGordan

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics Beius/ Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject			PRODUCTION, TRANSPORTATION AND DISTRIBUTION OF ELECTRICAL ENERGY				
2.2 Holder of the subject			Popa Monica				
2.3 Holder of the academic seminar/laboratory/project			Soproni Darie, Szoke Adrian				
2.4 Year of study	IV	2.5 Semester	VII	2.6 Type of the evaluation	Ex	2.7 Subject regime	I

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	3	of which: 3.2 course	2	3.3 academic laboratory	2
3.4 Total of hours from the curriculum	56	of which: 3.5 course	28	3.6 academic laboratory	28

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	22
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	8
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	12
Tutorials	3
Examinations	3
Other activities.	

3.7 Total of hours for individual study	**48**
3.9 Total of hours per semester	**104**
3.10 Number of credits	**4**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Electrical installations, Electrical devices
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	on-site
5.2. for the development of the academic laboratory	on-site at local companies in the domain of production and distribution of electrical energy

6. Specific skills acquired	
Professional skills	**C3.1** Description of the operating principles of transformers, static, electromechanical converters, electrical equipment, the main sources of electromagnetic disturbances and the rules regarding electromagnetic compatibility **C3.2.** Explanation and interpretation of the operating regimes of static, electromechanical converters, of electrical and electromechanical equipment **C3. 4.** Assessing the quality and functional performance of electrical systems through specific methods **C6.2.** Identification and selection of components for operation, maintenance and integration in electromechanical systems
Transversal skills	

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	Component of the electricity production, transport and distribution systems
7.2 Specific objectives	Explaining energy conversion phenomena Description of the principles and operating regimes of the component elements of the electricity transport and distribution systems

8. Contents *

8.1 Course	Teaching methods	No. of hours/ Observations
1. Electrical systems. Electricity production. The impact on the environment	notes on blackboard, Power Point presentation	2
2. Power plants - general presentation. Production of electricity from renewable sources.	notes on blackboard, Power Point presentation	2
3. General considerations regarding the transport and distribution of electricity - requirements, classifications	notes on blackboard, Power Point presentation	2
4. Classification of electrical networks from the point of view of the situation of the neutral with respect to the ground	notes on blackboard, Power Point presentation	2
5. Constructive elements of overhead power lines	notes on blackboard, Power Point presentation	2
6. Constructive elements of cable electric lines	notes on blackboard, Power Point presentation	2
7. The main parameters and the equivalent schemes of the elements of the electricity transport and distribution installations	notes on blackboard, Power Point presentation	2

8. Electrical calculation of distribution networks - structure of distribution networks, connection schemes	notes on blackboard, Power Point presentation	2
9. Electrical calculation of distribution networks in permanent mode - calculation of voltage losses	notes on blackboard, Power Point presentation	2
10. The thermal regime of electric lines	notes on blackboard, Power Point presentation	2
11. Choosing the power line section	notes on blackboard, Power Point presentation	2
12. Power and energy losses in electrical networks	notes on blackboard, Power Point presentation	2
13. The quality of electricity	notes on blackboard, Power Point presentation	2
14. Energy efficiency in electrical distribution	notes on blackboard, Power Point presentation	2
References 1. Monica Popa – Note curs 2. Ghidul pentru instalatii electrice 2018 – editat de Schneider Electric 3. Normative si ordine ANRE		
8.2 Laboratory		
L1. Safety methods in electrical installations.		2
L2. Norms for labor protection and first aid in electricity production, transport and distribution facilities		2
L3. Testing knowledge of labor protection rules		2
L4. Technological and constructive elements of thermoelectric and hydroelectric plants		2
L5. Presentation of CET Oradea equipment - the generation part	Visit at CET Oradea	2
L6. Presentation of CET Oradea equipment – command room	Visit at CET Oradea	2
L7. Production of electricity from renewable sources - solar energy		2
L8. Production of electricity from renewable sources - hydrogen fuel cells		2
L9. Connection station presentation – description, component parts		2
L10. Connection station presentation	Visit at connection station	2

	in Beius	
L11. Presentation of medium voltage cells 20kV		2
L12. Operational management by dispatch of the operation of an electric distribution station	Visit at DEER Beius	2
L13. Technological and constructive elements of LEA and LES		2
L14. Ending the situation at the laboratory - knowledge testing		2
References Colectii de STAS si Normative – SR EN 60364, NP/I7/2011 … Ghidul pentru instalatii electrice 2018 – editat de Schneider Electric		

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- Knowledge about electricity generation and transportation
- Dimensioning methods according with IEC Standards

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Metode de evaluare	10.3 Pondere din nota finală
10.4 Course	Theoretical	Written exam	60%
10.5 Laboratory	Achievement of laboratory tasks	Activity during laboratory classes	40%
10.6 Minimum performance standard:			
Passing the subject - grade ≥ 5.			

Completion date: 29.08.2022

Signature of subject holder
Assoc. Prof. Monica Popa
E-mail: mpopa@uoradea.ro

Signature of academic laboratory holder
Assoc. Prof. Monica Popa

Date of endorsement in the department: 01.09.2022

Signature of Department Head
Prof. Francisc – Ioan Hathazi
E-mail: francisc.hathazi@gmail.com

Date of endorsement in the Faculty Board: 23.09.2022

Signature of Dean
Prof. Mircea Gordan
E-mail: mgordan@uoradea.ro

DISCIPLINE SHEET

1. Facts about the program

1.1 Highereducation institution	**UNIVERSITY OF ORADEA**
1.2 Faculty / Department	**ELECTRICAL** ENGINEERING **ANDINFORMATION** TECHNOLOGY
1.3 Chair	**ELECTRICAL ENGINEERING**
1.4 Field of study	**ELECTRICAL ENGINEERING**
1.5 Cycle of studies	**LICENȚĂ**
1.6 Study program/qualification	**ELECTROMECHANICAL BEIUȘ**

2. Discipline data

2.1 Name of the discipline			**ELECTROMECHANICAL SYSTEMS I**				
2.2 The holder of the course activities			**Șef lucrări.dr.ing. Gal Teofil Ovidiu**				
2.3 Holder of laboratory/project activities			**Șef lucrări.dr.ing. Gal Teofil Ovidiu**				
2.4 Year of study	**IV**	2.5 Semester	**7**	2.6 Type of assessment	**Ex**	2.7 Discipline regime	**Ds**

(I) Imposed; (o) optional; (F) Optional

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

3.1 Număr de ore pe s ă pt ă ă r o ă ăă	**42**	of which: 3.2 course	**2**	3.3 laboratory/project	**1**
3.4 Total hours ofthe learning plan	**42**	of which: 3.5 course	**28**	3.6 laboratory/project	**14**
Distribution ofthetime fund for hours					**62**
Studyby textbook, course support, bibliography andnotes					**20**
Additional documentation inthe library, on specialized electronic platforms andin the field					**10**
Preparation of seminars/laboratories, themes, papers, portfolios and essays					**20**
Tutoriat					**6**
Examinecountries					**6**
Other activitiesi.....					

3.7 Total individual study hours	**62**
3.9 Total hours per semester	**104**
3.10 The numberof creditis	**4**

4. Preconditions (where applicable)

4.1 curriculum	Technical drawing
4.2 of competiționțe	Knowledge of symbols, graphs specific to electrical diagrams

5.Conditions (where applicable)

5.1. course development	- "The course can be held face to face or online" - Attendance at least 50% of the courses - Video projector , computer .
5.2. of laboratory /project development	- "The seminar/laboratory/project can be held face-to-face or online" - Equipment related to the laboratory class. ; - Preparation of the report (synthesis material); - Performing all laboratory hours; - A maximum of 2 papers can be recovered during the semester (30%); - The frequency at laboratory classes below 70% leads to the restoration of the discipline.

6. Specific competences acquired	
Professional skills	**C3.** Adequate application of knowledge on energy conversion, electromagnetic and mechanical phenomena specific to static, electromechanical converters, electrical equipment and electromechanical drives **C3.4.** Assessment of the quality and functional performances of electromechanical systems by specific methods **C4.** The use of techniques for measuring electrical and non-electrical sizes, of data acquisition systems in electromechanical systems. **C5. 4.** T h eC o you are t c on t r o ls y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y a parametra t i on o f the hnologici, (vitesa, pozic a t i on, cupl t h eC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s th eC o you are t c on tr o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t ctivelor de cal itate mpus
Cross-sectional	

7. Objectives of the discipline (based on the grid of specific competences accumulated)

7.1 The general objective of the discipline	The course "Electromechanical systems I " aims at definire a n i n t i on o f the th eC o you aret c on t r o l s y s temsa n d c o n t r o l s y s t e m s a n d c o n t r o ls y s t e m s t h eCo you are t c on t r o l s y s t e m s a n d compoen t s a n d c o n t r o l s y s t e m s an d c o n t r o l s y s t e m s i ms it iono f the
7.2 Specific objectives	- s i mplementer si on s is a tesstece sisteme m sa t i on o f the ru SEM - i'mplem e nte ze echip ame nt e l e l ectri ce, h i draii ic e s a p newasmeasuredc e p e e s truc t un u of SEM; -to measure the electrical / hydraulic / pneumatic paramenters of the SEM and to interpreteze datel e le o you arenotcon t; - w h ic h w h i c re la t i on s EM.

8. Conţinuturi

8.1.Curs	Teaching methods	Observaţii
CHAP.1. Cthe main construction of different types of SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.2. Electromechanical systems – sources and receptors for electromagnetic disturbances	Free exposure, with the presentation of	2 hours

	the course on the video projector and on the blackboard	
CAP.3. Structure of electromechanical systems. Sources and receptors of disturbances	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.4. Block of work of SEM tipice: vehicul u s a n ergies t heC o you are tc on t r ols y s t em s a n d c o n t rols y s t e ms , t h eC o youaret c on t rol s y s t e m s a n d c o n t r o l s y s t e m s	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.5. The cinematic pad of SE M t ipice: s ii e con ve r ergiei b aza e e s e r e gene ra bi e, mi c rosisele c tramwalka nice, echip ame nt hee c troc asnc	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.6. Transmission system of the SEM tipice: microsisteme m ele c tromecanice used in e chipamentul electroc a snic a t i on s	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.7. The adjustment, command and control block of SEM: microsisteme m ele c tromecanice used to ech ipamentul electroc a snic.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.8. Types of disturbances occurring in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.9. Harmonics and voltage fluctuations in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.10. Classification and negative effects of harmonics in SEM.	Free exposure, with the presentation of the course on the	2 hours

	video projector and on the blackboard	
CAP.11. Mechanism of occurrence of disturbance in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.12. Antiparasitic methods in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2 hours
Head. 13. Software used in SEM design.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2 hours
Head. 14. Diagnoz a t i on SEM: gener a lic a ti on o f the diagnosis of echip a m a m a m o n t r ie s, mon i t ori e s t a t i on o f the d is tan d i s t a n d i t you are e m	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours

Bibliography:

1. **M. Horgoş,** Masini si utilaje electromecanice, Editur a Risoprint Cluj Napoca, 2007.
2. **C l'awedia Marti,** T'sta r'e a and i proiecta r ea s i'sfearelor e thec t rome ca nce, Atelie rl e l e liplicare a l in i tuu u i Politehnic clu j-N a poca, 1987
3. M**ihai Gafi t and, Spiridon Cret, Barbu Dar** b u d a **n,** Dia g i ag t heC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s elor, Edi t you are a t e r a ti on o f the Bucyou areesti on, 1989
4. **N. U-Ficcher,** Vibrati i e s e i e ll or meca nice. It'sarandit's a pl'i e i, ed'ti aura Ca s a candr and d'e tit ie t a. , 1998.

8.2. Laboratory	Teaching methods	Observaţii
1. Th eC o you are t c on t r o ls y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e ms nci a t i on, organizara t i on o f the acti v i t i on o f the acti v i a t i on o f the activi t i on o f the borator o f the	Modelarea Case study	2h
2. Analiz a func ion c on c on a SEM.	Modelarea Case study	2h
3. Analiza comporti on o f efect a t i on o f the	Modelarea Case study	2h
4. Monitori es a pl ic a ti on o f the	Modelarea Case study	2h
5. Rezolv a r e a ti onof the problem arising in the operation of a	Modelarea	2h

SEM.	Case study	
6. T heCo you are t c on t r o l s y s t e m s a n d t h a t t h eC o you are t c on t r o l s y s t e m s a n d t h a t t h er e s u l t so f t h e a m a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s elte.	Modelarea Case study	2h
7. Conclusion of the situation at the laboratory	Modelarea Case study	2h

Bibliography:

1. **M. Horgoş,** Masini si utilaje electromecanice, Editur a Risoprint Cluj Napoca, 2007.
2. **C l'awedia Marti,** T'sta r'e a and i proiecta r ea s i'sfearelor e thec t rome ca nce, Atelie rl e l e liplicare a l in i tuu u i Politehnic clu j-N a poca, 1987
3. M**ihai Gafi t and, Spiridon Cret, Barbu Dar** b u d a **n,** Dia g i ag t heC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s elor, Edi t you are a t e r a ti on o f the Bucyou areesti on, 1989
4. **N. U-Ficcher,** Vibrati i e s e i e ll or meca nice. It'sarandit's a pl'i e i, ed'ti aura Ca s a candr and d'e tit ie t a. , 19 98

9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program

The content of the discipline is adapted and satisfies the requirements imposed by the labour market, being adapted cu mediul economic din egiune concretiza t h eC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y t h eC o you are t c on t r ol s y s t e m s a n d c on t r o l s y s t e m s a n d c on t r o l s y s t e m s e prob li c at i on s and f ie s w it h the pen t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
10.4 Course	Periodical check is done for a duration of 1 / 2 / 3 hours. **Written:** **For note 5:** All topics must be treated to minimum standards. **For the note > 5** all subjects must be treated to naxime standards.	"The assessment can be done face-to-face or online" **Week a – 7 – a** Partial VP which is 50% of the FINAL VP **Week a – 14 – a** VP – final	80 %
10.5 Laboratory	**For a grade of 5**, all tests and the final test must be treated to a minimum standard. **For notes > 5** final must be treated to the maximum standard.	"The assessment can be done face-to-face or online" All laboratory work must be performed in order to be able to enter the final VP. It is allowed the recovery of the maximum 2 laboratories overdue before VP – final	20%
10.6 Project			

10.7 Minimum performance standard
• Carrying out works under coordination, to solve specific problems in the field, with the correct evaluation of the volume of lechers, the available resources, the necessary time of completion and the risks in conditions of strict application of the occupational safety and health norms. • Adequate use of the fundamental knowledge of technological methods and processes used in the machine building industry as well as in the electrotechnical industry.

Date of completion : Signature of the course holder : Signature of the laboratory holder :

29.0 8.202 2 Lecturer dr.ing. Teofil Ovidiu LAG Head of works dr.ing. Teofil Ovidiu LAG

Email: tgal@uoradea.ro

Date of approval in the department:
01.09.2022

Signature of the Director of Department
Prof.univ.dr.ing.inf. Hathazi Francis – John

Date of approval in the Faculty Council:
23.09.2022

Signature of Dean
Prof.univ.dr. habil. Mircea Ioan Gordan

DISCIPLINE SHEET

1. Facts about the program

1.1 Highereducation institution	**UNIVERSITY OF ORADEA**
1.2 Faculty / Department	**ELECTRICAL** ENGINEERING **ANDINFORMATION** TECHNOLOGY
1.3 Chair	**ELECTRICAL ENGINEERING**
1.4 Field of study	**ELECTRICAL ENGINEERING**
1.5 Cycle of studies	**LICENȚĂ**
1.6 Study program/qualification	**ELECTROMECHANICAL BEIUȘ**

2. Discipline data

2.1 Name of the discipline			**ELECTROMECHANICAL SYSTEMS I**				
2.2 The holder of the course activities			**Șef lucrări.dr.ing. Gal Teofil Ovidiu**				
2.3 Holder of laboratory/project activities			**Șef lucrări.dr.ing. Gal Teofil Ovidiu**				
2.4 Year of study	**IV**	2.5 Semester	**7**	2.6 Type of assessment	**Ex**	2.7 Discipline regime	**Ds**

(I) Imposed; (o) optional; (F) Optional

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

3.1 Număr de ore pe s ă pt ă ă r o ă ăă	**42**	of which: 3.2 course	**2**	3.3 laboratory/project	**1**
3.4 Total hours ofthe learning plan	**42**	of which: 3.5 course	**28**	3.6 laboratory/project	**14**
Distribution ofthetime fund for hours					**62**
Studyby textbook, course support, bibliography andnotes					**20**
Additional documentation inthe library, on specialized electronic platforms andin the field					**10**
Preparation of seminars/laboratories, themes, papers, portfolios and essays					**20**
Tutoriat					**6**
Examinecountries					**6**
Other activitiesi.....					

3.7 Total individual study hours	**62**
3.9 Total hours per semester	**104**
3.10 The numberof creditis	**4**

4. Preconditions (where applicable)

4.1 curriculum	Technical drawing
4.2 of competitionțe	Knowledge of symbols, graphs specific to electrical diagrams

5.Conditions (where applicable)

5.1. course development	- "The course can be held face to face or online" - Attendance at least 50% of the courses - Video projector , computer .
5.2. of laboratory /project development	- "The seminar/laboratory/project can be held face-to-face or online" - Equipment related to the laboratory class. ; - Preparation of the report (synthesis material); - Performing all laboratory hours; - A maximum of 2 papers can be recovered during the semester (30%); - The frequency at laboratory classes below 70% leads to the restoration of the discipline.

6. Specific competences acquired	
Professional skills	**C3.** Adequate application of knowledge on energy conversion, electromagnetic and mechanical phenomena specific to static, electromechanical converters, electrical equipment and electromechanical drives **C3.4.** Assessment of the quality and functional performances of electromechanical systems by specific methods **C4.** The use of techniques for measuring electrical and non-electrical sizes, of data acquisition systems in electromechanical systems. **C5. 4.** T h eC o you are t c on t r o ls y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y a parametra t i on o f the hnologici, (vitesa, pozic a t i on, cupl t h eC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s th eC o you are t c on tr o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t ctivelor de cal itate mpus
Cross-sectional	

7. Objectives of the discipline (based on the grid of specific competences accumulated)

7.1 The general objective of the discipline	The course "Electromechanical systems I " aims at definire a n i n t i on o f the th eC o you aret c on t r o l s y s temsa n d c o n t r o l s y s t e m s a n d c o n t r o ls y s t e m s th eCo you are t c o n t r o l s y s t e m s a n d compoen t s a n d c o n t r o l s y s t e m s i ms it iono f the
7.2 Specific objectives	- s i mplementer si on s is a tesstece sisteme m sa t i on o f the ru SEM - i'mplem e nte ze echip ame nt e l e l ectri ce, h i draii ic e s a p newasmeasuredc e p e e s truc t un u of SEM; -to measure the electrical / hydraulic / pneumatic paramenters of the SEM and to interpreteze datel e le o you arenotcon t; - w h ic h w h i c re la t i on s EM.

8. Conţinuturi

8.1.Curs	Teaching methods	Observaţii
CHAP.1. Cthe main construction of different types of SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.2. Electromechanical systems – sources and receptors for electromagnetic disturbances	Free exposure, with the presentation of	2 hours

	the course on the video projector and on the blackboard	
CAP.3. Structure of electromechanical systems. Sources and receptors of disturbances	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.4. Block of work of SEM tipice: vehicul u s a n ergies t heC o you are tc on t r ols y s t em s a n d c o n t rols y s t e ms , t h eC o youaret c on t rol s y s t e m s a n d c o n t r o l s y s t e m s	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.5. The cinematic pad of SEM ti pice: s i i e conve r ergiei b aza e e s e re genra bie, mic rosisele ct romeca nice, chip ame n t hee ct roc asnc	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.6. Transmission system of the SEM tipice: microsisteme m e m ele c tromecanic is used to echipamentul ectroc a tion o f the	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.7. The adjustment, command and control block of SEM: microsisteme m ele c tromecanice used to ech ipamentul electroc a snic.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.8. Types of disturbances occurring in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.9. Harmonics and voltage fluctuations in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.10. Classification and negative effects of harmonics in SEM.	Free exposure, with the presentation of the course on the	2 hours

	video projector and on the blackboard	
CAP.11. Mechanism of occurrence of disturbance in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours
CAP.12. Antiparasitic methods in SEM.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2 hours
Head. 13. Software used in SEM design.	Free exposure, with the presentation of the course on the video projector and on the blackboard.	2 hours
Head. 14. Diagnoz a t i on SEM: gener a lic a ti on o f the diagnosis of echip a m a m a m o n t r ie s, mon i t ori e s t a t i on o f the d is tan d i s t a n d i t you are e m	Free exposure, with the presentation of the course on the video projector and on the blackboard	2 hours

Bibliography:

1. **M. Horgoş,** Masini si utilaje electromecanice, Editur a Risoprint Cluj Napoca, 2007.
2. **C l'awedia Marti,** T'sta r'e a and i proiecta r ea s i'sfearelor e thec t rome ca nce, Atelie rl e l e liplicare a l in i tuu u i Politehnic clu j-N a poca, 1987
3. M**ihai Gafi t and, Spiridon Cret, Barbu Dar** b u d a **n,** Dia g i ag t heC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s elor, Edi t you are a t e r a ti on o f the Bucyou areesti on, 1989
4. **N. U-Ficcher,** Vibrati i e s e i e ll or meca nice. It'sarandit's a pl'i e i, ed'ti aura Ca s a candr and d'e tit ie t a. , 1998.

8.2. Laboratory	Teaching methods	Observaţii
1. Th eC o you are t c on t r o ls y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e ms nci a t i on, organizara t i on o f the acti v i t i on o f the acti v i a t i on o f the activi t i on o f the borator o f the	Modelarea Case study	2h
2. Analiz a func ion c on c on a SEM.	Modelarea Case study	2h
3. Analiza comporti on o fefect a t i on o f the	Modelarea Case study	2h
4. Monitori es a pl ic a ti on o f the	Modelarea Case study	2h
5. Rezolv a r e a ti onof the problem arising in the operation of a	Modelarea	2h

SEM.	Case study	
6. T heCo you are t c on t r o l s y s t e m s a n d t h a t t h eC o you are t c on t r o l s y s t e m s a n d t h a t t h er e s u l t so f t h e a m a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s elte.	Modelarea Case study	2h
7. Conclusion of the situation at the laboratory	Modelarea Case study	2h

Bibliography:

1. **M. Horgoş,** Masini si utilaje electromecanice, Editur a Risoprint Cluj Napoca, 2007.
2. **C l'awedia Marti,** T'sta r'e a and i proiecta r ea s i'sfearelor e thec t rome ca nce, Atelie rl e l e liplicare a l in i tuu u i Politehnic clu j-N a poca, 1987
3. M**ihai Gafi t and, Spiridon Cret, Barbu Dar** b u d a **n,** Dia g i ag t heC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s elor, Edi t you are a t e r a ti on o f the Bucyou areesti on, 1989
4. **N. U-Ficcher,** Vibrati i e s e i e ll or meca nice. It'sarandit's a pl'i e i, ed'ti aura Ca s a candr and d'e tit ie t a. , 19 98

9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program

The content of the discipline is adapted and satisfies the requirements imposed by the labour market, being adapted cu mediul economic din egiune concretiza t h eC o you are t c on t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y t h eC o you are t c on t r ol s y s t e m s a n d c on t r o l s y s t e m s a n d c on t r o l s y s t e m s e prob li c at i on s and f ie s w it h the pen t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t r o l s y s t e m s a n d c o n t

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
10.4 Course	Periodical check is done for a duration of 1 / 2 / 3 hours. **Written:** **For note 5:** All topics must be treated to minimum standards. **For the note > 5** all subjects must be treated to naxime standards.	"The assessment can be done face-to-face or online" **Week a – 7 – a** Partial VP which is 50% of the FINAL VP **Week a – 14 – a** VP – final	80 %
10.5 Laboratory	**For a grade of 5**, all tests and the final test must be treated to a minimum standard. **For notes > 5** final must be treated to the maximum standard.	"The assessment can be done face-to-face or online" All laboratory work must be performed in order to be able to enter the final VP. It is allowed the recovery of the maximum 2 laboratories overdue before VP – final	20%
10.6 Project			

10.7 Minimum performance standard
• Carrying out works under coordination, to solve specific problems in the field, with the correct evaluation of the volume of lechers, the available resources, the necessary time of completion and the risks in conditions of strict application of the occupational safety and health norms. • Adequate use of the fundamental knowledge of technological methods and processes used in the machine building industry as well as in the electrotechnical industry.

Date of completion : Signature of the course holder : Signature of the laboratory holder :

29.0 8.202 2 Lecturer dr.ing. Teofil Ovidiu LAG Head of works dr.ing. Teofil Ovidiu LAG

Email: tgal@uoradea.ro

Date of approval in the department:
01.09.2022

Signature of the Director of Department
Prof.univ.dr.ing.inf. Hathazi Francis – John

Date of approval in the Faculty Council:
23.09.2022

Signature of Dean
Prof.univ.dr. habil. Mircea Ioan Gordan

SUBJECT DESCRIPTION

1. Data related to the study program

1.1 Higher education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Electromechanics (at Beius) / Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject	Nonconventional equipments and technologies						
2.2 Holder of the subject	Assoc. prof. Pasca Sorin						
2.3 Holder of the academic seminar/laboratory/project	Assoc. prof. Pasca Sorin						
2.4 Year of study	4	2.5 Semester	7	2.6 Type of the evaluation	Vp - Continuous Assessment	2.7 Subject regime	Specialized Discipline

3. Total estimated time (hours of didactic activities per semester)

3.1 Number of hours per week	3	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	-/1/-
3.4 Total of hours from the curriculum	42	of which: 3.5 course	28	3.6 academic seminar/laboratory/project	-/14/-

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	28
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	14
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	16
Tutorials	-
Examinations	4
Other activities.	

3.7 Total of hours for individual study	62
3.9 Total of hours per semester	104
3.10 Number of credits	4

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Previous subjects: Physics, Technological methods and procedures, Electromagnetic field theory, Theory of electrical circuits, Electrotechnic materials
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	Teaching activities will normally take place face to face. If special measures will be imposed in the epidemiological context generated by the COVID-19 pandemic, the courses can be held online.
5.2.for the development of the academic seminary/laboratory/project	

6. Specific skills acquired	
Professional skills	▪ **C1.2.** Explaining and interpreting the phenomena presented at the domain disciplines and at the specialized disciplines, using the basic knowledge of mathematics, physics, chemistry ▪ **C3.2.** Explanation and interpretation of the operating modes of static, electromechanical converters, electrical and electromechanical equipment ▪ **C3.3.** Identification of electromechanical systems based on their structure; mathematical modeling, as well as their kinematic and dynamic description ▪ **C3.4.** Assessing the quality and functional performance of electrical systems by specific methods
Transversal skills	

7. The objectives of the discipline (resulting from the grid of the specific competences acquired)

7.1 The general objective of the subject	▪ the study of some of the most modern electrotechnologies and of the specific electrical equipment
7.2 Specific objectives	▪ knowledge of the basics of the physical phenomena involved in the studied electrotechnological processes ▪ knowledge of the general structure of the electrical equipment specific to the studied technologies ▪ understanding the functioning of complex installations and equipments from the electrical technologies domain ▪ skills regarding the comparative qualitative analysis of some technological processes ▪ skills regarding the calculus of sizing of some subassemblies from the studied installations ▪ formation of skills regarding the design and realization of experimental setup for the study of modern technological processes

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Introductory course: Electrotechnologies / Special electrical technologies / Unconventional electrical technologies, history, examples, features, advantages and disadvantages compared to "classical" processes	For on-site activity: Presentation with video-projector and additional explanations on the blackboard For the on-line activity: The university's e-learning platform and / or Microsoft Teams, in video-audio conferencing mode, are used	2
2. Infrared (IR) heating and drying equipment. IR - characteristics, specific laws, IR sources, types of furnaces / drying installations with IR (tunnel ovens), sizing principles		2
3. Electrotechnologies based on ultrasounds (UUS) applications in industry: UUS characteristics, phenomena that occur at UUS propagation through different media, UUS production. Magnetostrictive and piezoelectric transducers. The general setup of an electroacoustic system		2
4. Electrotechnologies based on ultrasounds (UUS) applications in industry: Applications (dimensional processing, welding and soldering plastics and metals, cleaning - degreasing in ultrasonically activated baths)		2
5. Equipment for electrical metalworking: EDM (Electric Discharge Machine) processing. (Principle of processing, process analysis, EDM with massive electrode. Specific power sources)		2
6. Equipment for electrical metalworking: EDM machines with filiform electrode. Electrical contact processing equipment. Electrochemical processing equipment. Anode-mechanical processing equipment		2
7. Equipment for electrical metalworking. High speed forming equipment. Electromagnetic processing / electromagnetic forming		2

8. Equipment for electrical metalworking. High speed forming equipment. Electrohydraulic processing / electrohydraulic forming	For on-site activity: Presentation with video-projector and additional explanations on the blackboard For the on-line activity: The university's e-learning platform and / or Microsoft Teams, in video-audio conferencing mode, are used	2
9. Unconventional processes for coating metal surfaces; specific electrical equipment. Electrophoretic varnishing (chemical bonds, process analysis, power supply sources, constant voltage or constant current process, energy balance		2
10. Unconventional processes for coating metal surfaces; specific electrical equipment: Electrostatic painting (electrostatics basics, types of electrostatic coatings, electrostatic painting installations, power supply (HV), adv./disadv.)		2
11. Electrotechnologies using thermal plasma and specific equipment: Thermodynamic characteristics of plasma. Plasma generation. Types of plasmatrons (with electric arc, induction, electronic), construction and power supply variants		2
12. Industrial applications of low temperature thermal plasma; plasma furnaces, remelting for refining, separation of useful components, obtaining metals with high melting point, cutting metals		2
13. Electrical equipment for unconventional welding and soldering processes. Classification of unconventional welding processes. Sheet metal welding with stored energy		2
14. Electron beam equipment: basics, features, equipment, applications		2

Bibliography (selection)

1. I. Şora, N. Golovanov et al – *Electrothermia and Electrotechnologies* (in Romanian), Vol. 2, *Electrotechnologies*, Technical Publishing House, Bucharest, 1999
2. Fl.T. Tănăsescu, C. Ifrim – *Electrotechnologies* (in Romanian), Politehnica Press, Bucharest, 1990
3. I. Şora ş.a.– *Installations for electrotechnologies* (in Romanian), laboratory works, Politehnica University Timişoara, 1994
4. S. Paşca – *Nonconventional electrical technologies and equipment* (in Romanian), Vol. I, University of Oradea Publishing House, 2004
5. S. Paşca – *Nonconventional equipment and technologies* (in Romanian) – lecture notes, (electronic)
6. S. Pasca, V. Fireteanu – *Finite Element Analysis of Successive Induction Heating and Magnetoforming of Thin Magnetic Steel Sheets*, 14th International Symposium on Numerical Field Calculation in Electrical Engineering IGTE 2010, Graz, Austria, Proceedings, pp. 356-361
7. S. Pasca, T. Tudorache, M. Tomse – *Finite Element Analysis of Coupled Magneto-Structural and Magneto-Thermal Phenomena in Magnetoforming Processes*, 6th International Conference on Electromagnetic Processing of Materials EPM 2009, Dresden, Germany, Proceedings, pp. 735-738
8. S. Pasca, T. Vesselenyi, V. Fireteanu, T. Tudorache, P. Mudura, M. Tomse, M. Popa – *Electromagnetic Forming - an Efficient Technology for Metallic Sheet Processing*, Przeglad Elektrotechniczny (Electrotechnical Review), 11/2008, 84, pp. 197-202
9. V. Fireteanu, T. Tudorache, M. Popa, and S. Pasca – *Finite Element Analysis of Aluminum Billet Heating by Rotation in DC Magnetic Fields*, XXIV UIE International Congress, Krakow, Poland, 2008, Proceedings
10. S. Pasca, T. Vesselenyi, V. Fireteanu – *Transient Phenomena in Electromagnetic Forming Processes*, International Scientific Colloquium "Modeling for Electromagnetic Processing" MEP 2008, Hannover, Germany, Proceedings, pp. 315-320.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Technical norms of work safety specific to electrotechnologies. Presentation of laboratory works		2
2. Study of an infrared heating / drying installation		2
3. Modern equipments which uses ultrasound applications. Determining the parameters of electroacoustic transducers that operate based on the piezoelectric effect		2
4. Modern equipments which uses ultrasound applications. Study of an equipment for cleaning / degreasing parts and components in ultrasonically activated solvent baths / {Determining the parameters of		2

electroacoustic transducers that operate based on the magnetostrictive effect}		
5. Study of the Electric Discharge Machine with massive electrode and of the pulse generators for EDM		2
6. Laboratory equipment for the study of electromagnetic forming process of thin metal sheets / {Numerical modeling of the electromagnetic forming process of thin metal sheets}		2
7. Nonconventional processes for welding metal half-finished products. Study of a classic spot welding equipment (with transformer) and, comparatively, of a spot welding equipment with stored energy		2

Bibliography (selection)

1. I. Şora, N. Golovanov et al – *Electrothermia and Electrotechnologies* (in Romanian), Vol. 2, Electrotechnologies, Technical Publishing House, Bucharest, 1999
2. Fl.T. Tănăsescu, C. Ifrim – *Electrotechnologies* (in Romanian), Politehnica Press, Bucharest, 1990
3. I. Şora ş.a.– *Installations for electrotechnologies* (in Romanian), laboratory works, Politehnica University Timişoara, 1994
4. S. Paşca – *Nonconventional electrical technologies and equipment* (in Romanian), Vol. I, University of Oradea Publishing House, 2004
5. S. Paşca – *Nonconventional equipments and technologies* (in Romanian) – laboratory works, (electronic)

9. Corroboration of the discipline content with the expectations of the representatives of epistemological community, professional associations and representative employers in the field related to the program

- The content of the subject is in accordance with the one in other national or international universities. In order to provide a better accomodation to the labour market requirements, there have been organized meetings both with representatives of the socio-economic environment and with academic staff with similar professional interest fields.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	- the final grade obtained at the assessment works, Vp	Continuous assessment Vp. - The students will support 2 written works Vp1 and Vp2, in the weeks 7 and 14, each covering 1/2 of the semester subject; - If special measures will be imposed in the epidemiological context generated by the COVID-19 pandemic, the assessment can beheld online, using the e-learning platform of the University of Oradea or the Microsoft Teams platform, in compliance with the requirements imposed by the Methodology for conducting didactic activities during the academic year. -final grade: Vp = (Vp1 + Vp2) / 2 - requirements: Vp1 ≥ 5, Vp2 ≥ 5	75 %
10.5 Laboratory	- the final grade for laboratory activity, L	- the students will take a test (set of questions) on the laboratory works, after which they will obtain the grade TL - another DL grade will be given on the personal laboratory file (complete file, experimental data processing, themes and applications solved correctly) - final grade for the laboratory activity results: L = (TL + DL) / 2 - requirements: TL ≥ 5, DL ≥ 5	25 %
10.8 Minimum performance standard:			

- Passing the exam (obtaining the credits) involves: Vp1 ≥ 5, Vp2 ≥ 5 and L ≥ 5
- The final grade is calculated as follows: N = 0,75·Vp + 0,25·L

Completion date:	Signature of the course holder	Signature of the laboratory holder
29.08.2022	Assoc. prof. Sorin Paşca E-mail: spasca@uoradea.ro	Assoc. prof. Sorin Paşca

Date of endorsement in the department:	Signature of the head of department
01.09.2022	Prof. habil. Francisc-Ioan Hathazi E-mail: francisc.hathazi@gmail.com

Date of endorsement in the Faculty Board:	Signature of the dean
23.09.2022	Prof. habil. Ioan-Mircea Gordan E-mail: mgordan@uoradea.ro