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				**Modern Languages – English (1)**			
2.2 Holder of the subject				**Lecturer PhD. Abrudan Caciora simona Veronica**			
2.3 Holder of the academic laboratory/project							
2.4 Year of study	**I**	2.5 Semester	**1**	2.6 Type of the evaluation	**PE**	2.7 Subject regime	**CD**

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		3.6 academic seminar/ laboratory/project	**14**

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	36
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	12
Tutorials	18
Examinations	4
Other activities.	

3.7 Total of hours for individual study	**36**
3.9 Total of hours per semester	**50**
3.10 Number of credits	**2**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Basic knowledge of English
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	
5.2.for the development of the academic laboratory/project	- Mandatory presence at 80% of the seminars; - The seminar can be carried out face to face or online

6. Specific skills acquired

Professional skills	
Transversal skills	**CT3.** Effective use of information sources and resources of communication 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 seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses.
7.2 Specific objectives	• Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study

8. Contents*

8.2 Seminar	Teaching methods	No. of hours/ Observations
Chapter 1 Introductory seminar. Test for the evaluation of students'level of English language skills.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter Drawings in engineering: Drawing types and scales Reading. Vocabulary and conversation exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 3: **Types of views used in engineering drawings**.Vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h

Chapter 4. Design development: the initial design phase. Collaborative development of engineering projects. Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 5. The degrees of comparison for adjectives and adverbs (revision exercises)	Free exposure, with the presentation of the course with video projector, on the board or online	1 h
Chapter 6: Engineering Design. Technical Drawing in Engineering. Types of Views Used in Engineering Drawing. Listening and speaking exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 7: Design objectives and design calculations. Vocabulary and speaking exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 8: Expressing dimensions of circles (key dimensions of circles, expressing the dimensions of pipes and ducts). Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 9: Dimensional accuracy. Discussing the concepts of precision and tolerance in engineering. Vocabulary and speaking exercises	Free exposure, with the presentation of the course with video projector, on the board or online	1 h
Chapter 10: Expressing numbers and calculations. Decimals and fractions. Addition, subtraction, multiplication and division. (Listening and vocabulary exercises)	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 11: Expressing area, size and mass. Referring to weight, mass, volume and density.. (Reading and exercises)	Free exposure, with the presentation of the course with video projector, on the board or	1h

	online	
Chapter 12: Measurable parameters. Defining the concepts of supply, demand, capacity, input, output and efficiency in relation to the engineering domain. (Reading and conversation exrcises**)**	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 13: 3D component features (referring to 3D forms of edges and joints and the 3D forms of fasteners) Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 14: Revision of the concepts relating to the engineering domain discussed during the semester.	Free exposure, with the presentation of the course with video projector, on the board or online	1h

References:

Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering*, Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Bențea Violeta, *A Practical Course In English Science and Technology* , Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999

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 can be found in the curriculum of Automatics and Applied Informatics 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 of Technical Engish requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods The evaluation can be done face-to-face or online	10.3 Percent from the final mark

10.4 Seminar	Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them For 10: thorough knowledge of all subjects is required	**Written exam** Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester	100 %
10.6 Minimum performance standard: Seminary: Capacity to use English in an appropriate way, depending on the context Capacity to produce any of the documents, written in English, presented and discussed during the seminaries Capacity to use grammatical structures accurately			

Signature of the seminar holder:
AbrudanCaciora Simona Veronica
e-mail: veronicaabrudan@yahoo.com

Completion date:
29.08.2022

Head of the Department
Helga Maria Silaghi
e-mail: hsilaghi@uoradea.ro

Signature of the Head of teh Department
Prof. Habil.Phd Francisc Ioan Hathazi
e-mail: francisc.hathazi@gmail.com

Date of endorsement in the department:
1.09.2022

Date of endorsement in the Faculty Board:
23.09.2022

Signature of the Dean
Prof Habil PhD Ioan Mircea Gordan
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	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		**TECHNOLOGICAL METHODS AND PROCESSES**					
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		2.5 Semester		2.6 Type of the evaluation	7)	2.7 Subject regime	8)

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

3.1 Number of hours per week	42	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	2	3.6 academic seminar/laboratory/project	1

Distribution of time	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	7
Tutorials	3
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	(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 carried out face to face or online; - The equipment related to the laboratory class; - Preparation of the report (synthesis material);

	- Carrying out all laboratory works; - The laboratory can be carried out face to face or online; - A maximum of one laboratory work can be recovered; - Frequency during laboratory hours: less than 70% leads to the restoration of the discipline.
6. Specific skills acquired	
Professional skills	**C4. Using measurement techniques for electrical and non-electrical quantities and data acquisition systems in electromechanical systems** **C5. Automation of electromechanical processes** **C6. Operating, maintenance, service, system integration activities**

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

7.1 The general objective of the subject	▪ Students acquire the concepts regarding technological methods and procedures, methods of analysis and synthesis of their structure; ▪ Applying general and specialized technical knowledge to solve the logistic problems specific to the field of electrical engineering
7.2 Specific objectives	▪ Design and use of schemes, structural and functional diagrams, graphic representations and technical documents specific to the field of electrical engineering

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Basic concepts of technological methods and processes 1.1. Production process 1.2. Technological process	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
1.3. Technological flow 1.4. Quality technical control 1.5. Choosing the optimal process version 1.6. Elements of technical norming in the technological process	Idem	2
1.7. Precision of part and product processing. Tolerances and adjustments 1.8. Dimensions, deviations and tolerances	Idem	2
2. Material properties 2.1. Properties of materials and tests 2.2. Physical properties 2.3. Electrical properties 2.4. Magnetic properties 2.5. Mechanical properties and tests	Idem	2
2.6. Chemical properties 2.7. Electrical properties of insulating materials 2.8. Physical-chemical properties of insulating materials 2.9. Aluminium properties 2.10. Copper properties	Idem	2
3. Materials used in industry 3.1. Materials used in machine building 3.2. Metals and alloys used in electrical engineering 3.3. Electrical insulating materials used in electrical engineering 3.3.1. Gaseous electro-insulating materials 3.3.2. Liquid electro-insulating materials	Idem	2
3.3.3. Solid organic insulating materials 3.3.4. Solid inorganic insulating materials	Idem	2

4. Methods and processes of cold machining 4.1. Methods and processes for splitting machining 4.1.1. Turning 4.1.2. Milling 4.1.3. Drilling	Idem	2
4.1.4. Planning 4.1.5.Polishing 4.1.6.Rectification 4.1.7. Other processing methods 4.2. Methods and processes for processing materials by cutting and cold plastic deformation 4.2.1. Cutting 4.2.2. Shaping 4.2.3. Continuous deformation	Idem	2
4.2.4. Bending 4.2.5. Drawing 4.2.6. Special processing of sheets 4.3. Unconventional technologies 4.3.1. Electrical discharge machining processing	Idem	2
5. Innovative technologies in material processing 5.1. Plasma cutting technology 5.2 Friction rotation with rotating element 5.3. 2D and 3D Laser Testing 5.4. Non-destructive processing of materials 5.5. Laser processing by shock 5.6. Innovative pressing processing 5.7. Method of heating ingots using superconducting magnets	Idem	2
5.8. Nanotechnology 5.9. Water jet cutting 5.10. Pipe welding technology in a hyperbaric environment 5.11. Bionanotechnology 5.12. Technology of material processing by solidification with phase change surface control 5.13. Graphene	Idem	2
6. Corrosion and corrosion protection of metals and alloys 6.1 Corrosion of metals 6.1.2. Chemical corrosion 6.1.3. Electrochemical corrosion	Idem	2
6.2. Corrosion protection of metals and alloys	Idem	2
Bibliography 1) Șt. Nagy, **Livia Bandici** - „*Metode și procedee tehnologice*", Editura Universităţii din Oradea, 2017, ISBN 978-606-10-1888-8. 2) V. Petre - "*Tehnologie Electromecanica – Îndrumar de laborator*", UPB, 2001. 3) F. Anghel, M.O. Popescu - "*Tehnologii Electromecanice*", UPB, 2001. 4) F. Anghel, I. Bestea - "*Tehnologii Electromecanice – Aplicaţii practice*", UPB, 2003. 5) T. Tudorache – "M*etode si procedee tehnologice"*, UPB, 2003. 6) L. Balteș – "*Știința si ingineria materialelor*", Reprografia Universităţii "Transilvania"Braşov, 2004. 7) G. Oprea – "*Chimie fizică. Teorie şi aplicaţii",* Editura Risoprint, Cluj Napoca, 2005, ISBN 973-656-909-8. 8) D. Hoble, Livia Bandici, Șt. Nagy - „*Sisteme performante de procesare electrotermică a materialelor*", Editura Universităţii din Oradea, 2012, (ISBN 978-606-10-0767-7). 9) **Livia Bandici**, D. Hoble, Șt. Nagy – „*Tehnologii inovative în procesarea materialelor*", Editura Universităţii din Oradea, 2011, (ISBN 978-606-10-0472-0). 10) **Livia Bandici**, Dorel Hoble, Stefan Nagy – "*Tehnologii inovative în procesarea materialelor"*. Editura Universităţii din Oradea, 2011, pag. 224, ISBN 978-606-10-0472-0.		
8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the paper, instructions on the work safety rules, processing of the experimental data	- Presentation of the paper (synthesis material); - Test on the theoretical	2

	knowledge aquired during the laboratory; - Interpretation of the results.	
2. Standardization in the machine industry and in electrical engineering	Idem	2
3. Metals and alloys used in the electrotechnical industry	Idem	2
4. Cold treatment technologies	Idem	2
5 Heat treatment technologies	Idem	2
6. The use of MACH4	Idem	2
7. Closing the laboratory situation.	- presenting and handing out the laboratory papers; - the recovery of one missed laboratory is allowed.	2

Bibliography

1) **Livia Bandici,** Ștefan Nagy - *Metode şi procedee tehnologice. Lucrări practice de laborator*. Editura Universităţii din Oradea, 2018, ISBN 978-606-10-1958-8.
2) V. Petre - "*Tehnologie Electromecanica – Îndrumar de laborator*", UPB, 2001.
3) F. Anghel, M.O. Popescu - "*Tehnologii Electromecanice*", UPB, 2001.
4) F. Anghel, I. Bestea - "*Tehnologii Electromecanice – Aplicaţii practice*", UPB, 2003.
5) T. Tudorache - "*Metode si procedee tehnologice"*, UPB, 2003.
6) L. Balteş - "*Ştiinţa si ingineria materialelor*", Reprografia Universităţii "Transilvania"Braşov, 2004.
7) G. Oprea - "*Chimie fizică. Teorie şi aplicaţii",* Editura Risoprint, Cluj Napoca, 2005, ISBN 973-656-909-8.
8) Șt. Nagy, **Livia Bandici** - „*Metode și procedee tehnologice*", Editura Universităţii din Oradea, [ISBN 978-606-10-1888-8], 2017.
9) Hütte - „*Manualul inginerului. Fundamente*", Editura Tehnică, București, 1989.

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	The evaluation can be done face to face or online.	50 % from 0,5 VP_F;
10.5 Laboratory	Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard		
Note components: Final Periodic Verification (VPF), Laboratory (LF) Grade calculation formula: VP Grade = 0.5VPF + 0.5LF; LF = 0.450L + 0.05R; VPF = (VPI + VPII) / 2;			
10.6 Minimum performance standard: Carrying out works under coordination, in order to solve some problems specific to the field, with the correct evaluation of the workload, the available resources, the necessary completion time and the risks, in conditions of application of the norms of safety and health at work; Adequate use of basic knowledge of technological methods and processes used in the machine building and electrical engineering industries.			

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				**Modern Languages – English (1I)**			
2.2 Holder of the subject				**Lecturer PhD. Abrudan Caciora simona Veronica**			
2.3 Holder of the academic laboratory/project							
2.4 Year of study	**I**	2.5 Semester	**1I**	2.6 Type of the evaluation	**PE**	2.7 Subject regime	**CD**

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

3.1 Number of hours per week		of which: 3.2 course		3.3 academic seminar /laboratory/project	**1**
3.4 Total of hours from the curriculum		Of which: 3.5 course		3.6 academic seminar/ laboratory/project	**14**
Distribution of time					50
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					11
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					11
Tutorials					4
Examinations					2
Other activities.					

3.7 Total of hours for individual study	**36**
3.9 Total of hours per semester	**50**
3.10 Number of credits	**2**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Basic knowledge of English
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	
5.2.for the development of the academic laboratory/project	- Mandatory presence at 80% of the seminars; - The seminar can be carried out face to face or online

6. Specific skills acquired

Professional skills	
Transversal skills	**CT3.** Effective use of information sources and resources of communication 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 seminar aims to be, for the students who do not have English as main subject, a means of improving the English knowledge they had acquired in high school, in order to reach the level of language competence that would alow them to understand and produce accurate academic and scientific texts in English, and understand written or verbal texts on topics related to the field of engineering in general and the specialization they have chosen, in particular. During the seminar, students are given the opportunity to produce written texts or to express themselves verbally, in English. In order to achieve these goals, the textbooks elaborated by the foreign languages team of the Department of Automated Systems Engineering and Management are used, as well as specialized books, published by well-known international publishing houses.
7.2 Specific objectives	• Acquiring field-related vocabulary in English and the completion of documents that are specific to the chosen field of study

8. Contents*

8.2 Seminar	Teaching methods	No. of hours/ Observations
Chapter 1 Material types: Metals and non-metals. Elements, compounds and mixtures. Composite materials. Vocabulary and speaking exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter Polymers. Natural and synthetic polymers. Thermoplastics and thermosetting plastics. Reading. Vocabulary and conversation exercises. Revision of numerals.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 3: **Material properties (I). Tensile strength and deformation. Elasticity and plasticity. Stages in elastic and plastic deformation**.Vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h

Chapter 4. Material properties (I). Hardness. Fatigue, fracture toughness and creep. Basic thermal properties. Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 5. Interconnection: vocabulary relating to attaching and supporting and fitting together different parts, specific to the engineering domain. (revision exercises)	Free exposure, with the presentation of the course with video projector, on the board or online	1 h
Chapter 6: Mechanical fasteners (I). Bolts. Preload in bolted joints. Washers. Listening and speaking exercises. Revision: Countable and uncountable nouns.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 7: Mechanical fasteners (2). Screws. Screw anchors and rivets.. Vocabulary and speaking exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 8: Non-mechanical joints: welding, brazing, soldering, adhesives. Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 9: Referring to types of force and deformation. The concept of failure in engineering Vocabulary and speaking exercises	Free exposure, with the presentation of the course with video projector, on the board or online	1 h
Chapter 10: Expressing numbers and calculations. Decimals and fractions. Addition, subtraction, multiplication and division. (Listening and vocabulary exercises)	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 11: Referring to the electrical supply. Direct current and alternating current. AC generation and supply. DC generation and use.. (Reading and exercises)	Free exposure, with the presentation of the course with video projector, on the board or	1h

	online	
Chapter 12: Referring to circuits and components. Simple circuits. Mains AC circuits and switchboards. Printed and integrated circuits. Electrica land electronic components. (Reading and conversation exrcises**)**	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 13: Referring to engines and motors. Types and functions of engines and motors. Reading and vocabulary exercises.	Free exposure, with the presentation of the course with video projector, on the board or online	1h
Chapter 14: Referring to energy and temperature. Forms of energy. Energy efficiency. Work and power.	Free exposure, with the presentation of the course with video projector, on the board or online	1h

References:

Abrudan Simona Veronica, Bandici Adina, *Technical English for Electrical Engineering*, Editura Universității "Lucian Blaga" din Sibiu, 2016.
Abrudan Simona Veronica, *English for Computer Science Students*, Editura Universitatii din Oradea, Oradea, 2009
Abrudan Simona Veronica, '*English Practice. A Practical Course in English for Intermediary Students*', Editura Universitatii din Oradea, Oradea 2004
Abrudan Simona, Fazecas Eniko, Anton Anamaria, Bențea Violeta, *A Practical Course In English Science and Technology* , Editura Universitatii din Oradea, Oradea 2002
Beakdwood, L, *A first Course in Technical English*, Heinemann, 1978
Fitzgerald, Patrick,ș Marie McCullagh and Carol Tabor, *English for ICT Studies in Higher Education Studies*, Garnet Education, Reading, UK, 2011.
PPP- English for Science and Technology,Cavaliotti,Bucuresti, 1999

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 can be found in the curriculum of Automatics and Applied Informatics 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 of Technical Engish requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods The evaluation can be done face-to-face or online	10.3 Percent from the final mark

10.4 Seminar	Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them For 10: thorough knowledge of all subjects is required	**Written exam** Students rare required to solve exercises, meant at testing the knwledge they acquired during the semester	100 %
10.6 Minimum performance standard: Seminary: Capacity to use English in an appropriate way, depending on the context Capacity to produce any of the documents, written in English, presented and discussed during the seminaries Capacity to use grammatical structures accurately			

Completion date:
29.08.2022

Date of endorsement in the department:
1.09.2022

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	**Applied Informatics I**						
2.2 Holder of the subject	prof.PhD.Hathazi Francisc – Ioan						
2.3 Holder of the academic seminar/laboratory/project	--- / PhD student eng.Cheregi Gabriel Adrian / ---						
2.4 Year of study	I	2.5 Semester	I	2.6 Type of the evaluation	Ex.	2.7 Subject regime	Fundamental Discipline (DF)

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	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	8
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	10
Tutorials	4
Examinations	8
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	Minimum knowledge of hardware and software

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 laboratory can be carried out face to face or online. Smart board, 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	• C2. Operating with fundamental concepts in computer science and information technology

Transversal skills	• CT1 – Identify the objectives to be achieved, the available resources, the conditions for their completion, the working stages, the working times, the deadlines and the related risks; • CT2 – Identify roles and responsibilities in a multidisciplinary team and apply effective relationship techniques and teamwork; • CT3 – Efficient use of information sources and resources of communication 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 is addressed to students from the Electrical Systems specialization, trying to familiarize them theoretically but also practically with a series of knowledge about applied informatics. Given the degree of penetration of computer technology in most aspects of socio-economic life, the need to acquire computer skills, computer use is clearly required. Thus, the course supports students with information on acquiring the main knowledge in the field.
7.2 Specific objectives	• The lab is designed to provide future engineers with practical computer skills. The content of the laboratories presented is based on the need to deepen and practical explanation of the problems presented in the course. Students have the opportunity to identify specific issues discussed during the course, familiarization with modern means of work. They will understand the complexity of this discipline. Knowledge is useful in developing skills in addressing the specific issues facing a specialist in this field.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Introductory course.	Laptop, video projector, IQ Board, free speech	2
2. Computer systems architecture. Knowledge of the main parts of the personal computer: central processing unit (CPU), hard disk, input / output devices, memory types, data carriers. Understanding the term peripheral mechanisms.	Laptop, video projector, IQ Board, free speech	3
3. Operating systems.	Laptop, video projector, IQ Board, free speech	3
4. Basic hardware, software and IT concepts. Short history of programming languages.	Laptop, video projector, IQ Board, free speech	2
5. Advanced editing techniques.	Laptop, video projector, IQ Board, free speech	3
6. Spreadsheet programs.	Laptop, video projector, IQ Board, free speech	3
7. Ethical and legal aspects related to informatics, professional ethics, analytical tools (related to ethics).	Laptop, video projector, IQ Board, free speech	2
8. Aspects related to intellectual property protection: infringement, protection.	Laptop, video projector, IQ Board, free speech	3
9. Privacy issues - private space (internet).	Laptop, video projector, IQ Board, free speech	2
10. Case studies of violation of ethical norms and protection of one's work.	Laptop, video projector, IQ Board, free speech	2
11. Computer viruses. Understand the term computer virus. Understanding and knowing anti-virus measures.	Laptop, video projector, IQ Board, free speech	3

Bibliography

1. Hathazi Francisc – Ioan – Notițe de Curs – în curs de apariție;
2. Francisc Ioan Hathazi, Utilizarea calculatoarelor, Editura Universității din Oradea, ISBN 973-759-089-9, 978-973-759-089-3, 2006, pp.253;
3. FRENTIU, M., PARV, B.: Elaborarea programelor: metode si tehnici moderne, ProMedia, Cluj-Napoca, 1994;
4. GHEZZI, C., JAZAYERI, M.: Programming Language Concepts, John Wiley, 1972;
5. HOROWITZ, E.: Fundamentals of Programming Languages, Springer, 1973;
6. MACLENNAN, B.J.: Principles of Programming Languages: Design, Evaluation and Implementation, Holt, Rinehart and Winston, 1973;
7. PARV, B., VANCEA, A.: Fundamentele limbajelor de programare, Fascicolele 1-2, Lito Univ. "Babes-Bolyai", 1992;
8. PRATT, T.W.: Programming Languages: Design and Implementation, Prentice Hall, 1975;
9. SHAMMAS, N.: Object Oriented Programming with Turbo Pascal, Prentice-Hall, 1990;
10. VOSS, G.: Object-Oriented Programming: An Introduction, Osborne McGraw-Hill, 1991;
11. PARV, B., VANCEA, A.: Fundamentele limbajelor de programare, Ed.Microinformatica, 1996;

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Assessment of digital skills.	Free speech, use of computer network from the laboratory equipment	2
2. The structure of computer systems. Assembly and troubleshooting. Operating systems. Installation. Settings. Case studies.	Free speech, use of computer network from the laboratory equipment	4
3. Advanced editing techniques in MS Word.	Free speech, use of computer network from the laboratory equipment	5
4. Advanced techniques in the MS Excel spreadsheet program	Free speech, use of computer network from the laboratory equipment	5
5. Making professional presentations with MS Power Point	Free speech, use of computer network from the laboratory equipment	5
6. Ethical and legal issues related to informatics.	Free speech, use of computer network from the laboratory equipment	3
7. Protection of intellectual property	Free speech, use of computer network from the laboratory equipment	2
8. Viruses. Case studies.	Free speech, use of computer network from the laboratory equipment	2

Bibliography

1. 1. Hathazi Francisc – Ioan – Notițe de Laborator – în curs de apariție;
2. Francisc Ioan Hathazi, Utilizarea calculatoarelor, Editura Universității din Oradea, ISBN 973-759-089-9, 978-973-759-089-3, 2006, pp.253
3. FRENTIU, M., PARV, B.: Elaborarea programelor: metode si tehnici moderne, ProMedia, Cluj-Napoca, 1994;
4. GHEZZI, C., JAZAYERI, M.: Programming Language Concepts, John Wiley, 1972;
5. HOROWITZ, E.: Fundamentals of Programming Languages, Springer, 1973;
6. MACLENNAN, B.J.: Principles of Programming Languages: Design, Evaluation and Implementation, Holt, Rinehart and Winston, 1973;
7. PARV, B., VANCEA, A.: Fundamentele limbajelor de programare, Fascicolele 1-2, Lito Univ. "Babes-Bolyai", 1992;
8. PRATT, T.W.: Programming Languages: Design and Implementation, Prentice Hall, 1975;
9. SHAMMAS, N.: Object Oriented Programming with Turbo Pascal, Prentice-Hall, 1990;
10. VOSS, G.: Object-Oriented Programming: An Introduction, Osborne McGraw-Hill, 1991;

11. PARV, B., VANCEA, A.: Fundamentele limbajelor de programare, Ed.Microinformatica, 1996;

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 license program. The content of the discipline is found in the curriculum of the Electrical Systems 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. 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	75 %
10.6 Laboratory	Final evaluation test and free presentation of the report in ppt format.	The evaluation can be done face-to-face or online. Oral examination of students	25 %
10.8 Minimum performance standard: • Carrying out the works under the coordination of a teacher, in order to solve specific problems in the IT 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		**Electrotechnic materials**					
2.2 Holder of the subject		Lecturer dr.ing. Stașac Claudia Olimpia					
2.3 Holder of the academic seminar/laboratory/project		Lecturer dr.ing. Stașac Claudia Olimpia					
2.4 Year of study	1	2.5 Semester	2	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	44hours
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	5
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	16
Tutorials	1
Examinations	2
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	(Conditions) -Electromagnetic field theory, Physics, Mathematics
4.2 related to skills	-Knowledge of electrical symbols, electrical diagrams, use of measuring devices, properties of materials.

5. Conditions (where applicable)

5.1. for the development of the course	The course can be conducted face-to-face or online -Videoprojector, Online Teaching Equipment
5.2.for the development of the academic seminary/laboratory/project	Seminar/laboratory/project can be conducted face-to-face or online - Equipment related to the conduct of laboratory hours - Preparation of the report, knowledge of the notions contained in the

	laboratory work to be carried out (synthesis material); - Performing all the laboratory work.
6. Specific skills acquired	
Professional skill	- C3. Use of fundamental knowledge of electrotechnics - C4. Design of electrical systems and their components - C5. Design and coordination of experiments and tests
Transversal skills	- CT2. Identification of the roles and responsibilities in a multidisciplinary team and use of relationship and effective working techniques in 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	▪ The Course of Electrotechnical Materials is designed for the purpose of presenting modern interdisciplinary problems regarding the study of electrical materials. Through the topic addressed, the course is meant to allow students to acquire basic knowledge, in the first stage, about the main phenomena that occur in the study of electrical materials.The course is also intended to facilitate students the development of basic theories and methods of physics, chemistry, suitable for the field of electrical engineering. During the course, the aim is to attract students to discussions on the issues presented so that they have an active participation
7.2 Specific objectives	▪ The laboratory work is designed to provide future engineers in the field of electrical systems. Description of basic concepts, theories and methods of physics, chemistry, suitable for the field of electrical engineering.In the first part of the class time, students are appropriated, by questions, discussions, or tests, of the theoretical notions necessary for laboratory activity, after which, under the supervision of the teacher, the experimental determinations are carried out. During the laboratory class time, discussions are held with the students, who aim to establish the knowledge, and the practical skills of carrying out the assembly schemes, the correct reading of the sizes pursued, and the method of evaluating them.

8. Contents*

8.1 Course	Teaching methods Teaching is done "online", or "face-to-face" according to requirements	No. of hours/ Observations
1.Anorganic and organic chemistry. Chemical conexion..	During teaching, student contributions are requested on course-specific topics. Some courses are conducted by teaching the subjects and debating them by students.	2
2. Crystalline corps. Defects of crystalline networks	Idem	2
3 Energy bands of the electron in crystal	Idem	2

4. Electrical conduction of metals	Idem	2
5. Electrical conduction of semiconductors	Idem	2
6. Electrical polarization	Idem	2
8. Technical and technological properties of electrotechnical materials	Idem	2
9. Conductive materials. Metals	Idem	2
10 Semiconductor materials	Idem	2
11. Gaseous and liquid electro-insulating materials	Idem	2
12. Solid electro-insulating materials	Idem	2
13 Magnetic materials	Idem	2
14. Magnetic liquids	Idem	2

Bibliography
[1]. Claudia Olimpia Staşac, D.A. Hoble – Materials for Electrotechnical and Electronics – University of Oradea Publishing House 2020 ISBN 978-606-10-2092-8
[2]. D.A. Hoble – Materials for Electrical and Electronic Engineering – University of Oradea Publishing House 2013 ISBN 978-606-10-1171-1
[3]. D. Hoble – Electrotechnical Materials – University of Oradea Publishing House 2004 ISBN 973-613-579-9
[4] D. Hoble - Electrotechnical Materials -Laboratory Advisor- U.O.-1998
[5] Rodica Helera – Materiale pentru componente electronice- Ed. MatrixRom Bucureşti 2003
[6] A.Ifrim ş.a. - Materiale electrotehnice E.D.P. - 1982

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1.Work protection rules specific to electrical equipment. Getting the basics of the study of electrical materials.	During the first hour of the laboratory will be presented by the teacher coordinator of the laboratory work of the notions related to the protection of work specific to electrical materials.	2
2. The crystalline structure.	Presentation by students of the report prepared (synthesis material). The laboratory guide is available in printed format within the Laboratory and at the University Library, with students having constant access to teaching materials. - Test on theoretical knowledge related to the laboratory - Performing experimetal	2

	determinations - Interpretation of the results obtained.	
3. Study of volume resistivity.	idem	2
4. Study of surface resistivity	idem	2
5. Study of materials for contacts	idem	2
6. Dynamic study of brushes for electric machines	idem	2
7. Determination of dielectric rigidity in electro-insulating oils	idem	2
8. Determination of dielectric rigidity in solid dielectrics	idem	2
9. Determination of dielectric rigidity in gaseous dielectrics	idem	2
10. Study of viscosity of liquid dielectrics	idem	2
11. Study of Hygroscopicity.	idem	2
12. Determination of the characteristic of varistors.	idem	2
13. Study of the influence of temperature on photovoltaic cells.	idem	2
14 Evaluation of laboratory activity. End of the situation	14 Evaluation Teaching of laboratories and their support; Remaining lab recovery.	2

Bibliography

[1] D.A. Hoble – Applications in the study of electrical materials - University of Oradea Publishing House 2017 ISBN 978-606-10-1879-6
[2]. D. Hoble – Electrotechnical Materials – University of Oradea Publishing House 2004 ISBN 973-613-579-9
[3] D. Hoble - Electrotechnical Materials -Laboratory Advisor- U.O.-1998
[4] Rodica Hella – Electronic Component Materials- Ed. MatrixRom Bucharest 2003
[5] Petre Notingher - Electrotechnical Materials. Uses. Ed. Politahnica Press - 2005

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 note 5: all subjects must be treated to minimum standards; - For grades >5 all subjects must be treated proportionally according to the scoring scale.	Written, oral or on-line examination	75 %
10.6 Laboratory	-- All laboratory work must be carried out, which is a condition to enter the exam.	Knowledge assessment test	25 %
10.8 Minimum performance standard: Performing work under the coordination of a teacher, to solve problems specific to the study of electrical equipment and maintenance, maintenance and diagnosis of electrical equipment with the correct evaluation of workload, available resources, time of completion and risks, under conditions of application			

of occupational safety and health rules. After the promotion of the discipline, the student must have the ability to understand the mechanisms of the main phenomena that take place at the level of the structure of electrotechnical materials, their main properties, so that he can choose the right meter in the various practical engineering applications.

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	**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			**Electromagnetic field theory**				
2.2 Holder of the subject			**Prof.Dr.-Ing.Ec. Silaghi Alexandru Marius**				
2.3 Holder of the academic seminar/laboratory/project			**Conf.Dr.Ing. Grava Adriana** **Ş.l.Dr.Ing. Pantea Mircea Dănuț**				
2.4 Year of study	**I**	2.5 Semester	**2**	2.6 Type of the evaluation	**Ex**	2.7 Subject regime	**DD**

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 academic seminar/laboratory/project	**2/2**
3.4 Total of hours from the curriculum	**84**	Of which: 3.5 course	**28**	3.6 academic seminar/laboratory/project	**28/ 28**

Distribution of time	66h
Study using the manual, course support, bibliography and handwritten notes	36
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	16
Tutorials	2
Examinations	4
Other activities.	

3.7 Total of hours for individual study	**66**
3.9 Total of hours per semester	**150**
3.10 Number of credits	**6**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Knowledge of mathematics and physics
4.2 related to skills	PC usage

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 laboratory and seminar hours; - students will perform the hours with the lab work; - maximum 2 works (30%) can be recovered during the semester; - frequency at laboratory less than 70% leads to the restoration of

	discipline. - the laboratory can be held face to face or online

6. Specific skills acquired	
Professional skills	C.3 Operation with fundamental concepts in electrical engineering C.3.1. Description of the theory and methods of analysis of the electromagnetic field and methods of analysis of electrical circuits operation with fundamental concepts in computer science and information technology
Transversal skills	CT1. Identification of the objectives to be achieved, the available resources, the conditions for their completion, the working steps, the working times, the deadlines and the related risks. 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 "Electromagnetic field theory" proposes to familiarize the students in the field of Electrical Engineering with the knowledge in the theoretical field of Electrotechnics and to present the Electromagnetic phenomena from the point of view of the technical applications.
7.2 Specific objectives	Being a fundamental specialty discipline in electrical engineering, its objective is to present some computational methods in a unitary framework, which are necessary for solving the problems of classical or modern industrial electrotechnics. ▪ Without neglecting the theoretical aspect of the problems being treated, a greater emphasis was placed on practical applications, the course containing computational examples.

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. ELECTROMAGNETIC FIELD IN ELECTROSTATIC REGIME	Free exposure, with the presentation on-line	8 h
Chapter 3. ELECTROMAGNETIC FIELD IN ELECTROCINETIC REGIME	Free exposure, with the presentation on-line	6 h
Chapter 4. MAGNETIC FIELD IN AIR AND SUBSTANCE	Free exposure, with the presentation on-line	8 h
Chapter 5. MAGNETIC ENERGY AND MAGNETIC FORCES	Free exposure, with the presentation on-line	4 h
Total		28 h
Bibliography 1. Andrei, H.L., Popovici, D., Cepişcă, C.- Inginerie Electrică Modernă, vol. 1, Editura Electra Bucureşti, 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.
8. Silaghi , A.M., Pantea, M.D. - Introducere in Electrotehnica, Editura Risoprint,Cluj-Napoca, 2010, ISBN 978-973-53-0258-0
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. Solving electrostatic problemens	During the seminar classes there is an application of the theoretical parts of the course, emphasis is placed on interactice methods	4 h
2. Electrostatic field		4 h
3. Capacities and capacitors		4 h
4. Stationary electrocinetic field		4 h
5. Stationary linear electrical circuits		4 h
6. Stationary magnetic field in vacuum		4 h
7. Stationary magnetic field in bodies		4 h
Total		28 h
Bibliography 1. Silaghi,A.,M., Durgau Maria - Teoria campului electromagnetic, culegere de probleme , Editura Universitatii din Oradea, 2014, ISBN 978-606-10-1388-3 2. Silaghi,A.,M., Durgau Maria - Teoria campului electromagnetic, culegere de probleme , vol. II , Editura Universitatii din Oradea, 2016, ISBN 978-606-10-1869-7 3. Gavrilă, H., Spinei, F., Ionescu, G., Andrei, H. Electrotehnica. Aplicaţii şi probleme, Tipografia I.P.B., 195 pg., 1989		
1. Presentation of the topic and the laboratory. Instructions for work safety technique	Students receive lab reports at least one week before, study them, study them, and give a theoretical test at the beginning of the lab. Then, students complete the practical part of the paper under	4 h

	the guidance of the teacher. Free presentation on how to mount the assemblies and check them after the students have finished the assembly.	
2. Measurement of voltage, current. Resistors in series and parallel.		4 h
3. Circuit series - parallel. Kirchoff I and II theorem.		4 h
4. Current and voltage dividers.		4 h
5. Amper laws		4 h
6. Inductions, magnetic flux detection		4 h
7. Program for the recovery of laboratory work and verification of the acquired concepts		4 h
Total		28 h
Bibliography 1. Pantea, M.D , Silaghi , A.M. – Electrotehnica, Editura Universităţii din Oradea, 2010, ISBN 978-606-10-0011-1 2. Silaghi , A.M., Pantea, M.D. - Introducere in Electrotehnica, Editura Risoprint,Cluj-Napoca, 2010, ISBN 978-973-53-0258-0 3. Pantea D.M., Silaghi A.M. - Teoria campului electromagnetic ,Indrumator de laborator, Editura Universităţii din Oradea, 2011, ISBN 978-606-10-0380-8 4. Popovici, D., Andrei, H - Electrotehnica şi aplicaţiile ei. Teoria campului electromagnetic şi aplicaţiile ei, Editura Printech, Bucureşti, 1997, I.S.B.N 973-98367-1-2.		

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): in accordance with the minimum performance standard 1pt. - ex officio - attendance at the course 4PT. - 4 medium-level subjects - For 10: 1pt. - ex officio - attendance at the course 9PT. - 9 medium-level	Questioner on line with 9 subjects	80%

	subjects		
10.5 Academic seminar	Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard For 10: solving the proposed problems	Free presentation with interactive discussion	10 %
10.6 Laboratory	Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard For 10: 1pt. - ex officio - attendance at the course 9PT. - 9 medium-level subjects	Questioner on line with 9 subjects	10%
10.7 **Final exam note:**	**Nfe**=0,8**Nse**+0,1**Nla**+0,1**Nse**, **Nla**≥5		
10.8 Minimum performance standard: Course:- knowing the construction parts and the principle of operation of different electrical equipment. - the ability to identify a particular type of electrical circuit - participating in at least half of the courses. Academic seminar: - ability to solve the electromagnetic problems. Laboratory: - ability to conceive and read an electrical scheme - ability to carry out an electrical installation; - participation in all laboratory work.			
E110, tel.:+40 259 408 458 , masilaghi@uoradea.ro, **hhtp://masilaghi.webhost.uoradea.ro**			

Completion date: 29.09.2022

Date of endorsement in the department: 01.09.22

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		**Engineering computing media**					
2.2 Holder of the subject		Conf.univ. dr. ing. GRAVA ADRIANA					
2.3 Holder of the academic seminar/laboratory/project		Conf.univ. dr. ing. GRAVA ADRIANA/-/-					
2.4 Year of study	I	2.5 Semester	2	2.6 Type of the evaluation	Vp	2.7 Subject regime	DF

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	69
Study using the manual, course support, bibliography and handwritten notes	15
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	18
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	18
Tutorials	4
Examinations	4
Other activities.	10

3.7 Total of hours for individual study	**69**
3.9 Total of hours per semester	**125**
3.10 Number of credits	5

4. Pre-requisites (where applicable)

4.1 Related to the curriculum	Special mathematics, mathematical analysis
4.2 Related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	The course could be physically or online
5.2.for the development of the academic seminary/laboratory/project	Seminary could be physically or online

6. Specific skills acquired	
Professional skills	*C1. Proper implementation of specific fundamental knowledge of mathematics, physics, chemistry, in the field of electrical engineering* *- C2. Use of fundamental concepts of computer science and information technology* *- C3. Use of fundamental knowledge of electrotechnics* *- C4. Design of electrical systems and their 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 student after this course acquires mathematical skills in solving problems of electric and electromagnetic field, the use of signals in time and frequency.
7.2 Specific objectives	After completing the course, the student must know how to use and apply mathematical formulas, within the studied chapters such as: symbolic analysis, partial differential equations, time and frequency analysis required for electrical engineering applications in the following disciplines to be performed during the 4 years of study.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Scalar fields. Vector fields.	Video projector, presentation, discussion or online	2h
2. Analysis of electrical signals over time. Applications with the 20 SIM simulation program.	Video projector, presentation, discussion or online	2h
3. Use of functions for modeling complex systems.	Video projector, presentation, discussion or online	2h
4. Methods of modifying equations. Applications with the 20 SIM simulation program.	Video projector, presentation, discussion or online	2h

5. Power and energy variables. Input sizes		2h
6. Analysis of the system of equations for an electrical circuit	Video projector, presentation, discussion or online	2h
7. Modeling of direct current electrical circuits in the 20 Sim simulation program.	Video projector, presentation, discussion or online	2h
8. Making connection graphs for simple electrical circuits.	Video projector, presentation, discussion or online	2h
9. Procedures for constructing connection graphs for electrical circuits.	Video projector, presentation, discussion or online	2h
10. Checking the current and voltage characteristics for direct current electrical circuits using classical methods and simulation in 20 SIM.	Video projector, presentation, discussion or online	2h
11.Verification of Kirchhoff's Theorem I for direct current circuits by applying the simulation method in 20 SIM. Comparison of the results obtained in 20 SIM with the results obtained by the classical method.	Video projector, presentation, discussion or online	2h
12.Verification of Kirchhoff's Theorem II for direct current circuits by applying the simulation method in 20 SIM. Comparison of the results obtained in 20 SIM with the results obtained by the classical method.	Video projector, presentation, discussion or online	2h
13. Comparison of the results of some electrical circuits that are in direct current solved using the theorem of cyclic currents with simulation results using the connection graphs and the simulation program 20 SIM	Video projector, presentation, discussion or online	2h
14. Comparison of the results of some direct current electrical circuits solved using the potential theorem at nodes with simulation results using the connection graphs and the 20 SIM simulation program	Video projector, presentation, discussion or online	2h

Bibliography:

1. Grava A. - “Calculation methods for engineers” - University of Oradea Publishing House 2009;
2. Grava A. - www.agrava.webhost.uoradea.ro;
3. Grava A. - “Connection graphs in electrical engineering”, University of Oradea Publishing House, 2004;
4. Grava A. - “Connection graphs in electrical engineering - Applications”, University of Oradea Publishing House, 2009;
5. Moisil C.J. - “Physics for engineers”, Vol 1,2, Bucharest Technical Publishing House, 1967;
6. Nicolescu L.O. - “Mathematics for engineers”, Vol 1,2, Bucharest Technical Publishing House, 1971;
7. Popescu I. - “Physics”, Vol 1,2, Didactic and Pedagogical Publishing House, Bucharest, 1982;
8. Rudner V. - “Problems of special mathematics”, Didactic and Pedagogical Publishing House, Bucharest, 1982;
9. Şabac, I. Gh. - “Special Mathematics”, Didactic and Pedagogical Publishing House, Bucharest, 1983;

10. Cărţianu Gh. - „Analysis and synthesis of electrical circuits” - Didactic and pedagogical publishing house - 1972.		
8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the 20 SIM simulation program	Simulasion or online simulation	2h
2. Analysis of electrical signals over time. Applications with the 20 SIM simulation program.	Simulasion or online simulation	2h
3. Use of functions for modeling complex systems.	Simulasion or online simulation	2h
4. Methods of modifying equations. Applications with the 20 SIM simulation program.	Simulasion or online simulation	2h
5. Power and energy variables. Input sizes	Simulasion or online simulation	2h
6. Analysis of the system of equations for an electrical circuit	Simulasion or online simulation	2h
7. Modeling of direct current electrical circuits in the 20 Sim simulation program.	Simulasion or online simulation	2h
8. Making connection graphs for simple electrical circuits.	Simulasion or online simulation	2h
9. Procedures for constructing connection graphs for electrical circuits.	Simulasion or online simulation	2h
10. Checking the current and voltage characteristics for direct current electrical circuits using classical methods and simulation in 20 SIM.	Simulasion or online simulation	2h
11.Verification of Kirchhoff's Theorem I for direct current circuits by applying the simulation method in 20 SIM. Comparison of the results obtained in 20 SIM with the results obtained by the classical method.	Simulasion or online simulation	2h
12.Verification of Kirchhoff's Theorem II for direct current circuits by applying the simulation method in 20 SIM. Comparison of the results obtained in 20 SIM with the results obtained by the classical method.	Simulasion or online simulation	2h
13. Comparison of the results of some electrical circuits that are in direct current solved using the theorem of cyclic currents with simulation results using the connection graphs and the simulation program 20 SIM	Simulasion or online simulation	2h
14. Comparison of the results of some direct current electrical circuits solved using the potential theorem at	Simulasion or online simulation	2h

nodes with simulation results using the connection graphs and the 20 SIM simulation program		

9. Corroborating 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

1. 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 license program. The content of the discipline is found in the curriculum of the EM 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. For a better adaptation to the labor market requirements 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		Paper - oral or online presentation The evaluation can be done face to face or online	70%
10.5 Laboratory	Laboratory Activity	Oral or online simulation presentation The evaluation can be done face to face or online	30%
10.8 Minimum performance standard:			
Adequate use of basic knowledge of mathematics, physics, chemistry in developing a professional project of low complexity			
Final Periodic Verification (VPF) Seminar (S), Laboratory(L), Project (P). Grade calculation formula N = 70%Ex + 30%S; Condition for obtaining loans:: N ≥ 5; S = ≥ 5; L = ≥ 5; P = ≥ 5.			

Signature of the course holder

Completion date:
28.08.2022

Conf.univ.dr.ing. Grava Adriana Marcela

Date de contact:
Tel.: 0259 / 410.667, e-mail: agrava@uoradea.ro

Signature of the laboratory holder

Conf.univ.dr.ing. Grava Adriana Marcela

Date de contact:
Tel.: 0259 / 410.667, e-mail: agrava@uoradea.ro

Signature Departament Directory

Date of endorsement in the department:

01.09.2022

Prof.univ.dr.ing.inf. Francisc – Ioan Hathazi

Date de contact:
Tel.: 0259 / 410.172, e-mail: ihathazi@uoradea.ro

Pagina web: http://ihathazi.webhost.uoradea.ro/

Dean's Signature

prof.univ.dr.ing. Ioan – Mircea Gordan

Date of endorsement in the department:

23.09.2022

Date de contact:
Tel.: 0259 / 410.204, e-mail: mgordan@uoradea.ro
Pagina web: http://mgordan.webhost.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	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				COMPUTER AIDED GRAPHICS I			
2.2 Holder of the subject				head of works dr.eng. SEBEŞAN RADU			
2.3 Holder of the academic seminar/laboratory/project				head of works dr.eng. SEBEŞAN RADU			
2.4 Year of study	1	2.5 Semester	1	2.6 Type of the evaluation	Vp	2.7 Subject regime	Fundamental Discipline FD

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 fieldrelated places	15
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	15
Tutorials	2
Examinations	2
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	(Conditions) - Knowledge of descriptive geometry
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	- Video projector they can take place face to face or online
5.2.for the development of the academic seminary/laboratory/project	Laboratory hours - computers, software AutoCAD

6. Specific skills acquired	
Professionalskills	C6 Performing operations, maintenance, service, system integration C6.1. Definition of basic concepts regarding the operation and maintenance of electromechanical systems C6.2 Identification and selection of components for operation, maintenance and integration in electromechanical systems C6.4 Use of methods and technical means for increasing the reliability of electromechanical systems
Transversal skills	CT1. Identifying the objectives to be achieved, the resources available, the conditions for completion, the working steps, the working times, the related implementation deadlines and the related risks. CT3. Effective use of information and communication resources and assisted training (portals, Internet, specialized software applications, databases, on-line courses) both in Romanian and in an international language.

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

7.1 The general objective of the subject	Course of "Computer Aided Drawing I" is the general technical discipline, required in the formation of future engineers. It aims to acquire fundamental knowledge of engineering graphics, universal language of communication in the technical field
7.2 Specific objectives	The course aims at acquiring the basic knowledge in the field of orthogonal representation, obtaining the true size, geometric elements and the deployments defining the technical parts. Learn the rules of representation, grading and scoring of technical drawings, according to the world-wide rules through ISO, using the computer using AutoCAD software The lab acquaints students with practical aspects of drawing technical drawings using the computer using AutoCAD software.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course 1 Presentation of the AutoCAD operating mode. The AutoCAD User Interface. Launching orders. Data input. Selecting objects. Display Control. Establishing the drawing environment. End of work session.	Free exposure, with course presentation on video projector and on blackboard	2 h

Course 2. Use basic commands for drawing, editing, and specifying entity-specific points. Draw commands for base entities. Commands used to modify and edit drawings. Using Object Snap Modes (Object SNAP). Selection sets.	Idem	2 h
Course 3 - Using the UCS coordinate system in plane drawing (2D). Orders for making connections and bevels. Orders that allow copying, moving, scaling, and splitting entities.	Idem	2 h
Course 4. General rules for the execution of the technical drawings Lines used in the technical drawing. Formats of technical drawings. Indicator. Numerical scales used in the technical drawing. Standardized writing. Representations	Idem	2 h
used in industrial design: Representation in double and triple orthogonal point projection.		
Course 5. Orthogonal representation of the straight. Double Orthogonal Projection of the Straight. Triple Orthogonal Projection of Straight.	Idem	2 h
Course 6. Rules for the representation and marking of views and sections. Layout of the projections in the plan. Classification of views. Section representation of parts. Classification of sections. Notation of section sectioning path.	Idem	2 h
Course 7. Use of commands for quoting drawings. Rules and quotation rules. Elements of quote. Symbols used for enrolling quotas. Quoting specific elements. Classification of allowances. Quoting methods.	Idem	2 h
Course 8. Quoting drawings with AutoCAD. Configuring Query Elements. Print text. Text style. Text input	Idem	2 h
Course 9. Viewing a drawing. Hatching and representing breaks. Study some drawing display commands. Hatching. Hatch styles. Representation of ruptures.	Idem	2 h
Course 10. Using Layers. Layer Definition. Create and modify layers. Determining the color and layer type of layers. Define blocks. Studying commands for creating and inserting blocks into AutoCAD.	Idem	2 h
Course 11. Elements of 3D Modeling and Visualization. Introduction to 3D modeling. Types of three-dimensional models. Superficial models. Coordinate systems in 3D. Creating surfaces. Modeling solids. Generating Solids. Editing Solid Objects. Quoting in 3D		2 h

Course 12. Modeling solids. Generating Solids. Editing Solid Objects. Quoting in 3D		2 h
Course 13. Modeling in three-dimensional space		2 h
Course 14. Construction of surface solids modeling three-dimensional solids		2 h
Bibliography 1.Durgău, M., Sebeşan, R., - Technical drawing in electrotechnics, University of Oradea, 2006 2.Dolga, Lia, - Technical drawing for electrotechnics, Ed. Politehnica Timişoara, 2002 3.Segal L., Ciobanasu G.,- Engineering Graphics, Tehnoexpres Iasi, 2003 4.Simion, I., - AutoCAD 2007 for Engineers, Theora Edition, 2007 5.R. Păunescu - Technical and Infographic Drawing - Ed.Univ.Brasov, 2006 6. M.Durgău, R.Sebeşan - Graphics and Computer Assisted Drawing, Litogr. Course, 2010		
8.2 Laboratory	Teaching methods	No. of hours/ Observations
1.Presentation of the laboratory, labor protection norms and laboratory works.	For the laboratory applications the students will have at their disposal written	2 h
	materials with the presentation of the way of carrying out the practical work. The applications contain written, concrete instructions, as well as general information about new commands encountered. For the development of practical applications students will use the computer network and the AutoCAD program provided by the technical drawing laboratory	
2.Execution of drawings using absolute, relative, polar coordinates and LINE, GRID, SNAP, ERASE commands.		2 h
3. Realization of the sandarded A3 drawing format and the indicator.		2 h
4. Representations in double and orthogonal projection of the point Representations in double orthogonal projection of the right.		2 h
5. Making drawings using editing commands with the specification of some attachment points.		2 h
6. Representation in view using the rules of representation and notation of views.		2 h
7. Representation of the drawings in section in compliance with the indicated sectioning paths.		2 h
8. Configuring the dimension elements. Drawing drawings.		2 h
9. Applications with the exercise of the main editing commands: Breack, Offset, Extens, Fillet, Chamfer, Array.		2 h

10.Combining drawing and editing commands to obtain the desired model.		2 h
11. Dimensioning drawings in interactive graphics and using non-graphic elements such as texts, tables, symbols.		2 h
12. Making a three-dimensional 3D drawing.		2 h
13. Recovery of laboratory works.		2 h
14. Assessment of knowledge acquired during laboratory hours.		2 h
Bibliography 1. Durgău M., Sebeşan R., Computer aided graphics / laboratory works,, 2012, 2. M.Durgău, R. Sebeşan - Computer Aided Graphics - Wiring Diagrams, 2012 3. M.Durgău - Laboratory works - Computer aided technical drawing, 2014		

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 is required knowledge of notions fundamentals required in the subjects, without presenting details on their - for grade 10, is required thorough knowledge of all topics	Written examination	60 %
10.6 Laboratory	- for grade 5, recognition stands used in the realization laboratory work without present details about them - for grade 10, knowledge detailed method of practical realization of all laboratory work	Knowledge assessment test	40 %

10.8 Minimum performance standard:
Course:
- Ability to collaborate with specialists from various fields in the development of complex projects;
- Formation and development of the capacity of spatial thinking in the modeling of the industrial forms and of the graphic skills necessary for the realization correct of a drawing;
- Acquiring basic knowledge for the use of specific design programs - AutoCAD with other utilities related to:
databases, strength calculation, industrial design, two and three dimensional representations,
- Acquiring knowledge of computer-aided engineering graphics; - Participation in at least half of the courses.
Laboratory:
- Ability to make a technical drawing according to technical standards, using the AutoCAD program.

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				COMPUTER AIDED GRAPHICS II			
2.2 Holder of the subject				head of works dr.eng. SEBEŞAN RADU			
2.3 Holder of the academic seminar/laboratory/project				head of works dr.eng. SEBEŞAN RADU			
2.4 Year of study	1	2.5 Semester	2	2.6 Type of the evaluation	Vp	2.7 Subject regime	Fundamental Discipline FD

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					20
Supplementary documentation using the library, on field-related electronic platforms and in fieldrelated places					10
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					10
Tutorials					2
Examinations					2
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	(Conditions) - Technical drawing, Electrotechnical materials, Electrical equipment, Electric machines;

4.2 related to skills	- Knowledge of symbols, graphics, specific to electrical schemes.

5. Conditions (where applicable)

5.1. for the development of the course	Video projector, computer.
5.2.for the development of the academic seminary/laboratory/project	- The equipment related to the laboratory class; - Preparation of the report, knowledge of the notions included in the laboratory work to perform it (synthesis material); - Carrying out all laboratory work. Face to face and online

6. Specific skills acquired	
Professional skills	- C2. Use of fundamental concepts of computer science and information technology - C4. Design of electrical systems and their components
Transversal skills	- CT3. Effective use of information and communication sources and assisted professional training (Internet portals, specialized software applications, databases, online courses etc.) both in Romanian and in a foreign language.

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

7.1 The general objective of the subject	□ "Graphics Assisted by Computer II" is the general technical discipline, compulsory in the formation of future engineers. Its aim is to acquire fundamental knowledge of engineering graphics, the universal language of communication in the technical field;
7.2 Specific objectives	□ Considering the field of "Electrical Engineering", the students to whom it is addressed, the course "Graphics Assisted by Computer II" proposes a study on the most modern electrical and electronic schemes. In most cases, electronic installations occurred in those areas where conventional installations did not respond or were given, could only be partial, demanding and without ensuring a high quality. For this reason, each chapter insists on the advantages and disadvantages of each type of electrical and electronic schemes by using computer-aided graphics. □ The laboratory work follows the actual study of electrical and electronic schemes with the help of OrCAD and Electronics Workbench. Knowledge and observance of technical legislation, in areas of specialty in general and in the electrical field in particular, is an essential requirement for conducting in good technical and economic conditions the safety of specific activities

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Chapter 1. Introductory computer-aided graphics 1.1. Integration of CAE-CAD-CAM components 1.2. CAD software package categories 1.3. CAD Resources for Internet 1.4. Manufacturers and CAD software	• Video projector; • Courses take place by teaching subjects and engaging students in dialogues. Intercalated student contributions are requested on subject-specific subjects.	4

Chapter 2. The graphic elements in the realization of electrical and electronic projects with the help of the computer 2.1. Automatic Electronic Design (EDA) 2.2. Electronic Documentation 2.3. Conventional signs used in electrical and schemes	Idem	4
Chapter 3. Basic rules in the representation of computer and electrical schemes 3.1. Conditions imposed on control systems 3.2. System flexibility and order convenience	Idem	4

Chapter 4. Electrical schemes. Computer-aided graphic representation methods 4.1. Electrical schemes 4.1.1.Explicative (functional, circuit, equivalent) 4.1.2. Connection (external, internal, terminals) 4.1.3. Location	Idem	4
Chapter 5. Presentation of the OrCAD program 5.1. Overview of the OrCAD software package 5.1.1. OrCAD Capture 5.1.2. OrCAD Layout	Idem	4
Chapter 6.. Creating the OrCAD Capture PC Board Wizard project 6.1 Launch of the Orcad Capture program and the project management application.	Idem	4
Chapter 7. Presentation of the Electronics Workbench program 7.1.Electronics Workbench program menu, editing the electronic drawing	Idem	4

Bibliography

Bibliography

1. Durgău, M., Sebeşan, R., - Technical drawing in electrotechnics, Ed. Of the University of Oradea, 2006.
2. Dolga, Lia, - Technical drawing for electrotechnics, Ed. Politehnica Timisoara, 2002.
3. Segal L., Ciobanasu G.,- Engineering Graphics, Tehnoexpres Iasi, 2003.
4. Simion, I., - AutoCAD 2007 for Engineers, Ed. Theory Teora, 2007.
5. R. Păunescu - Technical and Infographic Drawing - Ed. Of the University of.Brasov, 2006.
6. M.Durgău, R.Sebeşan - Graphic Design and Computer Assisted Design, Litogr.,2011.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Using OrCAD Capture - the OrCAD Capture program name, editing the electrical scheme.	For laboratory applications, students will have written materials presenting how to practice. The applications contain written, concrete instructions as well as general information about new orders. For practical applications, students will use the computer network and the Orcad Capture, Electronics Workbench program in the laboratory.	6

2. Graphic examples of functional schemes made with OrCAD Capture.	Idem	2
3. Graphic examples of circuit schemes made with OrCAD Capture.	Idem	2
4. Graphic examples of equivalent schemes made with OrCAD Capture.	Idem	2
5. Schematics of external, internal or OrCAD Capture terminals.	Idem	2
6. Orcad Capture electric drive schemes.	Idem	4
7. Using Electronics Workbench - the Electronics Workbench program name, editing the electrical layout	Idem	4
8. Graphic examples of electronic schemes made with Electronics Workbench	Idem	4
9. Final check	Teaching laboratories by supporting them;	2

Bibliography

1. Bibliography

1. Fodor Dinu - Descriptive Geometry and Technical Drawing "Laboratory Guidance " 1994

2. Maria Oltean , Maria Durgău, Adriana Catanase – „Descriptive Geometry and Technical Drawing "Laboratory Guidance for Electrical and Energy Professionals" .Ed.Univ. Oradea 2002

3. Maria Durgău ,Radu Sebeşan ," Technical drawing in practical electrical engineering" ,Ed.Univ.Oradea 2006

4. Maria Durgău ,Radu Sebeşan - „Computer-aided graphics". Laboratory Guidance 2012

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	• Ability to work with specialists from diverse fields to develop complex projects; • Formation and development of spatial thinking capacity in the shaping of industrial electrical schemes and graphic skills necessary for the correct execution of an electrical scheme. • Acquiring basic knowledge for using specific design programs - OrCAD Capture, Electronics Workbench with other utilities related to: databases. Acquiring computer-aided engineering graphics; - Participation in at least half of the courses. -	-Verification The discipline ends at the end of the second semester. Minimum promotion mark = 5, with both components = 5 (course + lab) Examination module: Partial tests based on tests / homeworks. Overall rating; Applications - Practical (duration 1 hour). Theory / Writing (duration 1 hour) Structure of topics: Test with questions in the course theme.	60%

10.6 Laboratory	The ability to draw a technical drawing according to technical standards with the help of OrCAD Capture, Electronics Workbench. - - Participation in all laboratory work	Test + practical application Creating an execution drawing in OrCAD Capture, Electronics Workbench. Each student receives a grade for laboratory work during the semester and for the laboratory work. This results in a laboratory average.	40 %
10.8 Minimum performance standard: - Undertaking coordinated work to solve specific problems in the field, with the correct assessment of the workload, the available resources, the time required to complete and the risks, under the conditions of the application of the safety and health rules at work. Solving relevant applications for processing and representing data specific to electrical engineering.			

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	**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 Programme/Qualification	**Electrical Systems / Bachelor of Engineering**

2. Data related to the subject

2.1 Name of discipline				**COMPUTERS PROGRAMMING AND PROGRAMMING LANGUAGES**			
2.2 Holder of course activities				**S. l. Dr. Ing. Albu Răzvan**			
2.3 Holder of seminar/laboratory/project activities				**As. Drd. Ing. Marcu David**			
2.4 Year of study	2	2.5 Semester	3	2.6 Type of evaluation	EX	2.7 Subject regime	FD

FD – Fundamental Discipline, DD – Domain Discipline, SD – Specialty Discipline, CD – Complementary 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 seminar/laboratory/project	- / 2 / -
3.4 Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar/laboratory/project	- / 28 /-

Distribution of the 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	8
Preparation of seminars/laboratories, themes, reports, portfolios and essays	10
Tutoring	4
Examination	8
Other activities.....	-
3.7 Total hours individual study	**44**
3.9 Total 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	Minimal knowledge of hardware and software

5. Conditions (where applicable)

5.1. for the development of the course	Laptop, video projector, magnetic board, free speech.
5.2. for the development of the academic seminary/laboratory/project	Laboratory room equipped with smart board, computer network with workstation for each student, access to software that is studied in the course, internet network access.

6. Specific competencies acquired	
Professional skills	**C1. Using the fundamental elements referring to electronic devices, circuits, systems, instrumentation and technology:** - Describing the functioning of electronic devices and circuits and of the fundamental methods for measuring electric dimensions. - Analyzing low-average complexity electronic circuits and systems, in order to design and measure them. - Troubleshooting and repairing certain electronic circuits, equipment and systems. - Using electronic instruments and specific methods for characterizing and evaluating the performance of certain electronic circuits and systems. - Designing and implementing electronic circuits of low/average complexity using CAD_CAM technologies, as well as the standards applied in the domain. **C2. Applying basic methods for the acquisition and processing of signals:** - The temporal, spectral and statistic characterization of signals. - Explaining and interpreting methods for the acquisition and processing of signals. - Using simulation environments for the analysis and processing of signals. - Using specific methods and instruments for signal analysis. - Designing elementary functional blocks for the digital processing of signals with hardware and software implementation.
Cross-cutting skills	**C1. Using the fundamental elements referring to electronic devices, circuits, systems, instrumentation and technology:** - Describing the functioning of electronic devices and circuits and of the fundamental methods for measuring electric dimensions. - Analyzing low-average complexity electronic circuits and systems, in order to design and measure them. - Troubleshooting and repairing certain electronic circuits, equipment and systems. - Using electronic instruments and specific methods for characterizing and evaluating the performance of certain electronic circuits and systems. - Designing and implementing electronic circuits of low/average complexity using CAD_CAM technologies, as well as the standards applied in the domain. **C2. Applying basic methods for the acquisition and processing of signals:** - The temporal, spectral and statistic characterization of signals. - Explaining and interpreting methods for the acquisition and processing of signals. - Using simulation environments for the analysis and processing of signals. - Using specific methods and instruments for signal analysis. - Designing elementary functional blocks for the digital processing of signals with hardware and software implementation. **C3. Applying basic knowledge, concepts and methods concerning computer systems architecture, microprocessors, microcontrollers, programming languages and techniques:** - Describing the functioning of a computer system, of the basic principles applied for general-use microprocessor and microcontroller architecture, of the general principles of structured programming. - Using some general-use and specific programming languages for applications with microprocessors and microcontrollers; explaining the functioning of automated control systems that use such architectures and interpreting experimental results. - Solving concrete, practical problems that include elements of data-structures and algorithms, programming and the use of microprocessors and microcontrollers. - Elaborating programs in a general and/or specific programming language, starting from the specification of requirements and going up to the stages of execution, mending and interpretation of results in correlation with the processor used. - Carrying out projects that involve hardware components (processors and software components (programming).

7. Objectives of the discipline (resulting from the grid of specific competencies accumulated)

7.1 General objective of the discipline	– Acquire knowledge of the basic concepts of writing, interpreting, adapting written programs in a programming language. Acquiring skills to solve technical problems with electronic computer use and developing applications specific to industrial engineering.
7.2 Specific objectives	– Acquire knowledge and skills on: – Design and interpretation of basic algorithms used in computer science and applicable to solving engineering problems – Follow the basic steps for developing computing programs – Basic concepts of C programming language

	– Writing, processing, testing, correcting and interpreting programs using C programming language. – Analyze end-user requirements and design applications in accordance with them.

8. Contents*

8.1 Course	Teaching methods	No. Hours / Observations
1. Introduction to C language. Fundamental types of data.	Laptop, video projector, SMART BOARD, free speech	4
2. Expressions, operators and operands. Priority of operations.	Laptop, video projector, SMART BOARD, free speech	4
3.Decision instructions and loops.	Laptop, video projector, SMART BOARD, free speech	2
4. Pointers: declaration, examples, permitted operations and working with tables.	Laptop, video projector, SMART BOARD, free speech	2
5. Define user functions. Transmission of data and call of functions.	Laptop, video projector, SMART BOARD, free speech	2
6. Preprocessor directives.	Laptop, video projector, SMART BOARD, free speech	2
7. Recursive functions.	Laptop, video projector, SMART BOARD, free speech	2
8. Working with files.	Laptop, video projector, SMART BOARD, free speech	2
9. Data structures.	Laptop, video projector, SMART BOARD, free speech	8

bibliography:

1.Albu Răzvan -Daniel – Programming in the C-language in the making
2. Antal, T. A., C ANSI Language, Cluj-Napoca, Risoprint, 2001.
3. BORLAND International, Turbo C. User's Guide. Version 2.0, 1988, Borland Int., Scott Valley, CA.
4. ITCI Cluj-Napoca, Language C. Programming, Cluj-Napoca, 1988.
5. Kernighan, Brian W., Ritchie, Dennis M., The C Programming Language, Englewood Cliffs, Prentice Hall, 1978.
6. King, K.N., C Programming: A Modern Approach, W W Norton & Co Inc 1996,.

8.2 Seminar	Teaching methods	No. Hours / Comments
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8.3 Laboratory		
1. C programming environments. Structure of a program in C language, examples. Compilation and execution of a c. Errors program.	Free speech, use kit lab PC components; use of the computer network of the laboratory	4
2. Fundamental data types in C language.	Free speech, use of laboratory computing network	4
3. I/O functions for characters, strings, and various types of data.	Free speech, use of laboratory computing network	2

4. Operators in the C language.	Free speech, use of laboratory computing network	2
5. Decision instructions and loops.	Free speech, use of laboratory computing network	2
6. Pointers and tables.	Free speech, use of laboratory computing network	2
7. Declaring, defining and calling user functions.	Free speech, use of laboratory computing network	2
8. Working with files in C.		2
9. Data structures in C.		8

ibliography:
1.Pîslă, D., Computer Programming. Language C, Cluj-Napoca, Ed. Todesco, 2001.
2.Popescu, D.I., C-language programming, Dej, Ed. DSG Press, 1999.
3.Popescu, D.I., Popescu, A.D., #include C – Basics of Programming Language, Ed. Alma Mater, Cluj-N, 2014.
4.Schildt, H., C. Complete Manual, Bucharest, Ed. Teora, 1998.
5. Ursu-Fischer, Nicolae, Ursu, Mihai, Programming with C in Engineering, Cluj-Napoca, House of Science Cards, 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 and satisfies the requirements imposed on the labour market, being agreed by the social partners, professional associations, and employers in the field of the licence programme. The content of the discipline can be found in the curriculum of the specialization Electrical Engineering and Computers, and from other universities in Romania that have accredited this specialization. In order to better adapt to the requirements of the labour market the content of the discipline took place with both business representatives and teachers from pre-university education.

10. Rating

Task Type	10.1 Assessment criteria	10.2 Methods of evaluation	10.3 Weight of the final note
10.4 Course	Oral examination	Oral examination of students	75%
10.5 Seminar	---	---	---
10.6 Lab	Final evaluation test and free presentation of the report in ppt format.	Oral evaluation – test, report.	25%
10.7 Project	---	---	---
10.8 Minimum Performance Standard			
Carrying out work under the coordination of a teacher, in order to solve specific problems in the IT field with the correct assessment of the workload, the resources available to the time required to complete the risks, under the conditions of the application of occupational safety and health rules.			
Note components: Exam (Ex), Laboratory (L). - Note calculation formula: N = 0.75Ex + 0.25L; - Condition of obtaining credits: N ≥ 5, L ≥ 5			

Completion date:29.08.2022

Date of endorsement in the department:22.09.2022

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	**Electrical Engineering and Information Technology**
1.3 Department	**Department of Electrical Engineering**
1.4 Field of study	**Electrical Engineering**
1.5 Cycle of studies	**Bachelor**
1.6 Study program/qualification	**Electrical Systems / Engineer**

2. Data related to the subject

2.1 Name of the discipline		**APPLIED INFORMATICS II**					
2.2 The holder of the course activities		**S. l. Dr. Ing. Albu Răzvan**					
2.3 Holder of seminar /laboratory/project activities		**As. Drd. Ing. Marcu David**					
2.4 Year of study	I	2.5 Semester	I	2.6 Type of assessment	Ex.	2.7 Discipline regime	FD

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

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar/laboratory/project	- / 2 / -
3.4 Total hours of the curriculum	56	of which: 3.5 course	28	3.6 seminar/laboratory/project	- / 28 /-

Distribution of the time fund	Hours
Study by textbook, course support, bibliography and notes	24
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	8
Preparation of seminars/laboratories, themes, papers, portfolios and essays	24
Tutoring	5
Examination	8
Other activities.....	-

3.7 Total individual study hours	**69**
3.9 Total hours per semester	**125**
3.10 Number of credits	5

4. Preconditions (where applicable)

4.1 Curriculum	
4.2 competencies	Minimal knowledge of hardware and software

5. Conditions (where applicable)

5.1. course development	Laptop, video projector, magnetic board, free speech.
5.2. conducting the seminar/laboratory/project	- / smart board, computer network with workstation for each student, access to the software that is studied in the course, network access to the internet / -

6. Specific competences acquired

Professional skills	– C1.1 Adequate description of programming paradigms and specific language mechanisms, as well as identification of the difference between semantic and syntactical aspects; – C1.3 Development of appropriate source codes and unit testing of components in a known programming language based on given design specifications – C2. Operating with fundamental concepts from computer science and information technology
Transversal competences	– CT1 – Identification of objectives to be achieved, available resources, conditions for their completion, work stages, working times, deadlines for achievement and related risks; – CT2 – Identifying roles and responsibilities in a multidisciplinary team and applying techniques for networking and effective work within the team – CT3 – Efficient use of information sources and assisted communication and training resources (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation.

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

7.1 The general objective of the discipline	– The course is addressed to students from the electrical system specialization, trying to familiarize them theoretically but also practically with a series of knowledge about applied informatics. Given the degree of penetration of the computing technique in most aspects of social and economic life, the need to acquire computer skills, the use of the computer is imposed with evidence. Thus, the course comes to support students with information on acquiring the main knowledge in the field. – Acquiring knowledge of general and fundamental concepts related to the design and implementation of programming languages, in contrast to the detailed learning of one or two languages without fully understanding the meaning of the concepts circulated;
7.2 Specific objectives	– The laboratory is designed to provide future engineers with practical skills in computer science. The content of the laboratories presented are based on the need to deepen and explain practically the problems presented at the course. Students have the opportunity to identify specific issues debated during the course, getting acquainted with modern means of work. They will understand the complexity of this discipline. Knowledge is useful in developing skills in addressing the specific problems faced by a specialist in this field; – Critical analysis of the language elements developed so far with an emphasis on a comparison of the advantages and disadvantages presented by each. Developing the decision-making and analytical capabilities of students, features that will highlight and define them in an advanced way in relation to a simple programmer; – As an immediate goal, the student is expected to be able to deepen much faster any text or image editing application in front of which he will be put, to know the applications in the Office 365 package developed by Microsoft and those in the Adobe family.

8. Contents*

8.1 Course	Teaching methods	No. Hours / Remarks
1. Word processors, editing and formatting of documents, projects, drafting techniques.	Laptop, video projector, IQ Board, free speech	4
2. Spreadsheet.	Laptop, video projector, IQ Board, free speech	4
3. The art of presentation. Educational and business presentations.	Laptop, video projector, IQ Board, free speech	2
4. Flowcharts, diagrams, vector graphics.	Laptop, video projector, IQ Board, free speech	2
5. Digital notes, administration of activities and tasks.	Laptop, video projector, IQ Board, free speech	2
6. Databases.	Laptop, video projector, IQ Board, free speech	2

7. Creating newsletters, postcards, leaflets, invitations, brochures .	Laptop, video projector, IQ Board, free speech	2
8. Email client. Configuration and administration.	Laptop, video projector, IQ Board, free speech	2
9. Editing and manipulating photos and PDF documents.	Laptop, video projector, IQ Board, free speech	8

Bibliography:
1.Albu Răzvan -Daniel – Applied Informatics. Course 0 forthcoming
2. Faithe Wempen, Office 2019 For Seniors For Dummies 1st Edition, Kindle Edition, ISBN-13:978-1119517979.
3. Andrew Faulkner, Adobe Photoshop Classroom in a Book (2020 release) 1st Edition, ISBN-13:978-0136447993.

8.2 Seminar	Teaching methods	No. Hours / Remarks
---	---	---
8.3 Laboratory		
1. Microsoft Word	Free speech, use kit lab PC components; use of the computer network from the laboratory's endowment	4
2. Microsoft Excel	Free speech, use of laboratory computing network	4
3. Microsoft Power Point	Free speech, use of laboratory computing network	2
4. Microsoft Visio.	Free speech, use of laboratory computing network	2
5. Microsoft OneNote.	Free speech, use of laboratory computing network	2
6. Microsoft Access.	Free speech, use of laboratory computing network	2
7. Microsoft Publisher.	Free speech, use of laboratory computing network	2
8. Microsoft Outlook.		2
9. Adobe PHOTOSHOP, Acrobat DC Reader, Adobe ILLUSTRATOR.		8

Bibliography
Bibliography:
1.Albu Răzvan -Daniel – Applied Informatics. Course forthcoming
2. Faithe Wempen, Office 2019 For Seniors For Dummies 1st Edition, Kindle Edition, ISBN-13:978-1119517979.
3. Andrew Faulkner, Adobe Photoshop Classroom in a Book (2020 release) 1st Edition, ISBN-13:978-0136447993.
4. Barbara Obermeier,Ted Padova, Photoshop Elements 2021 For Dummies, ISBN-13:978-1119724124.

* It will be detailed the content, respectively the number of hours allocated to each course / seminar / laboratory / project during the 14 weeks of each semester of the academic year.

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 meets the requirements imposed on the labor market, being approved by the social partners, professional associations and employers in the field related to the bachelor's program. The content of the discipline can be found in the curriculum of the electrical and caculatory systems specialization and from other university centers in Romania that have accredited this specialization, so knowing the basic notions is an urgent requirement of the employers in the field. In order to better adapt the content of the discipline to the requirements of the labor market, meetings were held both with representatives of the business environment and with teachers from the pre-university education.

10. Evaluation

Activity Type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Share of final grade
10.4 Course	Oral examination	Oral examination of students	75%
10.5 Seminar	---	---	---
10.6 Laboratory	Final evaluation test and free presentation of the report in ppt format.	Oral evaluation – test, report.	25%
10.7 Project	---	---	---
10.8 Minimum performance standard			
Carrying out the works under the coordination of a teacher, in order to solve specific problems in the it field with the correct evaluation of the workload, the resources available for the necessary time to complete the risks, under the conditions of applying the occupational safety and health rules.			
Components of the note: Examination (Ex), Laboratory (L). - Formula for calculating the note: N = 0,75Ex + 0,25L; - Condition of obtaining credits: N ≥ 5, L ≥ 5			

Completion date: 29.08.2022

Date of endorsement in the department: 22.09.2022

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. Datarelated to thesubject

2.1 Name of the subject				**ANALOGICAL AND DIGITAL ELECTRONICS I**			
2.2 Holder of the subject				Professor eng.PhD CORNELIA EMILIA GORDAN			
2.3 Holder of the academic seminar/laboratory/project				Lecturer eng.PhDLUCIAN MORGOȘ			
2.4 Year of study	II	2.5 Semester	3	2.6 Type of the evaluation	EX.	2.7 Subject regime	I

(I) Imposed (O) Optional

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 laboratory	2
3.4 Total of hours from the curriculum	56	of which: 3.5 course	28	3.6 laboratory	28
Distribution of time					44 hours
Study using the manual, course support, references and handwritten notes					12
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					12
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					12
Tutorials					-
Examinations					8
Other activities.					-

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

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, laptop, smart board
5.2.for the development of the academic laboratory	The existence of the apparatus and equipment necessary for the development in optimal conditions of the works provided in the discipline file. Providing students with the laboratory guide in printed or electronic format.

6. Specific skills acquired	
Professional skills	▪ **C3. Use of fundamental knowledge in electrotechnics.** - Assessing the quality and functional performance of electrical systems by specific methods. - Design of components of a low complexity electrical system. ▪ **C6. Diagnosis, troubleshooting and maintenance of electrical systems and components.** - Defining the concepts regarding the diagnosis and maintenance of electrical components and systems. - Interpreting the results of the diagnosis and ensuring the maintenance of the components of electrical systems. - Application of diagnostic methods and definition of the necessary conditions for ensuring maintenance.
Trans-versal 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 is taught to second year ElectricaL Systems students.The course addresses notions that will allow future graduates to have a wealth of information on the construction, operation and use of semiconductor electronic devices (semiconductor diode, Zener diode, bipolar transistors, field effect transistors, thyristor, etc.) andof elementary electronic circuits (limiting circuits, mono and bialternating rectifiers, thyristor circuits, simple circuits with operational amplifiers, simple amplification stages).
7.2 Specific objectives	▪ Structure, characteristics and operation of semiconductor devices. ▪ Use of linear models on portions of electronic devices to solve circuits. ▪ Design and operation of simple electronic circuits with diodes, bipolar transistors, field effect transistors, thyristors, operational amplifiers. ▪ Developing a positive attitude towards the activities of assimilating new professional knowledge and information, cultivating and promoting a scientific environment focused on values, forming a positive and responsible professional behavior.

8. Contents*

8.1 **Course** (on site/ on-line)	Teaching methods	No. of hours/ Observations
Generalities - Electrical conduction in semiconductors. Bipolar	Interactive lecture;exposure;video projector presentation	2 hours
Diodes - pn semiconductor diode, Zener diode, varicap diode, LED (symbol, internal structure, characteristic V-A, characteristic parameters).	Interactive lecture;exposure;video projector presentation	2 hours
Bipolar transistor I - General; Operation in the active region: characteristics, equivalent circuits, operating parameters, polarization.	Interactive lecture;exposure;video projector presentation	2 hours
Bipolar transistor II - Blocking and saturation operation: characteristics, equivalent circuits, operating parameters.	Interactive lecture;exposure;video projector presentation	2 hours
Bipolar transistor III - Model with hybrid parameters: definition of parameters, equivalent circuits, diagrams with a transistor in different assemblies, simplified model.	Interactive lecture;exposure;video projector presentation	4 hours
Thyristor - Symbol, internal structure, V-A characteristic, operating parameters	Interactive lecture;exposure;video projector presentation	2 hours
Field effect transistors I - General; TEC-J with initial channel and with induced channel (symbol, characteristic and operating parameters).	Interactive lecture;exposure;video projector presentation	2 hours
Field effect transistors II - TEC-MOS with initial channel and with induced channel (symbol, characteristic and operating parameters).	Interactive lecture;exposure;video projector presentation	2 hours
Operational amplifiers - General (symbol, characteristics and operating parameters).Applications: inverter and non-inverter circuits, adder, differentiation circuit, derivative circuit, integrator, logarithmic circuit, precision rectifier.	Interactive lecture;exposure;video projector presentation	4 hours
Diode rectifier circuits - Mono-alternating, bi-alternating (with median socket, in bridge), with voltage doubling: schemes, mode and operating characteristics.	Interactive lecture;exposure;video projector presentation	2 hours
Stabilization circuits - Classifications;Operating parameters;Component element.	Interactive lecture;exposure;video projector presentation	2 hours
Transistor Voltage Stabilizers - Schemes with transistors and operational amplifier, with and without protection circuit.	Interactive lecture;exposure;video projector presentation	2 hours

References

1. **C.Gordan**, R.Reiz, L.Ţepelea, L.Morgoş: *Electronică Analogică şi Digitală,* Editura Universit. din Oradea 2010.
2**. C.Gordan**, A.Burca: *Dispozitive electronice*, Curs format electronic, 2015, ISBN 978-606-10-1751-5, Edit.Univ.Oradea
3. S.Castrase, A.Burca, **C.Gordan***Dispozitive şi circuite electronice*, Îndrumător de lucrări de laborator,ISBN 978-606-10-1610-5 Editura Universităţii din Oradea 2015.
4. R. Albu, **C.Gordan**: *Electronică Analogică şi Digitală I*, Îndrumător de lucrări de laborator format electronic, Editura Universitatii din Oradea 2018, ISBN 978-606-10-1955-7.

8.2 Academic seminar/laboratory/project (on site/ on-line)	Teaching methods	No. of hours/ Observations
1. Presentation of laboratory works	Practical application. Discussions	2 hours
2. Study of the semiconductor diode	Practical application. Discussions	2 hours
3. Zener diode	Practical application. Discussions	2 hours
4. Bipolar transistor - characteristics	Practical application. Discussions	2 hours

5. Bipolar transistor in common base mounting	Practical application. Discussions	2 hours
6. Bipolar transistor in common emitter assembly	Practical application. Discussions	2 hours
7. Field effect transistors	Practical application. Discussions	2 hours
8. The thyristor	Practical application. Discussions	2 hours
9. Inverters	Practical application. Discussions	2 hours
10. Operating amplifier in inverter, non-inverter, adder assembly	Practical application. Discussions	2 hours
11. Operational amplifier in integrator and logarithmic assembly	Practical application. Discussions	2 hours
12. Mono-alternating rectifier circuits	Practical application. Discussions	2 hours
13. Double-alternating rectifier circuits	Practical application. Discussions	2 hours
14. Recovery of laboratories.Ending the school situation.	Practical application. Discussions	2 hours

References

1 **C.Gordan**, R.Reiz, L.Ţepelea, L.Morgoş: *Electronică Analogică şi Digitală,* Editura Universit. din Oradea 2010.
2. **C.Gordan**, A.Burca: *Dispozitive electronice*, Curs format electronic, 2015, ISBN 978-606-10-1751-5, Edit.Univ.Oradea
3. S.Castrase, A.Burca, **C.Gordan**:*Dispozitive şi circuite electronice*, Îndrumător de lucrări de laborator,ISBN 978-606-10-1610-4, Editura Universităţii din Oradea 2015.
4. R. Albu, **C.Gordan**: *Electronică Analogică şi Digitală I*, Îndrumător de lucrări de laborator format electronic, Editura Universitatii din Oradea 2018, ISBN 978-606-10-1955-7.

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

- Introduction in the courses and laboratory works of some subjects of interest for the profile economic environment in the industrial area of the city.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	For 10:Active participation in the developed discussions.Documented arguments.Providing relevant solutions to the issues under debate.Knowledge of the basics on all topics covered.	Oral or written evaluation, online or on-site.Discussions.Argue.	60 %
10. Seminar	-	-	-
10.6 Laboratory	Written test marked with a minimum of 5. Practical realization of all the requirements imposed by all laboratory works. Well-documented arguments. Reading the required bibliography. A percentage of 15% of the final grade at the laboratory is awarded for the successful completion of all the topics provided for individual study.	Written test. Practical test. Discussions. Online or on-site argumentation	40%
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: 09.09.2022

Date of endorsement in the department: 19.09.2022

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. Datarelated to thesubject

2.1 Name of the subject				**ANALOGICAL AND DIGITAL ELECTRONICS II**			
2.2 Holder of the subject				Professor eng.PhD CORNELIA EMILIA GORDAN			
2.3 Holder of the academic seminar/laboratory/project				Lecturer eng.PhD LUCIAN MORGOŞ			
2.4 Year of study	II	2.5 Semester	4	2.6 Type of evaluation	EX.	2.7 Subject regime	I

(I) Imposed (O) Optional

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 laboratory	1
3.4 Total of hours from the curriculum	42	of which: 3.5 course	28	3.6laboratory	14
Distribution of time					58hours
Study using the manual, course support, references and handwritten notes					24
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					12
Tutorials					-
Examinations					8
Other activities.					-

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

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, laptop, smart board
5.2.for the development of the academic laboratory	The existence of the apparatus and equipment necessary for the development in optimal conditions of the works provided in the discipline file. Providing students with the laboratory guide in printed or electronic format.

6. Specific skills acquired	
Professional skills	▪ **C3. Use of fundamental knowledgeinelectrotechnics.** - Description of theoperatingprinciples of transformers, static converters, electromechanical, electricalequipment, themainsources of electromagnetic disturbances, as well as therules on electromagnetic compatibility (EMC) of electricaland electronic equipment. - Explanationandinterpretation of theoperatingregimes of static, electromechanicalconverters, electricalandelectromechanicalequipment ▪ **C5. Design andcoordination of experimentsandtests.**
Trans-versal skills	▪

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

7.1 General objective of the subject	▪ The course is taught to second year Electrical Systems students. The course addresses notions that will allow future graduates to have a rich background on the design, operation and use of simple electronic circuits (amplifier, voltage stabilizer, harmonic oscillator, switching circuit, logic circuit)
7.2 Specific objectives	▪ The structure, characteristics and operation of simple electronic circuits (amplifier, voltage stabilizer, harmonic oscillator, switching circuit, logic circuit). ▪ Design and operation of simple electronic circuits such as direct current or alternating current amplifier, voltage stabilizer, LC or RC oscillator, switching circuit (bistable, monostable, stable), respectively logic circuit made in bipolar or unipolar technology. ▪ Developing a positive attitude towards the activities of assimilating new professional knowledge and information, cultivating and promoting a scientific environment focused on values, forming a positive and responsible professional behavior.

8. Contents*

8.1 **Course** (on site/ on-line)	Teaching methods	No. of hours/ Observations
Basic amplification stages - Generalities (classifications, characteristics, parameters). Stages with a transistor in common-emitter, base-common, common-collector assemblies (parameters and operating characteristics).	Interactive lecture;exposure;video projector presentation	2 hours
Alternating current amplifiers - Schemes, parameters, amplification characteristics, operation.	Interactive lecture;exposure;video projector presentation	2 hours
Direct current amplifiers - Differential amplifier: diagram, operation, characteristic parameters.	Interactive lecture;exposure;video projector presentation	3 hours
Harmonic oscillators I - General; Classifications.	Interactive lecture;exposure;video projector presentation	3 hours
Harmonic oscillators II - LC oscillators (schemes, operation).	Interactive lecture;exposure;video projector presentation	2 hours
Harmonic oscillators III - RC oscillators; Quartz oscillators (schemes, operation).	Interactive lecture;exposure;video projector presentation	2 hours
Switching circuitsI - Switching circuits without memory. Positive reaction in amplifiers (schemes, operation).	Interactive lecture;exposure;video projector presentation	3 hours
Switching circuits II - Toggle circuits with coupling in the emitter (diagrams, operation, characteristics).	Interactive lecture;exposure;video projector presentation	2 hours
Switching circuits III - Toggle circuits with coupling in the base collector: bistable, monostable, stable (diagrams, operation, characteristics).	Interactive lecture;exposure;video projector presentation	2 hours
Logic circuits I - Generalities; Basic logic functions; Simple logic diagrams made with diodes and transistors.	Interactive lecture;exposure;video projector presentation	2 hours
Logic circuits II - Families of logic circuits, made in bipolar or unipolar technology (schemes, operation).	Interactive lecture;exposure;video projector presentation	3 hours
Logic circuits III - Registers, counters (schemes, operation).	Interactive lecture;exposure;video projector presentation	2 hours

References

1.**C.Gordan**, R.Reiz, L.Ţepelea, L.Morgoş: *Electronică Analogică şi Digitală,* Editura Universit. din Oradea 2010.
2**. C.Gordan**, A.Burca: *Dispozitiveelectronice*, Cursformatelectronic, 2015, ISBN 978-606-10-1751-5, EdituraUniv.Oradea
3. S.Castrase, A.Burca, **C.Gordan***Dispozitiveşi circuite electronice*, Îndrumător de lucrări de laborator,ISBN978-606-10-1610-5 Editura Universităţii din Oradea 2015.
4. R. Albu, **C.Gordan**: *Electronică Analogică şi Digitală I*, Îndrumător de lucrări de laborator format electronic, Editura Universitatii din Oradea 2018, ISBN 978-606-10-1955-7.

8.2.**Seminar**	Teachingmethods	No. of hours/ Observations
8.3.**Laboratory (on site/on-line)**		
1. Voltage stabilizers.	Practicalapplication. Discussions	2 hours

2. Alternating current amplifiers.	Practicalapplication. Discussions	2 hours
3. Differential amplifier.	Practicalapplication. Discussions	2 hours
4. Oscillators.	Practicalapplication. Discussions	2 hours
5. Switching circuits.	Practicalapplication. Discussions	2 hours
6. Logic circuits made in bipolar technology.	Practicalapplication. Discussions	2 hours
7. Recovery of laboratories. Ending the school situation.	Practicalapplication. Discussions	2 hours
8.4. Academic project		

Bibliography

1**C.Gordan**, R.Reiz, L.Ţepelea, L.Morgoş: *Electronică Analogică şi Digitală,* Editura Universit. din Oradea 2010.

2. **C.Gordan**, A.Burca: *Dispozitiveelectronice*, Cursformatelectronic, 2015, ISBN 978-606-10-1751-5, Edit.Univ.Oradea

3. S.Castrase, A.Burca, **C.Gordan**:*Dispozitiveşi circuite electronice*, Îndrumător de lucrări de laborator,ISBN978-606-10-1610-4, Editura Universităţii din Oradea 2015.

4. R. Albu, **C.Gordan**: *Electronică Analogică şi Digitală I*, Îndrumător de lucrări de laborator format electronic, Editura Universitatii din Oradea 2018, ISBN 978-606-10-1955-7.

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

- Introduction in the courses and laboratory works of some subjects of interest for the profile economic environment in the industrial area of the city.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	For 10: Active participation in the developed discussions.Documented arguments.Providing relevant solutions to the issues under debate.Knowledge of the basics on all topics covered.	Oral or written evaluation, online or on-site.Discussions.Argue.	60 %
10.5 Academic seminar	-	-	-
10.6 Laboratory	Written test marked with a minimum of 5. Practical realization of all the requirements imposed by all laboratory works. Well-documented arguments. Reading the required bibliography. A percentage of 15% of the final grade at the laboratory is awarded for the successful completion of all the topics provided for individual study.	Written test. Practical test. Discussions. Online or on-site argumentation	40%
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: 09.09.2022

Date of endorsement in the department: 19.09.2022

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		**Electrical Circuit Theory II**					
2.2 Holder of the subject		prof.PhD.Hathazi Francisc – Ioan					
2.3 Holder of the academic seminar / laboratory / project		associated prof.PhD Molnar Carmen / drd.ing. Daiana Rus					
2.4 Year of study	II	2.5 Semester	II	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	6	of which: 3.2 course	3	3.3 academic seminar/laboratory/project	2 / 2 /-
3.4 Total of hours from the curriculum	84	of which: 3.5 course	42	3.6 academic seminar/laboratory/project	14/28/-

Distribution of time	41 hours
Study using the manual, course support, bibliography and handwritten notes	15
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	2
Examinations	4
Other activities.	---

3.7 Total of hours for individual study	**41**
3.9 Total of hours per semester	**125**
3.10 Number of credits	**5**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Minimum knowledge regarding the theory of the electromagnetic field, the constituent elements of the electrical circuits and the way of their operation in stationary and permanent sinusoidal regime.
4.2 related to skills	Knowledge of electricity

5. Conditions (where applicable)

5.1. for the development of the course	The course can be taken face-to-face or online. The course takes place in the amphitheater with modern techniques available: Video projector, Blackboard, Free speech.
5.2.for the development of the academic seminary/laboratory/project	The seminar / laboratory can be held face-to-face or online. The seminar discusses theoretical aspects of the course and their applications with personal contributions of students. The practical applications will be made using the modern working means existing in the Electrical Engineering laboratory (Experimental stands, DEGEM workstations, high-performance and current measuring devices, modeling software, etc.). Students come with the observed laboratory work Attendance is mandatory at all laboratories It will be possible to recover 2 laboratory works during the semester; The frequency of laboratory hours below 80% leads to the restoration of the discipline / -

6. Specific skills acquired	
Professional skills	• **C1. Operating with scientific, engineering and computer science fundamentals** • C1.1 Adequate use in professional communication of the concepts of computability, complexity and modeling of electrical circuits in computer systems and communications • C1.2 Use of specific theories and tools (algorithms, diagrams, models, etc.) to explain the operation and structure of electrical circuits and solve electromagnetic field problems encountered in practical applications. • C1.3 Use of professional numerical analysis programs for the numerical solution of electrical circuits in different operating modes.
Transversal skills	• CT1 Honorable, responsible, ethical conduct in the spirit of the law to ensure the reputation of the profession

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 Circuit Theory II" aims to continue the presentation of electromagnetic phenomena in terms of applications in technology. This course is addressed to students in the field of Electrical Engineering, specializing in Electrical Systems; • The discipline also tries to form the following attitudinal competencies: manifesting a positive and responsible attitude towards the scientific field / optimizing and exploiting one's own potential in scientific activities / involvement in promoting scientific innovations / engaging in partnerships with others / participating in one's own development professional.
7.2 Specific objectives	• The objectives of the discipline are to know and understand the basic relationships of non-sinusoidal periodic circuits, three-phase electrical circuits and transient electrical circuits, by explaining and interpreting the behavior of electrical circuits, performing calculations and determinations in electrical circuits, experimental verification of relationships basic for physical systems encountered in industrial practice, simulation of the operation of electrical circuits with specialized software; • The activity at the seminar is focused on applications specific to the chapters taught in the course and aims at the formation of some calculation skills; • The activity in the laboratory is focused on applications specific to the chapters taught in the course and aims at the experimental verification of the basic relations for the physical systems encountered. Carrying out laboratory work offers, in addition to the formation of skills in the electrical field, the use of physical and numerical modeling, sizing of assemblies, the correct use of measuring equipment, evaluation of errors in experimental determinations performed.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course 1.	Laptop, video projector, IQ	2

CHAPTER.1. LINEAR ELECTRICAL CIRCUITS IN PERIODIC NON-UNUSUAL REGIME 1.1. Periodic non-sinusoidal regime. Generalities. 1.2. Decomposition of periodic functions into Fourier series 1.3. Actual and average values of periodic functions. 1.4. Coefficients characteristic of periodic functions	Board, free speech	
Course 2 1.5. Calculation of networks in periodic non-sinusoidal regime by decomposition into harmonics. Non-sinusoidal voltage resistor. Voltage coil at non-sinusoidal terminals. Voltage capacitor at non-sinusoidal terminals. RLC circuits live at non-sinusoidal terminals	Laptop, video projector, IQ Board, free speech	2
Course 3 1.6. Calculation of the current in decomposed form. 1.7. Non-sinusoidal powers 1.8. Three-phase circuits in periodic non-sinusoidal regime	Laptop, video projector, IQ Board, free speech	2
Course 4 CHAPTER.2. THREE-PHASE ELECTRICAL CIRCUITS 2.1. Three-phase circuits and systems. Overview 2.2. Production of a symmetrical three-phase system of electromotive voltages	Laptop, video projector, IQ Board, free speech	2
Course 5 2.3. Three-phase circuit connections. Star connection of three-phase circuits. Triangle connection of three-phase circuits. 2.4. Three-phase star-connected receivers with neutral conductor	Laptop, video projector, IQ Board, free speech	2
Course 6 2.5. Three-phase star-connected receivers without a neutral conductor 2.6. Three-phase circuits connected in a triangle 2.7. Three-phase circuits powered by three-phase asymmetric voltage systems	Laptop, video projector, IQ Board, free speech	2
Course 7 2.8. Electric power in three-phase electrical circuits CHAPTER 3. TRANSITIONAL LINEAR ELECTRICAL CIRCUITS 3.1. Overview	Laptop, video projector, IQ Board, free speech	2
Course 8 3.2. The direct method. RL series circuits in transient mode. RC series circuits in transient mode. Transient RLC series circuits. Transiently branched RLC circuits	Laptop, video projector, IQ Board, free speech	2
Course 9 3.3. Laplace transform method. Laplace transform. Laplace transform theorems. Some details regarding the application of the Laplace transform in the study of electrical circuits	Laptop, video projector, IQ Board, free speech	2
Course 10 3.4 Operational form of equations of electrical circuits. Operational impedances. Networks in null initial conditions. Networks in non-zero initial conditions. The response of a passive linear dipole circuit to an input signal u(t)	Laptop, video projector, IQ Board, free speech	2
Course 11	Laptop, video projector, IQ	2

CHAPTER.4. ELECTRIC QUADRUPLE THEORY 4.1. Definitions. Classification 4.2. Quadripole equations;	Board, free speech	
Course 12 4.3. The transition from one system of quadrilateral equations to another; 4.4. Interconnection of quadripoles. Chain connection. Parallel connection. Parallel-to-parallel connection Parallel-to-serial connection.		2
Course 13 4.5. Equivalent schemes of the quadripole; 4.6. Hollow and short circuit interconnection of the quadrupole.		2
Course 14 4.7. Characteristic impedance and constant propagation of the symmetric quadrupole; 4.8. Electric frequency filters. Filter pass intervals. Determ. Crossing limits of some filters.		2
Bibliography 1. Hathazi Francisc – Ioan – Teoria circuitelor electrice II – Note de curs; 2. Balabanian, N., Bickart, T. - Teoria modernă a circuitelor, Ed.Tehnică, Bucureşti, 1975; 3. Leuca, T. - Electrotehnică şi maşini electrice, Litografia Universităţii din Oradea, 1992; 4. Leuca, T., Molnar Carmen - Circuite electrice. Aplicaţii utilizând tehnici informatice, Ed. Univ. din Oradea, 2002; 5. Maghiar, T., Leuca, T. - Culegere de probleme de electrotehnică, vol.I, Lit. Univ. Oradea, 1992; 6. Maghiar, T., Leuca, T. - Culegere de probl. de electrotehnică, vol.II, vol.III, Lit. Univ. Oradea, 1992, 1993.; 7. Mocanu, C. I. - Teoria câmpului electromagnetic, Ed. Didactică şi Pedagogică, Bucureşti, 1981; 8. Şora, C. - Bazele electrotehnicii, Ed. Didactică şi Pedagogică, Bucureşti, 1982.		
8.2 Seminar	Teaching methods	No. of hours/ Observations
1. Linear electrical circuits in periodic non-sinusoidal regime	Free speech / use of blackboard	4
2. Three-phase electrical circuits	Free speech / use of blackboard	4
3. Transient linear electrical circuits. The direct method.	Free speech / use of blackboard	2
4. Transient linear electrical circuits. Laplace transform methods	Free speech / use of blackboard	4
8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Theoretical notions of protection and security.	Free speech	2
2. The study of the resonance phenomenon in the case of linear electrical circuits in periodic sinusoidal regime	Free speech, experimental stand use and measuring devices	2
3. Study of linear electrical circuits in periodic non-sinusoidal regime	Free speech, use of numerical analysis programs from the laboratory equipment	2
4. Three-phase electrical circuits	Free speech, use of experimental stand and measuring devices from the laboratory equipment	2
5. Study of three-phase circuits connected in a star fed by symmetrical line voltages	Free speech, use of experimental stand and measuring devices from the laboratory equipment	2
6. Study of three-phase circuits connected in a triangle powered by symmetrical line voltages	Free speech, use of experimental stand and	2

	measuring devices from the laboratory equipment	
7. Determining the sequence of phases	Free speech, use of experimental stand and measuring devices from the laboratory equipment	2
8. Study of the transient regime in RL circuits	Free speech, use of numerical analysis programs from the laboratory equipment	2
9. Study of the transient regime in RC circuits	Free speech, use of numerical analysis programs from the laboratory equipment	2
10. Transient mode in RLC circuits	Free speech, use of numerical analysis programs from the laboratory equipment	2
11. Study of filters for symmetrical components	Free speech, use of numerical analysis programs from the laboratory equipment	2
12. Study of electricity transmission in wireless systems	Free speech, use of numerical analysis programs from the laboratory equipment	2
13. Verification of knowledge	Free speech, use of numerical analysis programs from the laboratory equipment	2
14. Verification of knowledge	Free speech, use of numerical analysis programs from the laboratory equipment	2

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;

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 license program. The content of the discipline is found in the curriculum of the Electrical Systems 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. 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	75 %
10.5 Seminar	Final evaluation test	The evaluation can be done face-to-face or online. Oral assessment - test, report.	15%
10.6 Laboratory	Final evaluation test	The evaluation can be done face-to-face or online. Oral assessment - test, report.	10 %
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 High education institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**Faculty of Electrical Engineering and Information Technology**
1.3 Department	Department of Electrical Engineering
1.4 Study area	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	**QUALITY OF ELECTRIC ENERGY**						
2.2 Holder of the subject	Lecturer dr.ing. STAŞAC CLAUDIA OLIMPIA						
2.3 Holder of the academic seminar/laboratory/project	Lecturer dr.ing. STAŞAC CLAUDIA OLIMPIA						
2.4 Year of study	II	2.5 Semester	II	2.6 Type of the evaluation	Vp.	2.7 Subject regime	Specialized Discipline (I)

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

3.1 No.of hours/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					19 h
Study using the manual, course support, bibliography and handwritten notes					**19**
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					**6**
Examinations					**1**
Other activities.					**2**
3.7 Total hours of individual study	**19**				
3.9 Total hours per semester	**75**				
3.10 Number of credits	**3**				

4. Pre-requisites (where applicable)

4.1 related to the curriculum	(Restraints) Electrotechnics, Electrical equipment, Electrical installations, Electrical technology
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 course can be held face to face or online
5.2. for the development of the academic seminary/laboratory/project	- Equipment related to the conduct of seminar classes - Preparation of the paper, knowledge of the notions contained in the seminar paper to be performed (synthesis material);

	- Carrying out all seminar papers. The seminar can be held face-to-face or online.

6. Specific skills acquired	
Professional skills	▪ - C1. Proper implementation of specific fundamental knowledge of mathematics, physics, chemistry, in the field of electrical engineering ▪ - C2. Use of fundamental concepts of computer science and information technology ▪ - C3. Use of fundamental knowledge of electrotechnics ▪ - C4. Design of electrical systems and their components ▪ - C5. Design and coordination of experiments and tests ▪ - C6. Diagnosis, troubleshooting and maintenance of electrical systems and components
Crosscut skills	▪ CT1. Identification of the objectives to be achieved, available resources, conditions to complete them, working stages, working times, associated deadlines and risks ▪ - CT2. Identification of the roles and responsibilities in a multidisciplinary team and use of relationship and effective working techniques in the team ▪ - CT3. Effective use of information and communication sources and assisted professional training (Internet portals, specialized software applications, databases, online courses etc.) both in Romanian and in a foreign language.

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 of Quality of Electric Energy is addressed to second year students, specialization, ES, and is designed to present modern interdisciplinary issues regarding reliability and diagnosis, quality of equipment and devices in the field of electrical engineering. Through the approached topic, the course is meant to allow students to acquire basic knowledge, in the first stage, will study reliability indicators of elements and systems on the main phenomena that occur in the operation of electrical appliances, and in the stage of second of some knowledge regarding the maintenance of electrical equipment. The course also aims to facilitate students' development of skills and competencies in the issue of correct choice of equipment that is part of electrical installations.
7.2 Specific objectives	▪ The project is designed to provide future engineers in the field of electrical engineering, practical skills in electrical maintenance, construction, research, operation, repair and maintenance of electrical, electromechanical, electrothermal installations. The content of the seminar presented is based on the need to deepen the problems presented in the course. ▪ The students have the opportunity to study the quality of electrical equipment and devices, identify, electrical supply diagrams of electrical equipment, familiarization with modern means of measuring temperature, electrical parameters during the operation of electrical equipment. They will be able to understand the complexity, usefulness and maintenance of these facilities and treat them as such. Knowledge is useful in the formation of skills to address the specific problems faced by a specialist in the field of electrical engineering.

8. Contents*

8.1 Course	Teaching methods	Nr. Hours/ Notes
Chapter I. General notions regarding the quality of electricity.	Free exposure, with the presentation of the course on the video projector and on the board. Student contributions on course-specific topics are requested. Some courses are conducted by teaching topics and debating them by students.	2
Chapter II. Defining the quality of electricity. 2.1. Causes of non-quality of electricity. The main factors that influence the quality of electricity (frequency, voltage variations, unbalance of three-phase systems, voltage / current wave deformation, etc.).	Idem (same)	2
2.2. Implications of electricity quality on the operation of electric motors, resistive consumers,	Idem	2
2.3. Implications of electricity quality on the operation of electric lighting, semiconductor equipment, transmission and distribution networks, etc.	Idem	1
2.4. Indicators and standard values for assessing the quality of electricity.	Idem	2
2.5. Electricity monitoring	Idem	2
2.6. Improving the quality of electricity.	Idem	1
2.7. The quality-economic efficiency correlation, the quality costs and their recovery sources, criteria for establishing an optimal solution from an economic point of view, quality management.	Idem	2
Chapter III. The problem of electromagnetic compatibility. 3.1. Sources of electromagnetic disturbance	Idem	2
3.2.Classification of disturbance sources: narrowband, intermittent broadband, transient broadband.	Idem	1
3.3. Combating electromagnetic disturbances	Idem	2
Antiparasitic elements (operation, sizing, use).	Idem	2
3.4. Electromagnetic screens (operation, sizing, use).	Idem	2
Chapter IV. Intrinsic protection of electrical installations 4.1. General information on the protection of receivers in low voltage electrical installations. Selectivity in protection	Idem	2
4.2. Bodies involved in EMC standardization.	Idem	1
4.3. EMC standards.	Idem	1
4.4. EMC Directive.	Idem	1

Bibliography

1. Livia Bandici, Dorel Hoble – *Utilizări ale energiei electrice*. Editura Universităţii din Oradea, 2007.
2. Livia Bandici, Dorel Hoble - *Utilizări ale energiei electrice în echipamentele de iluminat şi sudură*. Editura Universităţii din Oradea, 2009.
3. C. Bianchi, ş.a – Sisteme de iluminat interior şi exterior. Concepţie, calcul, soluţii. Editura MatrixRom, Bucureşti, 2014.Staşac Claudia Olimpia – *Calitatea energiei electrice –Notite de curs pentru uzul studentilor*
4. Ovidiu Centea, Protectia instalatiilor electrice de joasa tensiune. Ed. Tehnica, Bucuresti, 1982
5. Dorel Hoble, Claudia Staşac – *Aparate şi echipamente electrice*. Editura Universizăţii din Oradea-2004
6. Iordache Mihaela si Conecini I. – *Calitatea energiei electrice.* Ed. Tehnica, Bucuresti, 1997.
7. Maier V., s.a. – *Ingineria calitatii si protectia mediului*. U.T. Press Cluj-Napoca, 2007.

8. Helga Silaghi - *Calitatea energiei in sistemele de actionare electrica cu masina de inductie, Editura Treira , Oradea, 2000, ISBN 973-99649-3-1.*
9. Claudia Olimpia Staşac - *Tehnologia îmbinărilor nedemontabile utilizând metode inductive*. Editura Universităţii din Oradea-2010.

8.2 Seminar	Teaching methods	No. hours / Notes
8.3 Laboratory		
8.3 Project		
Theme: Design of an installation for monitoring the quality of electricity. Bibliography.	Discussions on how to develop the project.	4
Chapter I. Statistical methods with application to electricity quality monitoring	Brief approach to the main problems related to indoor lighting systems and the optimal conditions for achieving a comfortable light microclimate.	4
Chapter II. .The problem of electricity quality. Improving the quality of electricity	Explanations on choosing the optimal lighting solutions	4
Chapter III. Sizing of the monitoring installation. 3.1. Calculation methods for pre - sizing monitoring installations	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.	4
3.2. Methods for verifying the quantitative conditions of monitoring installations. 3.3. Methods for assessing by calculation or graphing the quality conditions of electricity	In the first part of the session there will be a verification of the calculations presented by the students up to this phase. In the second part there will be a presentation of the verification methods and the quality conditions of the lighting.	4
Chapter IV. Design of the electricity quality monitoring installation. 4.1Conclusions	Design calculations.	4
Final evaluation of the project	Supporting and teaching the elaborated project.	4

Bibliography

1. Livia Bandici, Dorel Hoble – *Utilizări ale energiei electrice*. Editura Universităţii din Oradea, 2007.
2. Livia Bandici, Dorel Hoble - *Utilizări ale energiei electrice în echipamentele de iluminat şi sudură*. Editura Universităţii din Oradea, 2009.
3. C. Bianchi, ş.a – Sisteme de iluminat interior şi exterior. Concepţie, calcul, soluţii. Editura MatrixRom, Bucureşti, 2014.Staşac Claudia Olimpia – *Calitatea energiei electrice –Notite de curs pentru uzul studentilor*
4. Ovidiu Centea, Protectia instalatiilor electrice de joasa tensiune. Ed. Tehnica, Bucuresti, 1982
5. Dorel Hoble, Claudia Staşac – *Aparate şi echipamente electrice*. Editura Universizăţii din Oradea-2004
6. Iordache Mihaela si Conecini I. – *Calitatea energiei electrice.* Ed. Tehnica, Bucuresti, 1997.
7. Maier V., s.a. – *Ingineria calitatii si protectia mediului*. U.T. Press Cluj-Napoca, 2007.
8. Helga Silaghi - *Calitatea energiei in sistemele de actionare electrica cu masina de inductie, Editura Treira , Oradea, 2000, ISBN 973-99649-3-1.*
9. Claudia Olimpia Staşac - *Tehnologia îmbinărilor nedemontabile utilizând metode inductive*. Editura Universităţii din Oradea-2010.

- Enlarge upon the content, mainly the number of hours allocated to each course/seminar/laboratory/project along the 14 weeks of each semester of the academic year.

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

- The content of the discipline 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. The content of the discipline is found in the curriculum of Electromechanics or Electrical Systems and other university centers in Romania that have accredited these specializations, so knowledge of the basics is a stringent requirement of employers in electromechanical, electrical, electronic such as: Faist, Comau , SC Stimin Industries S.A. Celestica, Connectronix, Plexus.

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 subjects must be treated to minimum standards; - For grades 10 all subjects must be treated to maximum standards;	Written or oral exam - duration 2 hours. Students have the opportunity to choose the assessment method (written or oral exam). The exam consists of 3 topics from the course topic. In order to pass the exam, each subject must be treated for at least grade 5. The evaluation can be done face to face or online.	60 %
10.5 Seminar	- In the last seminar session the students will present the works performed, respectively the results obtained;	- All the papers from the seminar must be performed, condition to enter the exam. - The share of the seminar is 40% of the value of the exam grade. - It is allowed to recover only one remaining seminar (in the last week of the semester).	40 %
10.6 Laboratory			
10.7 Project			
10.8 Minimum performance standard: Carrying out work under the coordination of a teacher, to solve specific problems maintenance, maintenance and diagnosis of electrical equipment with the correct assessment of workload, available resources, time required to complete and risks, in conditions of application of safety rules and occupational health. Principle of operation and maintenance diagnosis, composition of electrical equipment.			
-Note components: Exam (Ex), Laboratory (LF) and Report / synthesis material (R); -Note calculation formula: N = 0.60Ex + 0.40LF; - Condition for obtaining loans: N≥5; LF≥5; R ≥5.			

Completion date
29.08.2022

Course owner's signature

Lecturer. dr. ing. STAȘAC CLAUDIA OLIMPIA

Signature of the laboratory owner

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. Date despre 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. Date despre disciplină

2.1 Name of the subject	**Bond graphs in electrotehnics**						
2.2 Holder of the subject	Conf.dr.ing. **Grava Adriana**						
2.3 Holder of the academic seminar/laboratory/project	Conf.dr.ing. **Grava Adriana**						
2.4 Year of study	II	2.5 Semester	3	2.6 Type of the evaluation	VP	2.7 Subject regime	DS

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	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					58
Study using the manual, course support, bibliography and handwritten notes					18
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					18
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					14
Tutorials					2
Examinations					4
Other activities.					2

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	Physics, Theory of electrical circuits
4.2 Related to skills	Elements of electrical circuit, knowledge of physics phenomena and the laws of electrical engineering and physics, series and parallel connection of electrical circuits

5. Conditions (where applicable)

5.1. for the development of the course	The course could be physically or online
5.2.for the development of the academic seminary/laboratory/project	Seminary could be physically or online

6. Specific skills acquired	
Competențe profesionale	C2. Use of fundamental concepts of computer science and information technology C3. Use of fundamental knowledge of electrotechnics
Competențe transversale	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	Within this discipline, students are presented with basic notions regarding the modeling of physical systems and in particular of electrical circuits and electromechanical systems, with the help of bond graphs. These are a way to model any physical system, no matter how complex, so it is possible to analyze it as a unique system. The use of bond graphs has the advantage that it allows the unitary modeling of a multidisciplinary physical system, allowing the study of any complex physical system, resulting from the interconnection of physical systems of different nature.
7.2 Specific objectives	After completing the discipline "Bond graphs in electrotehnics ", the student can model any multidisciplinary physical system and can analyze it with a single simulation tool, such as the 20 SIM program. Compared to other simulation programs, this program has the advantage that it is possible to obtain data on quantities from different domains of the analyzed system, being able to study the system as a unique system.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. The elements of bond graphs The procedure of modeling electrical systems that are in stationary regime with the help of bond graphs.	Video projector, presentation, discussion or online	2h
2. The procedure of construction and modeling of electrical systems that are in alternating sinusoidal regime with the help of bond graphs.	Video projector, presentation, discussion or online	2h
3. Procedure for construction and modeling of bond graphs for three-phase electrical systems. Examples	Video projector, presentation, discussion or online	2h
4. Comparison of the results of electrical circuits that are in permanent sinusoidal regime solved using Kirchhoff's theorems with simulation results using the bond graphs and the simulation program 20 SIM	Video projector, presentation, discussion or online	2h
5. Comparison of the results of some electrical circuits that are in permanent sinusoidal regime solved using the theorem of cyclic currents with simulation results using the bond graphs and the simulation program 20 SIM	Video projector, presentation, discussion or online	2h
6. Comparison of the results of some electrical circuits that are in permanent sinusoidal regime solved using the theorem of the potentials at nodes with simulation results using the bond graphs and the simulation program 20 SIM	Video projector, presentation, discussion or online	2h
7. Causality on active elements and jonction elements.	Video projector, presentation, discussion or online	2h
8. Causal loops. Causal ways.	Video projector, presentation, discussion or online	2h
9. Transmittance of active, passive elements, circuit transmittance. Mason's rule.	Video projector, presentation, discussion or online	2h
10. Frequency analysis of single-phase electrical circuits in alternating sinusoidal regime, using bond graphs using the 20 SIM simulation program	Video projector, presentation, discussion or online	2h
11. Frequency analysis of three-phase alternating sinusoidal electrical circuits using connection graphs using the 20 SIM simulation program	Video projector, presentation, discussion or online	2h

12. Calculation of transmittances for three-phase circuits applying Mason's Rule, using bond graphs	Video projector, presentation, discussion or online	2h
13. Modeling of electrical circuits that are in non-sinusoidal regime with the help of bond graphs	Video projector, presentation, discussion or online	2h
14. Calculation of transmittances for circuits that are in non-sinusoidal regime with the help of connection graphs Examples	Video projector, presentation, discussion or online	2h

Bibliografie

1. Gawthrop P.J. - "Bond graphs and dynamics system", London Prentice Hall, 1996;
2. Gawthrop P.J. - "Physical Interpretation of inverse dynamic using bond graphs", The Bond graphs Digest, 2 (1), 1998;
3. Grava A. - "Grafuri de legătură în electrotehnică", Editura Universităţii din Oradea, 2004;
4. Grava A. - "Grafuri de legătură în electrotehnică - Aplicaţii", Editura Universităţii din Oradea, 2009;
5. Grava A. – www.agrava.webhost.uoradea.ro;
6. Grellet G. - "Actionneurs électriques: principes, modèles, commandes", Paris, Eyrolles, 1997;
7. Karnopp D., Rosenberg R. - "System dynamics: a unified approach", John Willley, New-York, Second edition, 1991;
8. Scavarda S., Dauphin-Tanguy G. ş.a - "Les bond-graphs" – Editura Hermes, 2000;
8. Şora, C. - "Bazele electrotehnicii", Ed. Didactică şi Pedagogică, Bucureşti, 1982.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1.The procedure of construction and modeling of electrical systems that are in alternating sinusoidal regime with the help of bond graphs.	Simulasion or online simulation	2h
2. Comparison of the results of electrical circuits that are in permanent sinusoidal regime solved using Kirchhoff's theorems with simulation results using the bond graphs and the simulation program 20 SIM	Simulasion or online simulation	2h
3. Comparison of the results of some electrical circuits that are in permanent sinusoidal regime solved using the theorem of cyclic currents with simulation results using the bond graphs and the simulation program 20 SIM	Simulasion or online simulation	2h
4. Comparison of the results of some electrical circuits that are in permanent sinusoidal regime solved using the theorem of the potentials at nodes with simulation results using the bond graphs and the simulation program 20 SIM	Simulasion or online simulation	2h

5. Transmittance of active, passive elements, circuit transmittance. Mason's rule.	Simulasion or online simulation	2h
6. Frequency analysis of single-phase electrical circuits in alternating sinusoidal regime, using bond graphs using the 20 SIM simulation program	Simulasion or online simulation	2h
7. Frequency analysis of three-phase alternating sinusoidal electrical circuits using connection graphs using the 20 SIM simulation program	Simulasion or online simulation	2h
8.4 Project		

Bibliografie

1. Gawthrop P.J. - "Bond graphs and dynamics system", London Prentice Hall, 1996;
2. Gawthrop P.J. - "Physical Interpretation of inverse dynamic using bond graphs", The Bond graphs Digest, 2 (1), 1998;
3. Grava A. - "Grafuri de legătură în electrotehnică", Editura Universităţii din Oradea, 2004;
4. Grava A. - "Grafuri de legătură în electrotehnică - Aplicaţii", Editura Universităţii din Oradea, 2009;
5. Grava A. – www.agrava.webhost.uoradea.ro;
6. Grellet G. - "Actionneurs électriques: principes, modèles, commandes", Paris, Eyrolles, 1997;
7. Karnopp D., Rosenberg R. - "System dynamics: a unified approach", John Willley, New-York, Second edition, 1991;
8. Scavarda S., Dauphin-Tanguy G. ş.a - "Les bond-graphs" – Editura Hermes, 2000;
8. Şora, C. - "Bazele electrotehnicii", Ed. Didactică şi Pedagogică, Bucureşti, 1982.

9. Corroborating 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

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course		Paper - oral or online presentation The evaluation can be done face to face or online	50%
10.5 Laboratory	Laboratory Activity	Oral or online simulation presentation The evaluation can be done face to face or online	50%

10.7 Project			
10.8 Minimum performance standard: Carrying out a work / project, responsibly performing tasks specific to the role in a multidisciplinary team			
Final Periodic Verification (VPF) Seminar (S), Laboratory(L), Project (P). Grade calculation formula N = 50%Ex + 50%S; Condition for obtaining loans:: N ≥ 5; S = ≥ 5; L = ≥ 5; P = ≥ 5.			

Signature of the course holder

Completion date:
29.08.2022

Conf.univ.dr.ing. Grava Adriana Marcela

Date de contact:
Cod poștal: 410087, Oradea, jud.Bihor, Romania
Tel.: 0259 / 410.667, e-mail: agrava@uoradea.ro

Signature of the laboratory holder

Conf.univ.dr.ing. Grava Adriana Marcela

Date de contact:
Cod poștal: 410087, Oradea, jud.Bihor, Romania
Tel.: 0259 / 410.667, e-mail: agrava@uoradea.ro

Date of endorsement in the department:

01.09.2022

Signature Departament Directory

Prof.univ.dr.ing.inf. Francisc – Ioan Hathazi

Date de contact:

Tel.: 0259 / 410.172, e-mail: ihathazi@uoradea.ro
Pagina web: http://ihathazi.webhost.uoradea.ro/

Date of endorsement in the department:

23.09.2022

Dean's Signature

prof.univ.dr.ing. Ioan – Mircea Gordan

Date de contact:
Tel.: 0259 / 410.204, e-mail: mgordan@uoradea.ro
Pagina web: http://mgordan.webhost.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	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		Numerical Methods I					
2.2 Holder of the subject		Lecturer PhD eng. **Novac Cornelia Mihaela**					
2.3 Holder of the academic seminar/laboratory/project		Lecturer PhD eng. **Novac Cornelia Mihaela**					
2.4 Year of study	2	2.5 Semester	3	2.6 Type of the evaluation	Ex	2.7 Subject regime	Specialized 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 **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					69
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					15
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					20
Tutorials					6
Examinations					6
Other activities.					2
3.7 Total of hours for individual study	**69**				
3.9 Total of hours per semester	**125**				
3.10 Number of credits	5				

4. Pre-requisites (where applicable)

4.1 related to the curriculum	(Conditions) - Computer skills, linear algebra and mathematical analysis
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	- The course room has to be provided with a video-projector - The course can be carried out face to face or online
5.2.for the development of the academic seminary/laboratory/project	- Personal computers with dedicated software programs (Matlab); - Students presence to all laboratory hours is compulsory - The laboratory hours can be carried out face to face or online
6. Specific skills acquired	

Professional skills	C1. Proper implementation of specific fundamental knowledge of mathematics, physics, chemistry, in the field of electrical engineering C2. Use of fundamental concepts of computer science and information technology
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 discipline "Numerical methods I" aims to familiarize students with the features of the basic principles of numerical methods; the practical interpretation of the formulas from the methods presented with the help of a calculation system and the realization of some calculation programs with applications in electrical engineering, written in the Matlab programming language.
7.2 Specific objectives	After completing the discipline "Numerical methods I", students acquire the following skills: □ Knowledge and adequate use of notions specific to numerical calculation; □ Understanding the content and essence of laboratory work; □ Application of numerical methods in electrical engineering problems; □ Using the Matlab programming language for numerical calculation in electrical engineering; □ Choosing the numerical method appropriate to each type of problem; □ Solving with the help of a calculation system the more complex engineering problems, for which the analytical solutions do not exist, or are unsatisfactory. ▪ □ Acquiring the ability to use what they have learned in this discipline in the case of a rigorous and abstract approach to practical problems that may arise in further research (master's, doctorate)

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1.Matlab programming fundamentals	Interactive lecture + video projector / Online	2
2. Introduction in Matlab programming.	Interactive lecture + video projector / Online	4
3. Errors in numerical calculation	Interactive lecture + video projector / Online	2
4. Numerical methods to solve algebric linear systems equations. Exact methods.	Interactive lecture + video projector / Online	2
5. Numerical methods to solve algebric linear systems equations. Iterative methods.	Interactive lecture + video projector / Online	2
6. Numerical methods to solve nonlinear equations	Interactive lecture + video projector / Online	2
7. Interpolation	Interactive lecture + video projector / Online	4
8. Functions approximation	Interactive lecture + video projector / Online	2
9.Numerical integration	Interactive lecture + video projector / Online	2
10.Numerical derivation	Interactive lecture + video projector / Online	2
11.Numerical methods to solve differential equations	Interactive lecture +	4

	video projector / Online	
Bibliography 1. Mihaela Novac-" Metode numerice", Editura Universităţii din Oradea, 2005. 2. Mihaela Novac, O. Novac - "Metode numerice utilizând Matlab", Editura Universităţii din Oradea, 2003. 3. Mihaela Novac - "Metode numerice îndrumător de laborator", Editura Universităţii din Oradea, 2012. 4. M. Ghinea, V. Fireţeanu, - " Matlab calculul numeric-grafică-aplicaţii.", Editura Teora, 1997. 5. I.A Viorel,D. M. Ivan – "Metode numerice cu aplicaţii în ingineria electrică", Editura Universităţii din Oradea, 2000. 6. Mihaela Novac - *Metode numerice utilizând MatLAB : pentru ingineri*- Editura Universităţii din Oradea, 2014		
8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Using the Matlab programming environment	Application programs using Matlab	2
2. Function in Matlab. Operations with vectors and matrices in Matlab	Application programs using Matlab	4
3. Graphics in Matlab	Application programs using Matlab	4
4. Numerical methods for solving linear equations systems. Direct methods.	Application programs using Matlab	4
5. Numerical methods for solving linear equations systems. Iterative methods.	Application programs using Matlab	2
6. Solving systems of nonlinear equations.	Application programs using Matlab	2
7. Interpolation	Application programs using Matlab	2
8. Functions approximation..	Application programs using Matlab	2
9. Numerical integration and derivation	Application programs using Matlab	2
10. Numerical solution of differential equations	Application programs using Matlab	2
11. Evaluation of laboratory activity.		2
Bibliography 1. Mihaela Novac-" Metode numerice utilizând Matlab pt. ingineri", Editura Universităţii din Oradea, 2014 2. Mihaela Novac-" Metode numerice", Editura Universităţii din Oradea, 2005. 3. Mihaela Novac, O. Novac - "Metode numerice utilizând Matlab", Editura Universităţii din Oradea, 2003. 4. Mihaela Novac - "Metode numerice îndrumător de laborator", Editura Universităţii din Oradea, 2012. 5. M. Ghinea, V. Fireţeanu, - " Matlab calculul numeric-grafică-aplicaţii.", Editura Teora, 1997. 6. I.A Viorel,D. M. Ivan – "Metode numerice cu aplicaţii în ingineria electrică", Editura Universităţii din Oradea, 2000.		

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	Oral examination practical computer applications / Online Assessment (Online questionnaire)	70 %
10.5 Seminar/ Laboratory	Laboratory activity + seminar + final test	Questions	30%
10.8 Minimum performance standard:			

Completion date:
29.08.2022

Date of endorsement in the department:
1.09.2022

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		**Numerical Methods II**					
2.2 Holder of the subject		Lecturer PhD eng. Novac Cornelia Mihaela					
2.3 Holder of the academic seminar/laboratory/project		Lecturer PhD eng. Codrean Marius					
2.4 Year of study	2	2.5 Semester	4	2.6 Type of the evaluation	Vp - Continuous Assessment	2.7 Subject regime	DF

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	6
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	(Conditions) - Computer skills, linear algebra, mathematical analysis and numerical methods I
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	- The course room has to be provided with a video-projector - The course can be carried out face to face or online
5.2.for the development of the academic seminary/laboratory/project	- Personal computers with dedicated software programs (Matlab); - Students presence to all laboratory hours is compulsory - The laboratory hours can be carried out face to face or online

6. Specific skills acquired	
Professional skills	**C2. Use of fundamental concepts of computer science and information technology.** **C3. Use of fundamental knowledge of electrotechnics**
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 purpose of the Numerical Methods II course is for the student to form an overview of the methods presented and to be able to apply them in cases where the problem does not allow an exact analytical solution. The objectives of this course are the acquisition by students of the theoretical knowledge presented. The acquisition of this discipline results in a general fundamental training of students by providing them with knowledge in the vast field of numerical methods, with emphasis on the finite element method, finite difference method, process optimization, etc., with which to align with the progress of science. - to develop skills of applied, technical thinking, and to adapt to the current requirements of the market economy; - to know how to analyze the correlation between fundamental knowledge and practical problems, -to interpret the data obtained at the laboratory hours. - It will insist on the use of the calculation technique by using the MATLAB programming environment and its toolboxes, in order to solve some problems with a high degree of complexity.
7.2 Specific objectives	After completing the discipline "Numerical Methods II", students acquire the following skills: - Knowledge and adequate use of notions specific to numerical calculation; - Correct interpretation of the theoretical ideas underlying the numerical methods studied; - Understanding how to choose and use study methods. - Selection of investigation methods and recognition of the optimal method - Understanding the content and essence of laboratory work; - Application of numerical methods in electrical engineering problems; - Acquiring the skills of elaborating papers, scientific papers specific to the field and participating in scientific sessions, conferences, etc..

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1 Mathematical modeling, numerical methods and problem solving.	Interactive lecture + video projector / Online	2
2. Numerical derivation. Finite difference method (FDM).	Interactive lecture + video projector / Online	4
3. Finite element method (FEM).	Interactive lecture + video projector / Online	2
4. Toolboxes presentation in the MATLAB programming environment	Interactive lecture + video projector / Online	2
5. SIMULINK toolbox.	Interactive lecture +	6

Introduction. Toolboxes. Building of a simple model with Simulink.	video projector / Online	
6. Optimization methods. Genetic algorithms.	Interactive lecture + video projector / Online	4
7**.** OPTIMIZATION Toolbox. Fminimax optimization. Fmincon optimization	Interactive lecture + video projector / Online	2
8. Differential Equations with Partial Derivatives - PDE Toolbox	Interactive lecture + video projector / Online	4
9. Analysis of linear resistive electrical circuits. Node potential method Data structures. Preprocessing stage. Solving stage. Post-processing stage. Complexity analysis. Algorithm optimization.	Interactive lecture + video projector / Online	2

Bibliography

1. Mihaela Novac- Metode numerice II-notite de curs
2.I.A Viorel,D. M. Ivan – "Metode numerice cu aplicaţii în ingineria electrică", Editura Universităţii din Oradea, 2000.
3.Mihaela Novac - Metode numerice utilizând MatLAB : pentru ingineri- Editura Universităţii din Oradea, 2014.
4.D. Ioan, I. Munteanu, B. Ionescu, M. Popescu, R. Popa, M. Lazarescu ¸si G. Ciuprina. Metode numerice ın ingineria electrica. MatrixROM, Bucure¸sti, 1998.
5.Cleve Moler. Numerical Computing with MATLAB. SIAM, 2004. http://www.mathworks.com/moler/.
6. Irina Munteanu, Gabriela Ciuprina ¸si F.M.G. Tomescu. Modelarea numerica a campului electromagnetic prin programe Scilab. Editura Printech, 2000.
7.http://www.lmn.pub.ro/ gabriela/studenti/an4/carte MNCE.pdf
8. https://e.uoradea.ro/course/view.php?id=9306 (Course)

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Recapitulation of programming knowledge in the Matlab environment	Free presentation, with exemplification on the board. Application programs running on PC (Personal Computers).	2
2. Numerical derivation. Finite difference method. Matlab applications.	idem	2
3. Finite element method. Matlab applications.	idem	2
4. Computer-aided solution of ordinary differential equations and systems of ordinary differential equations. Programming in the Simulink environment. Practical aspects and applications in electrical engineering.	idem	6
5.Discrete Fourier Transform. Matlab applications.	idem	2
6.Solve optimization problems using GA (Genetic Algorithms) in Matlab.	idem	2
7. Solving optimization problems using the Optimization Toolbox within Matlab (fminimax optimization and fmincon optimization). Practical aspects and applications.	idem	4
8. Solving partial differential equations with PDE TOOLBOX	idem	4
9.Analysis of linear resistive electrical circuits. Node potential method. Applications in Matlab.	idem	2
10. Evaluation of laboratory activity.		2

Bibliography

1. Mihaela Novac- Metode numerice utilizând Matlab pentru ingineri, Editura Universităţii din Oradea, 2014.
2. Mihaela Novac-" Metode numerice", Editura Universităţii din Oradea, 2005.
3. Mihaela Novac, O. Novac - "Metode numerice utilizând Matlab", Editura Universităţii din Oradea, 2003.
4. Mihaela Novac - "Metode numerice îndrumător de laborator", Editura Universităţii din Oradea, 2012.
5. M. Ghinea, V. Fireţeanu, - " Matlab calculul numeric-grafică-aplicaţii.", Editura Teora, 1997.
6. I.A Viorel,D. M. Ivan – "Metode numerice cu aplicaţii în ingineria electrică", Editura Universităţii din Oradea, 2000.
7. Lucian MIHEŢ-POPA- MODELARE ŞI SIMULARE ÎN MATLAB & Simulink

8. Nicolae Mitu,Viorel Paleu Introducere in Matlab - Vol. I, Indrumar de laborator, Iasi 2008
9. Gabriela Ciuprina, Mihai Rebican, Daniel Ioan- Metode numerice in ingineria electrică,Indrumar de laborator pentru studenții facultății de Inginerie Electrică, Bucuresti 2013
10. https://e.uoradea.ro/course/view.php?id=9306 (laboratory)

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	Oral examination practical computer applications / Online Assessment (Online questionnaire) The evaluation can be done face to face or online.	70 %
10.6 Laboratory	Laboratory activity + final test	Knowledge assessment test.	30 %
10.8 Minimum performance standard: Pass mark from 50% of the requirements met.			

Completion date:
29.08.2022

Date of endorsement in the department:
1.09.2022

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				**ELECTRIC AND ELECTRONIC MEASUREMENTS I**			
2.2 Holder of the subject				Prof. univ. dr. ing. habil. IOAN MIRCEA GORDAN			
2.3 Holder of the academic seminar/laboratory/project				Şef lucrări dr. ing. RADU SEBEŞAN			
2.4 Year of study	II	2.5 Semester	3	2.6 Type of the evaluation	EX.	2.7 Subject regime	FD

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 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					74 hours
Study using the manual, course support, bibliography and handwritten notes					25
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					19
Tutorials					-
Examinations					10
Other activities.					-
3.7 Total of hours for individual study	**74**				
3.9 Total of hours per semester	**130**				
3.10 Number of credits	**5**				

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 presentation
5.2.for the development of the academic seminary/laboratory/project	The existence of the apparatus and equipment necessary for the development in optimal conditions of the works provided in the discipline file. Providing students with the laboratory guide in printed or electronic format.
6. Specific skills acquired	

Professional skills	▪ **C4. Design of electrical systems and their components** - Adequate description of the basic concepts and principles of measurement techniques and data acquisition specific to electrical engineering. - Explaining the means and methods of measurement, as well as the operation of instruments, devices and installations for measuring various technical quantities. - Application of the basic principles of measurement technique and data acquisition for determining electrical and non-electrical quantities in electromechanical systems. - Appropriate use of measuring devices and data acquisition systems for performance evaluation and monitoring of electromechanical systems. - Design of electromechanical installations including measuring devices and digital data acquisition systems. ▪ **C6. Diagnosis, troubleshooting and maintenance of electrical systems and components.** - Defining the concepts regarding the diagnosis and maintenance of electrical components and systems. - Interpreting the results of the diagnosis and ensuring the maintenance of the components of electrical systems. - Application of diagnostic methods and definition of the necessary conditions for ensuring maintenance. - Establish and use appropriate methods for assessing the quality of electrical components and systems. - Elaboration of maintenance projects for electrical components and systems. - Development and testing of an electrical system analysis program.
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 is taught to second year *Electrical Systems* students. The course addresses notions that will allow future graduates to have a rich background on the use of techniques for measuring electrical and non-electrical quantities and data acquisition systems in electromechanical systems.
7.2 Specific objectives	▪ Explaining and interpreting the phenomena presented in the field and specialty disciplines, using the basic knowledge of mathematics, physics, chemistry ▪ Application of general scientific rules and methods for solving problems specific to electrical engineering ▪ Explanation and interpretation of the operating modes of static, electromechanical converters, ▪ of electrical and electromechanical equipment ▪ Identification of electromechanical systems according to their composition mathematical modeling, as well as their kinematic and dynamic description ▪ Adequate description of the basic concepts and principles of electrical engineering measurement and data acquisition techniques ▪ Explanation of the means and methods of measurement, as well as the operation of instruments, devices and installations for measuring various technical quantities ▪ Application of the basic principles of measurement technique and data acquisition for determining electrical and non-electrical quantities in electromechanical systems. ▪ Appropriate use of measuring devices and data acquisition systems for performance evaluation and monitoring of electromechanical systems. ▪ Design of electromechanical installations including measuring devices and digital data acquisition systems. ▪ Developing a positive attitude towards the activities of assimilating new professional knowledge and information, cultivating and promoting a scientific environment focused on values, forming a positive and responsible professional behavior.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Chapter I INTRODUCTION 1.1. The object of the science of measurement 1.2. Classification of measurable quantities 1.3. The legal system of units of measurement 1.4. Standards	Interactive lecture; exposure; video projector presentation	2 hours
Chapter II ELECTRICAL METHODS AND MEASURES.	Interactive lecture; exposure;	4 hours

METROLOGICAL CHARACTERISTICS 3.1. The measurement process 3.2. Classification of electrical measurement methods 3.3. Hierarchy of electrical measurement methods 3.4. Definition of electrical measuring instruments 3.5. Functional diagrams of electrical measuring instruments 3.6. Metrological characteristics of electrical measuring instruments	video projector presentation	
Chapter III MEASUREMENT ERRORS 2.1. Classification of measurement errors 2.2. Estimation of random errors 2.3. Estimation of systematic errors 2.4. Estimation of total errors for indirect measurement methods 2.5. Processing and presentation of measurement results 2.6. Informational interpretation of measurement errors	Interactive lecture; exposure; video projector presentation	4 hours
Chapter IV MEASURING MEANS IN DYNAMIC REGIME 4.1. Overview 4.2. Typical behaviors of measuring instruments	Interactive lecture; exposure; video projector presentation	4 hours
Chapter V ANALOGUE MEASURING MEASURES 5.1. Principles of operation of electromechanical instruments 5.2. Constructive elements of electromechanical instruments	Interactive lecture; exposure; video projector presentation	6 hours
Chapter VI. PROCESSING OF ANALOG SIGNALS 6.1. shunt 6.2. Additional resistor 6.3. Voltage dividers 6.4. Measuring transformers 6.5. Measuring amplifiers	Interactive lecture; exposure; video projector presentation	4 hours
Chapter VII. DIGITAL MEASURERS 7.1. Working principle and characteristics of digital devices 7.2. Components of digital devices 7.3. Digital display devices	Interactive lecture; exposure; video projector presentation	4 hours

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1. Gordan M., - Măsurări electrice în electrotehnică, Ed. Universităţii din Oradea, 2003.
2. Gordan M., - Măsurări electrice şi sisteme de măsurare, Ed. Universităţii din Oradea, 2001.
3. Gordan M. – Măsurări electrice şi electronice, Ed. Universităţii din Oradea, 1999.
4. Gordan M. – Măsurări electrice şi electronice – Culegere de probleme, Lito Univ. din Oradea, 1998.
5. Gordan M., - Echipamente de măsură şi control, Ed. Universităţii din Oradea, 2003.
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7. Pawan Chandani, *Electrical Measurements and Instrumentation*, 2017.
8. E. Nicolau şi colectiv - Manualul inginerului electronist, E.T. Bucureşti 1980.
9. Tânovan I. G., Metrologie electrică şi instrumentaţie, Ed. Mediamira Cluj - Napoca 2003.
10. Ciocârlea-Vasilescu, A., M. Constantin, Neagu I., *Tehnici de măsurare în domeniu*, Bucureşti, Ed. CD PRESS 2007.
11. C. Mich-Vancea, I.M. Gordan –*Traductoare, interfeţe şi Achiziţii de date*, Note de curs, Ed. Universităţii din Oradea 2010.
12. Ştefănescu C., Cupcea N., - Sisteme inteligente de măsurare şi control, Ed. Albastră Cluj-Napoca 2002.
12. Gordan M. şi colab. - Măsurări electrice în electrotehnică – Îndrumător de laborator, Ed. Universităţii din Oradea, 2003.
13. Gordan M., Tomşe M., - Măsurări în energetică - Îndrumător de laborator, Lito. Univ. din Oradea, 1999.
14. Gordan M., Tomşe M., - Măsurări electrice şi electronice - Îndrumător de laborator, Lito Univ. din Oradea, 1997.

8.2 Academic seminar	Teaching methods	No. of hours/ Observations
8.3 Academic laboratory		
1. Presentation of the content and requirements required for the proper conduct of laboratory work.	Practical application. Discussions	2 hours
2. Estimation of measurement errors and interpretation of results.	Practical application. Discussions	2 hours
3. Metrological verification of indicator measuring instruments. Part I.	Practical application. Discussions	2 hours
4. Metrological verification of indicator measuring instruments. Part II.	Practical application. Discussions	2 hours
5. Metrological verification of digital voltmeters.	Practical application. Discussions	2 hours
6. Metrological verification of the current transformers.	Practical application. Discussions	2 hours

7. Checking the cathode ray oscilloscope.	Practical application. Discussions	2 hours
8. Measurement of voltages and currents. Part I.	Practical application. Discussions	2 hours
9. Measurement of voltages and currents. Part II.	Practical application. Discussions	2 hours
10. Real-time oscilloscope measurements.	Practical application. Discussions	2 hours
11. DC voltage compensators.	Practical application. Discussions	2 hours
12. Measurement of resistances by volt - ammeter method.	Practical application. Discussions	2 hours
13. Measuring resistances with simple direct current bridge.	Practical application. Discussions	2 hours
14. Recovery of laboratories. Ending the school situation.	Practical application. Discussions	2 hours
8.4 Academic project	--	--

Bibliography

1. Gordan M., - Măsurări electrice în electrotehnică, Ed. Universităţii din Oradea, 2003.
2. Gordan M., - Măsurări electrice şi sisteme de măsurare, Ed. Universităţii din Oradea, 2001.
3. Gordan M. – Măsurări electrice şi electronice, Ed. Universităţii din Oradea, 1999.
4. Gordan M. – Măsurări electrice şi electronice – Culegere de probleme, Lito Univ. din Oradea, 1998.
5. Gordan M., - Echipamente de măsură şi control, Ed. Universităţii din Oradea, 2003.
6. Iliescu C., Ionescu-Golovanov C., şi alţii - Măsurări electrice şi electronice, E.D.P. Bucureşti 1983.
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6. Kishore K. Lal, *Electronic Measurement and Instrumentation*, PEI, 2009.
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11. Pop E., Stoica V., Naforniţa I., Petriu E., - Tehnici moderne de măsurare, Ed. Facla Timişoara 1983.
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12. Gordan M. şi colab. - Măsurări electrice în electrotehnică – Îndrumător de laborator, Ed. Universităţii din Oradea, 2003.
13. Gordan M., Tomşe M., - Măsurări în energetică - Îndrumător de laborator, Lito. Univ. din Oradea, 1999.
14. Gordan M., Tomşe M., - Măsurări electrice şi electronice - Îndrumător de laborator, Lito Univ. din Oradea, 1997.
15. D. Belege, G. Gasparesc – Măsurări electrice şi electronice. Aplicații practice, Ed. Politehnica Timişoara, 2019.

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	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

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				**ELECTRIC AND ELECTRONIC MEASUREMENTS II**			
2.2 Holder of the subject				Prof. univ. dr. ing. habil. IOAN MIRCEA GORDAN			
2.3 Holder of the academic seminar/laboratory/project				Şef lucrări dr. ing. RADU SEBEŞAN			
2.4 Year of study	II	2.5 Semester	4	2.6 Type of the evaluation	EX.	2.7 Subject regime	FD

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 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					48 hours
Study using the manual, course support, bibliography and handwritten notes					15
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					15
Tutorials					-
Examinations					8
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	(Conditions)
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	video projector presentation
5.2.for the development of the academic seminary/laboratory/project	The existence of the apparatus and equipment necessary for the development in optimal conditions of the works provided in the discipline file. Providing students with the laboratory guide in printed or electronic format.
6. Specific skills acquired	

Professional skills	▪ **C4. Design of electrical systems and their components** - Adequate description of the basic concepts and principles of measurement techniques and data acquisition specific to electrical engineering. - Explaining the means and methods of measurement, as well as the operation of instruments, devices and installations for measuring various technical quantities. - Application of the basic principles of measurement technique and data acquisition for determining electrical and non-electrical quantities in electromechanical systems. - Appropriate use of measuring devices and data acquisition systems for performance evaluation and monitoring of electromechanical systems. - Design of electromechanical installations including measuring devices and digital data acquisition systems. ▪ **C6. Diagnosis, troubleshooting and maintenance of electrical systems and components.** - Defining the basic concepts regarding the operation and maintenance of electromechanical systems. - Identification and selection of components for operation, maintenance and integration in electromechanical systems. - Commissioning, operation test, fault analysis and troubleshooting of electromechanical systems. - The use of methods and technical means to increase the reliability of electromechanical systems. - Elaboration of maintenance and repair plans for electromechanical installations.
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 is taught to second year *Electrical Systems* students. The course addresses notions that will allow future graduates to have a rich background on the use of techniques for measuring electrical and non-electrical quantities and data acquisition systems in electromechanical systems.
7.2 Specific objectives	▪ Explaining and interpreting the phenomena presented in the field and specialty disciplines, using the basic knowledge of mathematics, physics, chemistry ▪ Application of general scientific rules and methods for solving problems specific to electrical engineering ▪ Explanation and interpretation of the operating modes of static, electromechanical converters, ▪ of electrical and electromechanical equipment ▪ Identification of electromechanical systems according to their composition mathematical modeling, as well as their kinematic and dynamic description ▪ Adequate description of the basic concepts and principles of electrical engineering measurement and data acquisition techniques ▪ Explanation of the means and methods of measurement, as well as the operation of instruments, devices and installations for measuring various technical quantities ▪ Application of the basic principles of measurement technique and data acquisition for determining electrical and non-electrical quantities in electromechanical systems. ▪ Appropriate use of measuring devices and data acquisition systems for performance evaluation and monitoring of electromechanical systems. ▪ Design of electromechanical installations including measuring devices and digital data acquisition systems. ▪ Developing a positive attitude towards the activities of assimilating new professional knowledge and information, cultivating and promoting a scientific environment focused on values, forming a positive and responsible professional behavior.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Chapter VIII MEASUREMENT OF ELECTRIC CURRENT AND VOLTAGE 8.1. Current measurement. 8.2. Methods and means of measuring electrical voltage.	Interactive lecture; exposure; video projector presentation	6 hours
Chapter IX ELECTRICAL POWER MEASUREMENT 10.1. Introduction. 10.2. Power measurement in c. c. and c.a. single phase with	Interactive lecture; exposure; video projector presentation	4 hours

electrodynamic wattmeter. 10.3. Active power measurement in polyphase circuits. 10.4. Reactive power measurement.		
Chapter X MEASUREMENT OF ELECTRICAL ENERGY 11.1. Generalities. 11.2. Measurement of active energy in single-phase alternating current circuits. 11.3. Single phase induction meter. 11.4. Electronic meters for measuring energy.	Interactive lecture; exposure; video projector presentation	2 hours
Chapter XI MEASUREMENT OF ELECTRICAL ENERGY 11.1. Generalities. 11.2. Measurement of active energy in single-phase alternating current circuits. 11.3. Single phase induction meter. 11.4. Electronic meters for measuring energy.	Interactive lecture; exposure; video projector presentation	2 hours
Chapter XII ARCHITECTURE OF ANALOG DATA ACQUISITION AND GENERATION SYSTEMS [1] 12.1. Generalities. 12.2. Data acquisition systems (DAS). 12.3. Data generation systems (DGS). 12.4. Interface techniques.	Interactive lecture; exposure; video projector presentation	4 hours
Chapter XIII. ELECTRIC TRANSDUCERS 13.1. General considerations; 13.2. Resistive transducers; 13.3. Capacitive transducers; 13.4. Inductive transducers; 13.5. Induction transducers; 13.6. Thermoelectric transducers; 13.7. Galvanomagnetic transducers; 13.8. Photoelectric transducers; 13.9. Piezoelectric transducers.	Interactive lecture; exposure; video projector presentation	6 hours
Chapter XIV. CATHODIC OSCILLOSCOPE 14.1. Overview. 14.2. Real-time oscilloscope. 14.3. Special oscilloscopes.	Interactive lecture; exposure; video projector presentation	4 hours

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1. Gordan M., - Măsurări electrice în electrotehnică, Ed. Universităţii din Oradea, 2003.
2. Gordan M., - Măsurări electrice şi sisteme de măsurare, Ed. Universităţii din Oradea, 2001.
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6. Ignea, A, Stoiciu, D., *Măsurări electronice, senzori si traductoare*, Editura Politehnica, Timisoara, 2007
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13. Gordan M., Tomşe M., - Măsurări în energetică - Îndrumător de laborator, Lito. Univ. din Oradea, 1999.
14. Gordan M., Tomşe M., - Măsurări electrice şi electronice - Îndrumător de laborator, Lito Univ. din Oradea, 1997.

8.2 Academic seminar	Teaching methods	No. of hours/ Observations
8.3 Academic laboratory		
1. Presentation of the content and requirements required for the proper conduct of laboratory work.	Practical application. Discussions	2 hours
2. Power measurement in c.c. circuits.	Practical application. Discussions	2 hours
3. Measurement of active power and determination of consumer	Practical application. Discussions	2 hours

characteristics in single-phase alternating current circuits. Measurement of active and reactive power in three-phase circuits.		
4. Active energy measurement. Checking single-phase induction meters.	Practical application. Discussions	2 hours
5. Study of light emitting diodes. LED displays.	Practical application. Discussions	2 hours
6. Study of liquid crystal displays.	Practical application. Discussions	2 hours
7. Analog to digital converter with dual integration.	Practical application. Discussions	2 hours
8. The study of galvanomagnetic transducers.	Practical application. Discussions	2 hours
9. Thermoelectric transducers.	Practical application. Discussions	2 hours
10. Introduction to the LabView interface program.	Practical application. Discussions	2 hours
11. Realization of a simple virtual instrument device.	Practical application. Discussions	2 hours
12. Modern measuring systems I. Acquisition boards and virtual instruments.	Practical application. Discussions	2 hours
13. Modern measuring systems II. Acquisitions and data generation.	Practical application. Discussions	2 hours
14. Recovery of laboratories. Ending the school situation.	Practical application. Discussions	2 hours
8.4 Academic project	--	--

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1. Gordan M., - Măsurări electrice în electrotehnică, Ed. Universităţii din Oradea, 2003.
2. Gordan M., - Măsurări electrice şi sisteme de măsurare, Ed. Universităţii din Oradea, 2001.
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15. D. Belege, G. Gasparesc – Măsurări electrice și electronice. Aplicații practice, Ed. Politehnica Timișoara, 2019.

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	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	Written test. Practical test. Online test. Discussions. Argue.	30%

	the laboratory work. Well-documented arguments. Reading the required bibliography.		
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

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 Control Systems Engineering and Management
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		Microcontrollers and programmable logic controllers					
2.2 Holder of the subject		Assoc. prof. GERGELY Eugen-Ioan					
2.3 Holder of the academic seminar/laboratory/project		Assoc. prof. GERGELY Eugen-Ioan					
2.4 Year of study	3	2.5 Semester	5	2.6 Type of the evaluation	Continuous Assessment	2.7 Subject regime	FD - Field 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					33 hours
Study using the manual, course support, bibliography and handwritten notes					12
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					7
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					6
Tutorials					4
Examinations					4
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	-
4.2 related to skills	-

5. Conditions (where applicable)

5.1. for the development of the course	- The course room has to be provided with a video-projector - The course can be carried out face to face or online
5.2.for the development of the academic	- The laboratory facility has to be provided with the necessary equipments - Students presence to all laboratory hours is compulsory

seminary/laboratory/project	- Students must have summarized the current laboratory work - Maximum 2 laboratory works (30%) can be recovered during the semester - A participation below 70% at the laboratory works leads to the restoration of the subject - The laboratory can be carried out face to face or online

6. Specific skills acquired	
Professional skills	C3. Operation with fundamental concepts in electrical engineering.
Transversal skills	CT1. Identifying the objectives to be achieved, the available resources, the conditions for their completion, the working stages, working hours, deadlines and related risks

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

7.1 The general objective of the subject	▪ To create the skills necessary for the design and use of control systems implemented with microcntrollers and programmable logic controllers (PLCs)
7.2 Specific objectives	▪ Students acquaintance with the architecture of the microcontrollers and PLCs ▪ Acquirement of basic knowledge regarding the programming languages, internal bit memories, timers and counters, programming techniques ▪ Highlighting the features of analog interfacing and of the communication in distributed systems ▪ Acquirement of the techniques necessary for human-machine interfacing and practical aspects

8. Contents*

8.1 Course	Teaching methods face to face or online	No. of hours/ Observations
1. Introductory aspects. Families of microcontrollers	interactive presentation	2 hours
2. The architecture of the central processing unit of microcontrollers	interactive presentation	2 hours
3. Input/ouptput ports. Timers and counters. Interfaces	interactive presentation	4 hours
4. The computing systems and the industrial control	interactive presentation	2 hours
5. The structure of the PLCs	interactive presentation	4 hours
6. Programming languages	interactive presentation	4 hours
7. Special functions	interactive presentation	2 hours
8. Programming techniques	interactive presentation	4 hours
9. Analog signals	interactive presentation	2 hours
10. Human-machine interface	interactive presentation	2 hours

Bibliography

1. E. Gergely, Microcontrolere și automate programabile, Note de curs, format electronic, 2021.
2. E. Gergely, Helga Silaghi, V. Spoială, L. Coroiu, Z. Nagy, Automate programabile. Operare, programare, aplicaţii, Editura Universităţii din Oradea, Oradea, ISBN 978-973-759-940-7, 2009.

3. J.A. Rehg and G.J. Sartori, Programmable Logic Controllers (2nd Edition), Prentice Hall, 2 edition, 2008.J.A. Rehg and G.J. Sartori, Programmable Logic Controllers (2nd Edition), Prentice Hall, 2 edition, 2008.		
8.2 Academic laboratory	Teaching methods face to face or online	No. of hours/ Observations
1. Labor protection. Presentation of laboratory works. General presentation of the PLC.	Laboratory work summary and practical demonstrations using specific equipments	2 hours
2. The PLC instruction set	Laboratory work summary and practical demonstrations using specific equipments	2 hours
3. Base racks and discrete I/O modules	Laboratory work summary and practical demonstrations using specific equipments	2 hours
4. Timers and counters	Laboratory work summary and practical demonstrations using specific equipments	2 hours
5. Analog input modules	Laboratory work summary and practical demonstrations using specific equipments	2 hours
6. Analog output modules	Laboratory work summary and practical demonstrations using specific equipments	2 hours
7. PLC stage programming	Laboratory work summary and practical demonstrations using specific equipments	2 hours
Bibliography 1. Gergely E.I., Automate programabile. Aplicatii, 92 pag., Editura Universitatii din Oradea, CD-ROM EDITION ISBN: 978-606-10-1474-3, 2014 2. Gavriş M., Gergely E.I., Conducerea proceselor cu automate programabile, Editura Mediamira Cluj-Napoca, 2003		

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 The evaluation can be made face to face or online	10.3 Percent from the final mark
10.4 Course	Minimum required	Written examination	66,66%

	conditions for passing the exam (mark 5): in accordance with the minimum performance standard - For mark 10: - thorough knowledge regarding the architecture of the microcontrollers and of the PLCs - thorough knowledge regarding the programming of the PLCs - the ability to synthesize hardware and software requirements of the applications upon the microcontrollers and of the PLCs - the ability to implement the human-machine interface		
10.6 Laboratory	Minimum required conditions for passing the examination (grade 5): in accordance with the minimum performance standard - For mark 10: - thorough knowledge regarding the configuration of modular PLCs - thorough knowledge regarding the addresing of I/O and memory variables - the ability to design PLC programs in all programming languages - thorough knowledge regarding the on-line communication with the PLC - thorough knowledge regarding the processing of analog signals	knowledge assessment test	33,33%
10.8 Minimum performance standard: Course: - knowledges regarding the architecture of the microcontrollers and of the PLCs - knowledges regarding the programming languages - knowledges regarding timers, counters, internal memories			

Laboratory:

- knowledges regarding the PLC configuration
- knowledges regarding the PLC addressing
- the ability to write programs in Ladder Diagram
- knowledges regarding the programs documenting
- knowledges regarding the design of the wiring diagrams

Completion date:
31.08.2022

Date of endorsement in the Department of Control Systems Engineering and Management:
12.09.2022

Date of endorsement in the Department of Electrical Engineering:
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. Datarelated to thesubject

2.1 Name of the subject		**SIGNALS PROCESSING**					
2.2 Holder of the subject		Professor eng.PhD CORNELIA EMILIA GORDAN					
2.3 Holder of the academic seminar/laboratory/project		Lecturer eng.PhDROMULUS REIZ					
2.4 Year of study	III	2.5 Semester	6	2.6 Type of the evaluation	VP.	2.7 Subject regime	I

(I) Imposed (O) Optional

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 laboratory	1
3.4 Total of hours from the curriculum	42	of which: 3.5 course	28	3.6 laboratory	14

Distribution of time	33hours
Study using the manual, course support, references and handwritten notes	12
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	7
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	7
Tutorials	-
Examinations	7
Other activities.	-

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

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, laptop, smart board
5.2.for the development of the academic laboratory	The existence of the apparatus and equipment necessary for the development in optimal conditions of the works provided in the discipline file. Providing students with the laboratory guide in printed or electronic format.

6. Specific skills acquired	
Professional skills	▪ **C3. Use of fundamental knowledgeinelectrotechnics.** - Assessing the quality and functional performance of electrical systems by specific methods. - Design of components of a low complexity electrical system.
Trans-versal 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 is taught to third year Electrical Systems students.The course addresses notions that will allow future graduates to have a wealth of information on the use of some fundamental elements concerning numerical signals characterization in time and frequency domains and to use specific methods and instruments to analyze numerical (discrete) signals, periodical and aperiodical.
7.2 Specific objectives	▪ Use of some dedicated software (Matlab) for numerical signals analyze and process. ▪ Ability to elaborate software programms in object-oriented software languages, based on specific demands and offering solutions for the results analyze, process ad interpretation. ▪ Developing a positive attitude towards the activities of assimilating new professional knowledge and information, cultivating and promoting a scientific environment focused on values, forming a positive and responsible professional behavior.

8. Contents*

8.1 **Course** (on site/ on-line)	Teaching methods	No. of hours/ Observations
Generalities – Continuous and discrete time signals. Concepts and classification.	Interactive lecture;exposure;video projector presentation	1 hour
Continuous time Fourier Series. Properties. Continuous periodical signals energy.	Interactive lecture;exposure;video projector presentation	2 hours
Continuous time Fourier Transform. Properties. Continuous non-periodical signals energy.	Interactive lecture;exposure;video projector presentation	2 hours
Continuous time periodical and non-periodical signals convolution.	Interactive lecture;exposure;video projector presentation	2 hours
Laplace Transform. Properties.	Interactive lecture;exposure;video projector presentation	2 hours
Harmonic carrier modulated signals.	Interactive lecture;exposure;video projector presentation	2 hours
Sampledsignalsdefinition. Samplingtheorem	Interactive lecture;exposure;video projector presentation	2 hours
Z Transform. Properties. Discrete time defined systems.Circuit function.	Interactive lecture;exposure;video projector presentation	2 hours
Discrete time Fourier Series. Properties. Discrete time Fourier Transform. Properties.	Interactive lecture;exposure;video projector presentation	2 hours
Impulsecarriermodulatedsignals - (amplitude, width, frequency, position).	Interactive lecture;exposure;video projector presentation	2 hours
Filters. Generalities	Interactive lecture;exposure;video projector presentation	1 hour
Passive filters (k constant, m derivate, bridge)	Interactive lecture;exposure;video projector presentation	4 hours
Active filters (simple and multiple reaction)	Interactive lecture;exposure;video projector presentation	4 hours
Generalities – Continuous and discrete time signals. Concepts and classification.	Interactive lecture;exposure;video projector presentation	1 hour

References

1. **Semnale, circuite şi sisteme**, *C. Gordan*, Editura Universităţii din Oradea 2000.
2. **Semnale şi Sisteme**, *Al.Isar, C.Gordan., I.Naforniţă*, Editura Orizonturi StudenţeştiTimişoara 2006, ISBN 973-638-324-9
3. **Prelucrarea numerică a semnalelor,***C.Gordan*:, Editura Universităţii din Oradea 2003, ISBN 973-613-324-9.
4. **Analiza şi sinteza semnalelor**, *C.Gordan, R.Reiz,* Editura Universităţii din Oradea 2008, ISBN 978-973-759-642-0.

8.2 Academic seminar/laboratory/project (on site/ on-line)	Teaching methods	No. of hours/ Observations
1. Periodical/non-periodical continuous time signals analyze in time and frequency domains	Practicalapplication. Discussions	2 hours
2. Harmonic carrier modulated signals in amplitude and frequency	Practicalapplication. Discussions	2 hours
3. Sampled signals analyze in time and frequency domains	Practicalapplication. Discussions	2 hours
4. Amplitude and width impulse modulation	Practicalapplication. Discussions	2 hours
5. Passive filters (k constant, m derivate, bridge)	Practicalapplication. Discussions	2 hours
6. Active filters (simple and multiple reaction)	Practicalapplication. Discussions	2 hours
7. Recovery of laboratories.Ending the school situation.	Practicalapplication. Discussions	2 hours

References

1. **Semnale, circuite şi sisteme**, *C. Gordan*, Editura Universităţii din Oradea 2000.
2. **Semnale şi Sisteme**, *Al.Isar, C.Gordan., I.Naforniţă*, Editura Orizonturi StudenţeştiTimişoara 2006, ISBN 973-638-324-

9
3. **Prelucrarea numerică a semnalelor,***C.Gordan*:, Editura Universităţii din Oradea 2003, ISBN 973-613-324-9.
4. **Analiza şi sinteza semnalelor**, *C.Gordan, R.Reiz,* Editura Universităţii din Oradea 2008, ISBN 978-973-759-642-0.
5. **Semnale şi sisteme I**, *C.Gordan, R.Reiz,*Indrumător de lucrări de laborator, Edit.Univ.Oradea 2017

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 license program. The content of the discipline is found in the curriculum of the study program ElectricalSystems and other university centers in Romania that have accredited this specialization, so knowledge of the basics is a stringent requirement of employers in the field.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	Active participation in the developed discussions.Documented arguments.Providing relevant solutions to the issues under debate.Knowledge of the basics on all topics covered.	Oral or written evaluation, online or on-site.Discussions.Argue.	60 %
10. Seminar	-	-	-
10.6 Laboratory	Written test marked with a minimum of 5. Practical realization of all the requirements imposed by all laboratory works. Well-documented arguments. Reading the required bibliography.	Written test. Practical test. Discussions. Online or on-site argumentation	40%
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: 09.09.2022

Date of endorsement in the department: 19.09.2022

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		**Superconductors and superconducting systems**					
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	Specialized discipline (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					70 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					10
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					10
Tutorials					4
Examinations					6
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 electromagnetic field theory, electrical circuit theory, analog and digital electronics, chemistry, physics, mathematics
4.2 related to skills	Knowledge of symbols, electrical diagrams, use of measuring devices, properties of materials

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 lab can be conducted face-to-face or online. Superconducting Laboratory Kits (CSI Supraconductors) with work points for each student, access to software that allows the drawing of diagrams for the experimental data obtained and comparisons between different superconducting disks and magnets, internet access / -

6. Specific skills acquired

Professional skills	• C3. Operation with fundamental concepts in electrical engineering; • C4. Design of electrical systems and their components;

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;

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 "Superconductors and superconducting systems" aims to present the characteristics of superconducting materials and the electromagnetic phenomena that occur in them and is addressed to students in the engineering department, profile ELECTRICAL SYSTEMS. Being a specialized discipline, its object is the presentation in a unitary framework of the phenomena and characteristics of superconductivity as well as of some applications in this field, necessary for the knowledge of the way of their design and application. Carrying out laboratory work provides the formation of skills, highlights the phenomena and methods of approaching these phenomena.
7.2 Specific objectives	• The laboratory is designed to provide future engineers with practical skills in superconductors and superconducting systems. The content of the laboratories presented is based on the need to deepen and practical explanation of the problems presented in the course. Students have the opportunity to identify superconducting materials and different types of magnets, familiarizing themselves with modern means of measuring temperature while conducting experiments. They will understand the complexity, usefulness and maintenance of these facilities and will treat them as such. Knowledge is useful in developing skills in addressing the specific issues facing a specialist in this field;

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course 1. – The phenomenon of superconductivity • Transition temperature in superconducting state; • The effect of canceling resistivity; • Electrical circuit analysis without electrical resistance; • Resistivity in alternating current circuits.	Laptop, video projector, IQ Board, free speech	2
Course 2 – Perfect diamagnetism • The magnetic properties of a perfect conductor; • The magnetic behavior of a superconductor; • Surface currents; • Depth of penetration.	Laptop, video projector, IQ Board, free speech	2
Course 3 – Electrodynamic issues applied to superconducting elements • Effects of the disappearance of electrical resistivity in superconductors; • London's theory.	Laptop, video projector, IQ Board, free speech	2
Course 4 – The influence of the critical magnetic field on the superconducting state • Free energy of the superconductor;	Laptop, video projector, IQ Board, free speech	2

• Variation of the critical field as a function of temperature; • Magnetization of superconductors; • Measurement of magnetic properties.		
Course 5 - Thermodynamic analysis of the transition from the normal state to the superconducting state • Entropy of the superconducting state; • Specific heat and latent heat; • Mechanical effects; • Thermal conductivity in the superconducting state • Thermoelectric effects occurring in superconductors	Laptop, video projector, IQ Board, free speech	2
Course 6 – Intermediate condition analysis • Demagnetization factors Magnetic transitions for $n \neq 0$; • The separation zone between the normal state and the superconducting state; • Magnetic properties of the intermediate state; • Gibbs free energy in the intermediate state; • Experimental observation of the intermediate state; • The absolute value of the domain size; the role of surface energy; • Resumption of electrical resistance by applying a transverse magnetic field; • The concept of coherence and the origin of the surface current.	Laptop, video projector, IQ Board, free speech	2
Course 7 – How currents move in superconductors • Critical currents; • Thermal propagation; • Intermediate state induced by a current.	Laptop, video projector, IQ Board, free speech	2
Course 8 – Properties of small superconductors • Effect of penetration of critical magnetic field into superconductors; • The critical field of parallel planes; • The case of complex geometries; • The limits of the London theory; • Ginzburg-Landau theory; • Marginal effects; • Perpendicular magnetic field transition; • Critical currents related to thin samples; • Measurement of critical currents;	Laptop, video projector, IQ Board, free speech	2
Course 9 – The use of microscopic energy in the analysis of the superconductivity phenomenon • Forbidden tape; • Bardeen-Cooper-Schrieffer theory.	Laptop, video projector, IQ Board, free speech	2
Course 10 – Tunneling and no-go lane • The tunneling process; • Energy level diagram for a superconductor; • Tunneling between an ordinary metal and a superconductor;	Laptop, video projector, IQ Board, free speech	2

• Tunneling between two identical superconductors; • Semiconductor analysis; • Other types of tunnels; • Practical issues.		
Course 11 – Coherence of the electron pair wave. Quantum interference • Electron pair waves; • The flow; • Weak connections; • Quantum Interference Superconducting Device (SQUID).	Laptop, video projector, IQ Board, free speech	2
Course 12 – Mixed state of type II superconductors • Negative surface energy; • Mixed state; • Constant Landau – Ginzburg applied to metals and alloys; • Lower and upper critical fields; • Magnetization of type II superconductors; • Specific heat of type II superconductors.	Laptop, video projector, IQ Board, free speech	2
Course 13 – Critical currents of type II superconductors • Critical currents • Transit resistance • Transit flow • Surface superconductivity	Laptop, video projector, IQ Board, free speech	2
Course 14 – The past, present and future of superconductors with high critical temperature in applications History of superconductors with high critical temperature; Predictions of the future of superconductors with high critical temperature; Electronics applications; Energy applications; Applications in electrical engineering; Superconducting magnets used to propel trains on magnetic cushions; Magnetic resonance imaging (MRI); Biomagnetism; Application of superconductivity technology in military technology; Application of superconductivity in cosmonautics; Use of massive superconductors to protect the environment; Other applications in which superconducting magnets are used; Perspectives on the application of superconductivity in industry.	Laptop, video projector, IQ Board, free speech	2
Bibliography 1. Hathazi Francisc – Ioan – Suport curs – în curs de editare; 2. Charles P. Poole, Jr., Horacio A. Farach, Richard J.Creswick, Ruslan Prozorov – Superconductivity – Academic Press in print of Elsevier, second edition, 2007; 3. V.D. Şoproni, Supraconductori şi sisteme supraconductoare, Editura Universităţii din Oradea, 2003; 4. The 1998 Applied Superconductivity Conference, Desert Springs Resort, Palm Desert, California, September 13-18, 1998;		

5. C. Gheorghe, Îndreptar de metale, Editura Tehnică Bucureşti, 1997;
6. A.V. Novac, Modele conceptuale în supraconductibilitate, Editura Tehnică, 1995;
7. R. Baker, J.C. Thompson, A Simple Demonstration of High T Superconductive Powder. *Journal of Chemical Education*, volume 64, October 1987;
8. S. G. Davis, The superconductive computer in you future.*Datamation*,Volume 33:74, August 15, 1987;
9. Superconduction possible at room temperatures? Radio-Electronics, Volume 58:5,July 1987;

8.2 Seminar	Teaching methods	No. of hours/ Observations

8.3 Laboratory	Teaching methods	No. of hours/ Observations
1. Safety regulations in the operation of superconducting equipment. The disappearance of superconductivity in the magnetic field. Intermediate condition.	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	1
2. Levitation, demonstration of the Meissner effect.	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	4
3. Measurement of critical temperatures in superconductors	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	3
4. Permanent magnets, the effect on superconductors	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	3
5. Toroidal currents, high-strength permanent magnets.	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	2
6. Final evaluation test.	Free speech, use of PC components laboratory kit; use of computer network from the laboratory equipment	1

Bibliography

1. Hathazi Francisc – Ioan – Notițe de Laborator – în curs de apariție;
2. Charles P. Poole, Jr., Horacio A. Farach, Richard J.Creswick, Ruslan Prozorov – Superconductivity – Academic Press in print of Elsevier, second edition, 2007;
3. The 1998 Applied Superconductivity Conference, Desert Springs Resort, Palm Desert, California, September 13-18, 1998;
4. A.V. Novac, Modele conceptuale în supraconductibilitate, Editura Tehnică, 1995;
5. Superconduction possible at room temperatures? Radio-Electronics, Volume 58:5,July 1987.
6. R. Baker, J.C. Thompson, A Simple Demonstration of High T Superconductive Powder. *Journal of Chemical Education*, volume 64, October 1987.

8.4 Project	Teaching methods	No. of hours/ Observations
---	-	

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 license program. The content of the discipline is found in the curriculum of the ELECTRICAL SYSTEMS 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. 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	Oral examination of students The evaluation can be done face-to-face or online	75 %
10.5 Seminar	---	---	---
10.6 Laboratory	Final evaluation test	Laboratory written evaluation. All laboratory work must be performed - subject to examination. Only one remaining lab recovery is allowed. The evaluation can be done face-to-face or online	25%
10.7 Project	---		---
10.8 Minimum performance standard: • Carrying out the work under the coordination of a teacher, in order to solve specific problems in the field of superconductors with the correct evaluation of the workload, resources available for the necessary time to complete the risks, under the application of occupational safety and health rules.			

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	Electrical Systems / Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject	**SIMULATION OF ELECTRICAL CIRCUITS**						
2.2 Holder of the subject	**Associate professor dr.eng. MOLNAR CARMEN OTILIA**						
2.3 Holder of the academic seminar / laboratory / project	**Associate professor dr.eng. MOLNAR CARMEN OTILIA**						
2.4 Year of study	**III**	2.5 Semester	**6**	2.6 Type of the evaluation	**Ex**	2.7 Subject regime	**S**

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 laboratory	**2**
3.4 Total of hours from the curriculum	**70**	Of which: 3.5 course	**28**	3.6 academic laboratory	**28/14**
Distribution of time					**55**
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					**5**
Examinations					**8**
Other activities.					-

3.7 Total of hours for individual study	**55**
3.9 Total of hours per semester	**125**
3.10 Number of credits	**5**

4. Pre-requisites (where applicable)

4.1 related to the curriculum	Calculation methods for engineers, Theory of electrical circuits I-II, Numerical methods
4.2 related to skills	Adequate application of basic knowledge of electrical circuit theory and computer use

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 carried out face to face or online; - The equipment related to the laboratory class; - Preparation of the report (synthesis material); - Carrying out all laboratory works; - The laboratory can be carried out face to face or online; - A maximum of one laboratory work can be recovered; - Frequency during laboratory hours: less than 70% leads to the restoration of the discipline.

6. Specific skills acquired	
Professional skills	- C3. Use of fundamental knowledge of electrotechnics - C4. Design of electrical systems and their components

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 "Simulation Algorithms in Electrical Engineering" is addressed to students in the Electrical Systems study program. ▪ It is a specialized discipline that presents some theoretical knowledge in the field of electrical circuits as well as their specific phenomena in terms of applications in technology.
7.2 Specific objectives	• Acquiring information and knowledge: numerical modelling of electrical circuits and electrical circuits role in the current modern industry; construction, behaviour, structure and operation of electrical circuits in a complex system; organization and maintenance of systems which include electrical circuits; • The laboratory works acquaint the students with the practical aspects regarding the operation of the electrical circuits, with the practical aspects regarding the establishment of specific regimes and ensure the understanding of the basic problems regarding these circuits.

8. Contents*

8.1 Course	Teaching methods	No. of hours
1. Introduction. The purpose of this course. The purpose of computer simulation of electrical circuits. Computer simulation algorithms Evolution of electrical circuit simulation and analysis programs. Simulation algorithms	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
Electrical circuits, models of reality. The composition of an electrical circuit Modeling of components in real circuits.		2
Simulation of an electrical circuit Solving algorithms. Circuit types / Mathematical problems	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
2. Analysis of linear resistive circuits in direct current The problem formulation. Terms of good form Methods for solving systematic Method nodal classical / modified		2
3. Analysis of electrical circuits in AC The problem formulation. Terms of good form Similarity with direct current circuits Complex representation of the circuit elements Solving algorithms Circuit simulators	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
4. PSPICE simulator Introduction. Topological conditions. PSpice simulator architecture. Types of analysis		2
Formulation of circuit equations. Algorithms for solving circuit equations. Circuit element symbols. Description of passive circuit elements (Resistor, Capacitor, Coil)	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
Description of semiconductor circuit devices (Diode, Thyristor, Transistor). Description of voltage sources, and current sources. Description of command lines. Conventions for numerical values and expressions. Presentation of the simulation results.		2
5. Analysis of direct current circuits with PSpice Analysis purely linear resistive circuits. Presentation of the peculiarities of direct current circuits Determination of the static operating point. Presentation of the simulation results.	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
Determination of DC transfer characteristic Presentation of the simulation results.		2

Determination small signal transfer function for DC circuits. Presentation of the simulation results.		
6. AC circuit analysis PSpice Presentation of the peculiarities of alternating current circuits Analysis of alternating current circuits with frequency sweeps. Presentation of the simulation results.		2
7. Time domain analysis with PSpice Transient regime analysis. Presentation of the simulation results.	Projector. Intercalated student contributions are requested on subject-specific topics. Some courses take place by teaching subjects and student debates.	2
Fourier analysis for linear circuits. Presentation of the simulation results.		2
Concluding the course with a recapitulation of the studied theoretical aspects and preparing the details regarding the development of the exam		2

Bibliography

1. Teodor Leuca, **Carmen Molnar** – Circuite electrice. Aplicatii utilizând tehnici informatice. Editura Universităţii din Oradea, pag.452 Oradea, 2002.
2. Teodor Leuca – Circuite electrice. Editura Mediamira, Cluj-Napoca, 1996.
3. **Carmen O. Molnar** – Algoritmi de simulare in ingineria electrică. Note de curs, Format electronic, Oradea 2018.
4. Teodor Leuca, **Carmen Otilia Molnar,** Mircea Nicolae ARION – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014, pag. 472, ISBN 978-606-10-1284-8.
5. Tudor Marian – Spice, seria Calculatoare personale, Editura Teora, Bucuresti, 1996
6. Lucia Dumitriu, Mihai Iordache – Simularea numerică a circuitelor analogice cu programul SPICE, Editura MatrixRom, Bucuresti, 2006
7. Gabriela Ciuprina - Algoritmi numerici pentru calcule stiintifice în ingineria electrica, Editura MatrixROM, 2013, pag. 121-141.
8. Teodor Leuca, **Carmen O. Molnar**, Mircea N. Arion – Elemente de bazele electrotehnicii. Aplicatii utilizând tehnici informatice. Editura Universităţii din Oradea, pag.471 Oradea, 2014
9. **Carmen O. Molnar** – Simularea circuitelor electrice. Suport de curs, Format electronic, Oradea 2021

8.2 Laboratory	Teaching methods	No. of hours
Laboratory presentation. Introducing and familiarizing students with the PSpice simulation program	- Presentation of the paper (synthesis material); - Test on the theoretical knowledge acquired during the laboratory; - Interpretation of the results.	2
2. Introduction to the SPICE Simulator		2
3. PSpice simulator architecture		2
Description of DC circuit elements (Resistor, Current Sources and Voltage Sources). Discussions		2
Analysis of purely resistive linear direct current circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions		2
6. Analysis of purely resistive linear direct current circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions		2
7. Analysis of nonlinear direct current circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions	- Presentation of the paper (synthesis material); - Test on the theoretical knowledge acquired during the laboratory; - Interpretation of the results.	2
8. Description of the AC circuit elements (Resistor, Capacitor, Coil, Voltage Sources and Current Sources). Discussions		2
9. Analysis of alternating current circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions		2
10. Analysis of alternating current circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions	- Presentation of the paper (synthesis material); - Test on the theoretical knowledge acquired during the laboratory; - Interpretation of the results.	2
11. Analysis of three-phase circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions		2
12. Analysis of transient circuits. Comparison of the results obtained by theoretical solution with those obtained with the Spice program. Discussions		2
13. Analysis of some transient circuits. Discussions	- presenting and handing out the laboratory papers; - the recovery of one missed laboratory is allowed.	2
14. Verification of the acquired knowledge and conclusion of the situation at the laboratory. Recovery of laboratory works		2

8.3 Project	Teaching methods	No. of hours
1. Project topic. Original data. Bibliography	Projector. Computers, Intercalated with student contributions on subject-specific topics. On-site or on-line.	2
2. Defining the initial sizes. Establishing the simulation conditions		2
3. Solving electrical circuits established by classical methods		2
4. Simulation of the established electrical circuits, with dedicated software		2
5. Simulation of the established electrical circuits, with dedicated software		2
6. Verification and comparison of the obtained results. Discussions		2
7. Completion of the project. Verification and delivery		2

Bibliography

1. Teodor Leuca, **Carmen Molnar** – Circuite electrice. Aplicatii utilizând tehnici informatice. Editura Universităţii din Oradea, pag.452 Oradea, 2002.
2. 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
3. Teodor Leuca – Circuite electrice. Editura Mediamira, Cluj-Napoca, 1996.
4. **Carmen O. Molnar** – Algoritmi de simulare in ingineria electrică. Note de curs, Format electronic,Oradea 2018.
5. Teodor Leuca, **Carmen Otilia Molnar,** Mircea Nicolae ARION – Elemente de bazele electrotehnicii. Aplicaţii utilizând tehnici informatice. Editura Universităţii din Oradea, 2014, pag. 472, ISBN 978-606-10-1284-8.
6. Tudor Marian – Spice, seria Calculatoare personale, Editura Teora, Bucuresti, 1996
7. Lucia Dumitriu, Mihai Iordache – Simularea numerică a circuitelor analogice cu programul SPICE, Editura MatrixRom, Bucuresti, 2006
8. Iordache M., Perpelea M. – Analiza asistată de calculator a circuitelor electrice si electronice neliniare complexe de mari dimensiuni, E.D.P Bucuresti, 1995
9. Iordache M., Dumitriu Lucia – Culegere de probleme, Circuite electrice neliniare, Problme, Algoritmi si programe de calcul, Bucuresti, 1996
10. Leuca, T., M. Silaghi, Laura Coroiu, **Carmen Molnar** - Electrotehnică, Probleme, vol.V, Litografia Universităţii din Oradea, 1996
11. **Carmen O. Molnar** – Simularea circuitelor electrice. Note de curs, Format electronic,Oradea 2021.

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 the Electrical Systems specialization and other university centers that have accredited these specializations, and knowing the types of electrical circuits and how they can be modeled and simulated numerically for a correct design is a stringent requirement. 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.	Students receive 3 topics to solve, one from each level. Exam written in the exam room or online with internet connection. The final grade also includes the grades from the laboratory and project activity.	40 %
10.5 Laboratory	For note 5, Solving a direct current circuit (pure resistive) For note 10, solving any studied electrical circuit and detailed knowledge of the specific features of each regime.	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. Project	For note 5, Classical resolution of the received circuit. For note 10, solving the electrical circuit required by both methods and detailed	Students will teach the project with the obtained results, both in print and in electronic form. Each student receives a note	30%

	knowledge of its specific features.	for the project activity during the semester and for the file with the practical application.	

10.6 Minimum performance standard:
Basic knowledge of the construction and operation of electrical circuits
Explaining and interpreting the operating regimes, the phenomena that appear in the operation of the studied electrical circuits
Proper use of the software and interpretation of the results obtained
Modeling and simulation of an electrical circuit, performing tests for an electrical circuit of medium complexity; analysis and interpretation of results

Completion date:
29 Aug. 2022

Conf.univ.dr.ing. Carmen Molnar **Conf.univ.dr.ing. Carmen Molnar**

Date of endorsement in the department:
1 Sept. 2022

Prof.dr.ing.inf.habil. Francisc - Ioan HATHAZI

Date of endorsement in the Faculty Board:

23 Sept. 2022

Prof.univ.dr.ing.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	Electrical Systems / Bachelor of Engineering

2. Datarelated to thesubject

2.1 Name of the subject	ELECTRICAL MACHINES - PROJECT						
2.2 Holder of the subject	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.3 Holder of the academic seminar/laboratory/project	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.4 Year of study	**3**	2.5 Semester	**5**	2.6 Type of the evaluation	Vp - Continuous Assessment	2.7 Subject regime	Specialized Discipline **DD**

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					36 hours
Study using the manual, course support, bibliography and handwritten notes					4
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					18
Tutorials					
Examinations					4
Other activities.					

3.7 Total of hours for individual study	**36**
3.9 Total of hours per semester	**50**
3.10 Number of credits	2

4. Pre-requisites(where applicable)

4.1 related to the curriculum	(Conditions) - ELECTRICAL MACHINES
4.2 related to skills	- Proper application of basic knowledge of electric machines

5. Conditions (where applicable)

5.1. for the development of the course	
5.2.for the development of the academic seminary/laboratory/project	The project allows the acquisition of design principles and skills, having at their disposal specific stands, with modules related to practical works, motors, transformers, oscilloscopes and measuring devices.

6. Specific skills acquired	
Professional skills	- C4. Design of electrical systems and their components
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	Putting into practice the notions learned in the course "Electric Cars II" in order to apply them in industry applications
7.2 Specific objectives	The project allows the acquisition of principles and skills of design and implementation of systems containing three-phase electrical transformers and their development in order to obtain high performance

8. Contents*

8.4. PROJECT	Teaching methods	No. of hours/ Observations
Three-phase electrical transformer, synchronous machine, DC motor with separate excitation	Video projector, slides in dialogues specific to the stages of the project	2
Calculation of the main parameters		2
Determining the dimensions of the conductors and the window		2
Yield.		2
Checking mechanical stresses		2
Analysis of special regimes.		2
Verification and delivery		2

Bibliography

1. Pantea Mircea - Design of electric cars - Design notes
2. Carmen O. Molnar - Electric cars. Course notes, Oradea 2012.
3. Carmen O. Molnar - Electric cars. Laboratory guide, Oradea 2010, page 212.
4. Carmen O. Molnar - The electrical transformer. Construction, theory, design. University of Oradea Publishing House, 2010, page 211. 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 Electromechanics 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 electric machines and how they work and design 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
10.7 Project	-		100 %
10.8 Minimum performance standard: - Description of the operating principles of transformers and direct current, synchronous and asynchronous electric machines. - Basic knowledge of the construction and operation of electric machines - Explanation and interpretation of operating modes, phenomena that occur in the operation of electric machines, electrical and electromechanical equipment - Proper use of electrical machines and monitoring of electromechanical systems - Design of a three-phase electrical transformer of complexity - Carrying out tests for a low complexity electrical system; data analysis, measurement and interpretation			

Signature of the course holder

Signature of the laboratory project holder

Completion date:
29.08.2022

Ş.l.dr.ing. Pantea Mircea

Ş.l.dr.ing. Pantea Mircea

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building Corp V,
floor 2, room V 213
Postal code 410087, Oradea, Bihor
county, Romania
E-mail: mirceadanutpantea@gmail.com
Discord MirceaPD # 1994

Date of endorsement in the department:
01.09.2022

Signature of the department director
Prof.univ.dr.ing.inf. Francisc - Ioan HATHAZI

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building Corp A, floor 2, room A 206
Postal code 410087, Oradea, Bihor county, Romania
Tel: 0259-408172, E-mail: francisc.hathazi@gmail.com

Signature of the Dean
Prof.univ.dr.ing. Mircea Ioan GORDAN

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building I, Room I003,
Postal code 410087, Oradea, Bihor county, Romania
Tel .: 0259-408204, E-mail: mgordan@uoradea.ro

Date of endorsement in the Faculty Board:
23.09.2022

Signature of the Dean
Prof.univ.dr.ing. Mircea Ioan GORDAN

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building I, Room I003,
Postal code 410087, Oradea, Bihor county, Romania
Tel .: 0259-408204, 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	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				**COMPUTER AIDED DESIGN IN ELECTRICAL ENGINEERING**			
2.2 Holder of the subject				Popa Monica			
2.3 Holder of the academic seminar/laboratory/project				Popa Monica			
2.4 Year of study	III	2.5 Semester	V	2.6 Type of the evaluation	Ex	2.7 Subject regime	I

(I) Imposed; (O) Optional;

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	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	10
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	12
Tutorials	5
Examinations	3
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	Fundamentals of electrotechnics, Numerical methods
4.2 related to skills	Computer operation

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 Computers and software packages Matlab, Flux

6. Specific skills acquired	
Professional skills	**C2** Use of fundamental concepts of computer science and information technology **C4** Design of electrical systems and their components
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	▪ Explanation and interpretation of software packages for design and optimization of representatives electrical sysstems
7.2 Specific objectives	▪ Computer aided design of basic electrical engineering subjects ▪ Interpretation of results obtained with CAD software packages ▪ Explanation of specific techniques for analysis, modeling and simlation of electrical system

8. Contents *

8.1 Course	Teaching methods	No. of hours/ Observations
Basics of Matlab. Applications – Point by point method. Solving differential equation in Matlab.	notes on blackboard, Power Point presentation	2
Computer aided design examples: Circuits in transient regime.	notes on blackboard, Power Point presentation	2
Application – Defining the melting time of a fuse – Method of finite differences.	notes on blackboard, Power Point presentation	2
GUI - Graphical User Interfaces	notes on blackboard, Power Point presentation	2
Equations, differential equations of electromagnetic and thermal field. Electrostatic field model.	notes on blackboard, Power Point presentation	2

Steady-state electrical field model. Magnetostatic field model. Magnetodynamic field model. Differential model of thermal conduction.	notes on blackboard, Power Point presentation	2
Finite element method. Variational formulation. Finite element numerical solution. 1D problem.	notes on blackboard, Power Point presentation	2
FEM in thermal field analysis. Example: Heating evaluation of a liniar conductor in electrocynetic regime. 2D numerical model in finite element for evaluation of AC resistance of a solid conductor.	notes on blackboard, Power Point presentation	2
Partial differential equation toolbox. Electrostatic field model. Modeling of an electromagnet	notes on blackboard, Power Point presentation	2
Applications in PDE toolbox: Numerical model of a capacitive transducer. Numerical model of an inductive proximity transducer.	notes on blackboard, Power Point presentation	2
Software package FLUX. Computer aided design of a DC electromagnet.	notes on blackboard, Power Point presentation	2
Coupling the electromagnetic field regime with transient thermal. Application in FLUX.	notes on blackboard, Power Point presentation	2
Optimization problems solved in Optimization Matlab Toolbox. Examples.	notes on blackboard, Power Point presentation	2
Optimization problems in electrical engineering. Inverse problems. Aplications: coil optimization, transversal flux inductor	notes on blackboard, Power Point presentation	2

Bibliography

1. Monica Popa – Course notes **http://webhost.uoradea.ro/mpopa/**
2. V. Fireteanu, Monica Popa, T. Tudorache – Modele numerice in studiul si conceptia dispozitivelor electrotehnice, Ed. Matrix Rom Bucuresti 2004
3. S.R. Hoole – Computer aided analysis and design of electromagnetic devices – Elesevier, New York, 1989
4. P. Neitaanmaki – Inverse problems and optimal design in electricity and magnetism, Clarendon Press, Oxford 1996
5. P.P/ Silvester, R.L. Ferrari – Finite elements for electrical engineers, Cambridge University Press 1994
6. MATLAB User's Manual
7. Flux User's Manual

8.3 Laboratory	Teaching methods	No. of hours/ Observations
Matlab functions	assisting the students in solving pplications on computer	2
Solving the differential equations	assisting the students in solving pplications on computer	2
Solving the transient regime at a DC motor startup	assisting the students in solving pplications on computer	2
Creating graphical user interfaces	assisting the students in solving pplications on computer	2

Applications in PDE Toolbox	assisting the students in solving pplications on computer	2
Applications in Flux2D	assisting the students in solving pplications on computer	2
Application in Optimization Toolbox	assisting the students in solving pplications on computer	2

Bibliography

1. Monica Popa – Laboratory applications **http://webhost.uoradea.ro/mpopa/**
2. V. Fireteanu, Monica Popa, T. Tudorache – Modele numerice in studiul si conceptia dispozitivelor electrotehnice, Ed. Matrix Rom Bucuresti 2004
3. MATLAB User's Manual
4. Flux Tutorials, Cedrat

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	Ability to solve a CAD application	Oral examination, Application on computer	80%
10.5 Laboratory	Solving the tasks	Activity at laboratory classes	20%
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

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		**Electrical equipments**					
2.2 Holder of the subject		Lecturer dr. ing. Stașac Claudia Olimpia					
2.3 Holder of the academic seminar/laboratory/project		Lecturer dr. ing. Stașac Claudia Olimpia					
2.4 Year of study	3	2.5 Semester	5	2.6 Type of the evaluation	VP-Continuous Assessment	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	the laboratory can be carried out face to face or online - Equipment related to laboratory hours - Preparation of the report, knowledge of the notions

seminary/laboratory/project	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	2

	Laboratory, and 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]. Claudia Staşac- Applications in the study of electrical equipment - under publication
[2] D. Hoble, C. Staşac - Electrical Apparatus and Equipment - 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 subjects must be treated to minimum standards; For grades> 5 all subjects must be treated to standards imposed by the grading scale;	Written examination	75 %
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

Lecturer. dr. ing. STAȘAC CLAUDIA OLIMPIA

Signature of the laboratory owner

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	Electrical Systems / 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	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	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	7
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	18
Tutorials	-
Examinations	5
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	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	▪ **C4.1.** Adequate selection of design methodology and characteristics of components and electrical systems ▪ **C4.5.** Use of appropriate methods to carry out projects specific to electrical systems ▪ **C5.2.** Explanation of techniques and description of modern test and measurement equipment, using basic knowledge in the field ▪ **C5.3**. Application of modern methods for testing, measuring and ensuring electromagnetic compatibility
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 ş.a., *Electric Power Quality* (in Romanian), Technical University Press, Cluj-Napoca, 2012
7. C. Bianchi ş.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 ş.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. Paşca, *Electrical Installations and Electric Power Use. Electrical lighting installations, design guide*, University of Oradea Press, 1998
13. S. Paşca, *Electrical Installations – lecture notes*, (electronic)

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the works and of the electrical installations laboratory		2
2. Protective measures against electric shock, Part I		2
3. Protective measures against electric shock, Part II		2
4. Checking the insulation resistance in electrical installations		2
5. Experimental determination of grounding resistance		2
6. Medium voltage switch. Medium voltage cell and low oil switch		2
7. Ensuring the supplementary power supply to consumers		2
8. Use of current and voltage transformers in electrical installations		2
9. Power factor compensation in industrial electrical installations		2
10. Protection in low voltage electrical installations. Selectivity of protection		2
11. Electrical installations for buildings, Part I		2
12. Electrical installations for buildings, Part II		2
13. Regulations governing the design and execution of electrical installations		2
14. Verification of knowledge and evaluation of activity at laboratory classes		2

Bibliography (selection)

1. D. Comşa, 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. Paşca, *Electrical Installations and Electric Power Use. Electrical lighting installations, design guide*, University of Oradea Press, 1998
9. S. Paşca, *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 ≥ 5, DL ≥ 5	25 %
10.8 Minimum performance standard: - Passing the exam (obtaining the credits) involves: E ≥ 5 and L ≥ 5 - The final grade is calculated as follows: N = 0.75·E + 0.25·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	**Electrical Systems/ Bachelor of Engineering**

2. Data related to the subject

2.1 Name of the subject	**Microwave technique**						
2.2 Holder of the subject	**Prof.Dr.-Ing.Ec. Silaghi Alexandru Marius**						
2.3 Holder of the academic seminar/laboratory/project	**Prof.Dr.-Ing.Ec. Silaghi Alexandru Marius**						
2.4 Year of study	**III**	2.5 Semester	**5**	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	33h
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	8
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	8
Tutorials	2
Examinations	5
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	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., Cepişcă, C.- Inginerie Electrică Modernă, vol. 1, Editura Electra Bucureşti, 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.
8. Silaghi , A.M., Pantea, M.D. - Introducere in Electrotehnica, Editura Risoprint,Cluj-Napoca, 2010, ISBN 978-973-53-0258-0
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	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
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		

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	Questioner on line with 9 subjects,online	80%

	at the course 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.			
E110, tel.:+40 259 408 458 , masilaghi@uoradea.ro, **hhtp://masilaghi.webhost.uoradea.ro**			

Completion date: 29.09.2022

Date of endorsement in the department:01.09.2021

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. Datarelated to thesubject

2.1 Name of the subject	ELECTRICAL MACHINES						
2.2 Holder of the subject	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.3 Holder of the academic seminar/laboratory/project	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.4 Year of study	**3**	2.5 Semester	**5**	2.6 Type of the evaluation	Exam	2.7 Subject regime	Specialized Discipline **DD**

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

3.1 Number of hours per week	**3**	of which: 3.2 course		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					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					
Examinations					2
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	(Conditions) - Electrical Engineering, Physics
4.2 related to skills	- Proper application of basic knowledge of electric machines

5. Conditions (where applicable)

5.1. for the development of the course	video projector, laptop, blackboard.
5.2.for the development of the academic	Mandatory presence at all laboratories;

seminary/laboratory/project	
6. Specific skills acquired	
Professional skills	C1. Proper implementation of specific fundamental knowledge of mathematics, physics, chemistry, in the field of electrical engineering - C3. Use of fundamental knowledge of electrotechnics -- C5. Design and coordination of experiments and tests
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 "Electric Machines II" is a specialized discipline that presents theoretical knowledge in the field of electric machines and their specific phenomena in terms of applications in industry
7.2 Specific objectives	Acquisition of information and knowledge The laboratory works familiarize the students with the practical aspects regarding the operation of electric machines The project allows the acquisition of principles and skills of design and implementation of systems containing three-phase electrical transformers

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course I. Operating modes of electrical transformers	Video projector, slides Interactive blackboard teaching /	2
Course II - III. Special regimes of electrical transformers		4
Course IV. Switching		2
Course V. Speed adjustment and change of direction of the DC motor		2
Course VI. Classification of direct current generators		2
Course VII. Classification of DC motors and starting methods		2
Course VIII. The asynchronous machine. The constructive part and the operation.		2
Course IX. Asynchronous motor and generator operation		2
Course X. Characteristics of asynchronous motors and generators		2
Course XI. Synchronous machine. The constructive part and the operation.		2
Course XII. Synchronous motor and generator operation		2
Course XIII. Characteristics of synchronous motors and generators.		2
Course XIV. Completion of the course		2

Bibliography

1. Pantea Mircea - Electric cars - Course notes
2. Constantin Bălă - Electric cars - Didactic and Pedagogical Publishing House, Bucharest 1982.
3. Biró Károly - Electric machines and drives - Lithograph IPC-N, Cluj 1987.
4. Ioan Boldea - Transformers and electric machines - Didactic and Pedagogical Publishing House, Bucharest 1994.
5. Aurel Câmpeanu, Vasile Iancu, M. Rădulescu - Machines in electric drives - Ed. Scrisul Rom, Craiova, 1996.
6. Aurel Câmpeanu - Electric cars, Ed. Scrisul Românesc, 1977.
7. Al. Fransua, R. Măgureanu - Electric machines and drives. Elements of execution, Technical Publishing House, Bucharest, 1986.
8. Ioan Felea - Electric machines and drives, Litogr. Univ. from Oradea, 1994.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Instructions for work safety technique and methodology for performing laboratory work	Laboratory presentation	2
2. Single-phase transformers	Based on the report prepared by the students, after a discussion with the teacher on the paper, we proceed to identify the stand, the components necessary for the work, after which the students make the assembly of the practical part of the paper and only together with the teacher make inexhaustible determinations. At the end, the results obtained face to face are interpreted	2
3. Three-phase transformers		2
4. DC motor		2
5. DC generator		2
6. Universal AC motor		2
7. AC motor with capacitor		2
8. Current motor speed measurement		2
9. Reverse electromotive voltage of a DC motor		2
10. DC motor load		2
11. Adjusting the speed, efficiency, torque and power		2
12. Speed control of a DC motor with a closed loop		2
13. 13. Alternating current generator voltage control in a closed loop		2
14. Controlling the speed of the variable cycle DC motor Checking the accumulated knowledge and concluding the situation in the laboratory. Recovery of laboratory works	Students take tests from all laboratory work.	2

Bibliography

1. Pantea Mircea - Electric cars - Laboratory notes
2. Constantin Bălă - Electric cars - Didactic and Pedagogical Publishing House, Bucharest 1982.
3. Mircea Pantea, Marius Silaghi Electrotechnics - Laboratory guide - University of Oradea Publishing House, 2010, ISBN 978-606-10-0011-1

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	-	Written examination	66,66 %
10.6 Laboratory	-	Knowledge assessment test	33,33 %

10.8 Minimum performance standard:

- Description of the operating principles of transformers and direct current, synchronous and asynchronous electric machines.
- Basic knowledge of the construction and operation of electric machines
- Explanation and interpretation of operating modes, phenomena that occur in the operation of electric machines, electrical and electromechanical equipment
- Proper use of electrical machines and monitoring of electromechanical systems
- Design of a three-phase electrical transformer of complexity
- Carrying out tests for a low complexity electrical system; data analysis, measurement and interpretation

Completion date:
29.08.2022

Signature of the course holder

Signature of the laboratory project holder

Ş.l.dr.ing. Pantea Mircea

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building Corp V,
floor 2, room V 213
Postal code 410087, Oradea, Bihor
county, Romania
E-mail: mirceadanutpantea@gmail.com
Discord MirceaPD # 1994

Ş.l.dr.ing. Pantea Mircea

Signature of the department director
Prof.univ.dr.ing.inf. Francisc - Ioan HATHAZI

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building Corp A, floor 2, room A 206
Postal code 410087, Oradea, Bihor county, Romania
Tel: 0259-408172, E-mail: francisc.hathazi@gmail.com

Date of endorsement in the department:
01.09.2022

Signature of the Dean
Prof.univ.dr.ing. Mircea Ioan GORDAN

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building I, Room I003,
Postal code 410087, Oradea, Bihor county, Romania
Tel .: 0259-408204, E-mail: mgordan@uoradea.ro

Date of endorsement in the Faculty Board:
23.09.2022

Signature of the Dean
Prof.univ.dr.ing. Mircea Ioan GORDAN

Contacts:
University of Oradea, Faculty of I.E.T.I.
Str. University, no. 1, Building I, Room I003,
Postal code 410087, Oradea, Bihor county, Romania
Tel .: 0259-408204, 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	**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				**Electrical drives**			
2.2 Holder of the subject				**Prof. PhD eng. Helga Silaghi**			
2.3 Holder of the academic laboratory/project				**Lect. PhD eng. Claudiu Costea**			
2.4 Year of study	**III**	2.5 Semester	**6**	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 laboratory/project	**2/-**
3.4 Total of hours from the curriculum	**56**	Of which: 3.5 course	**28**	3.6 academic laboratory/project	**28/-**

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	8
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	2
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	5
Tutorials	
Examinations	4
Other activities.	

3.7 Total of hours for individual study	**19**
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	(Conditions)
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	- Attendance at least 50% of the courses - The course can be held face to face or online
5.2.for the development of the academic laboratory/project	- Mandatory presence at all laboratories; - The laboratory/project can be carried out face to face or online - Students come with the observed laboratory works - A maximum of 4 works can be recovered during the semester (30%);

	- The frequency at laboratory hours below 70% leads to the restoration of the discipline

6. Specific skills acquired	
Professional skills	**C4.** Design of electrical systems and their components **C6.** Diagnosis, troubleshooting and maintenance of electrical systems and components
Transversal skills	**TC1.** 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 discipline has as objective the familiarization of the students with the field of electric drives. Theoretical and practical knowledge on the technique of electric drives is provided, as well as research, design and use of electric drive systems with DC and AC machines.
7.2 Specific objectives	• The course aims to present the theoretical elements of the technique of electric drives, electric drives with DC and AC machines • The laboratory familiarizes students with practical aspects of the operation of the electric drive system, the control methods of electrical actions with DC and AC machines, including modern control methods with programmed logic and computer control.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1.Subject of electrical drives 1.1.Introduction in electrical drives 1.2.Structure and construction of electrical drive systems	Free exposure, with the presentation of the course with video projector, on the board or online	2h 2h
2.General problems of electrical drives technology 2.1.The object of the kinematics and dynamics of electrical drives. Motion equation 2.2.Reporting of couples, moments of inertia, strength and mass 2.3.Mechanical characteristics of electric machines and working mechanisms 2.4.Transmission of the movement from the electric machine to the working mechanism. Electromagnetic couplings	Free exposure, with the presentation of the course with video projector, on the board or online	2h 2h 2h 2h
3.Electrical drives with DC machines 3.1.Electrical drives with DC machines 3.2. Drives with permanent magnets direct current machines 3.3.Reversible drives with DC machines	Free exposure, with the presentation of the course with video projector, on the board or online	4h 2h 2h

4.Electrical drives with asynchronous machines 4.1.General relationships and mechanical features for electrical drives with asynchronous machines 4.2.Methods of starting for electrical drives with asynchronous machines 4.3.Braking methods for electrical drives with asynchronous machines 4.4.Speed control for electrical drives with asynchronous machines	Free exposure, with the presentation of the course with video projector, on the board or online	2h 2h 2h 2h
Bibliography 1. SILAGHI H., SPOIALĂ V., SILAGHI M. – *Acţionări electrice*, Editura Mediamira , Oradea, 2009 2. SILAGHI, H., SPOIALĂ, VIORICA, *Acţionări electrice-probleme fundamentale şi noţiuni de proiectare*, Ed. Universităţii din Oradea, 2002 3. SILAGHI H., SILAGHI M. – *Sisteme de acţionări electrice cu maşini asincrone*, Editura Treira , Oradea, 2000 4. IANCU V., SPOIALĂ D., SPOIALĂ VIORICA, *Maşini electrice şi sisteme de acţionări electrice*, vol.II, Ed. Universităţii din Oradea, 2006 5. RICHARD CROWDER, *Electric drives and electromechanical systems*, Elsevier, Great Britain, 2006 6. VIORICA SPOIALĂ, HELGA SILAGHI, *Acţionări electrice speciale,* Editura Universităţii din Oradea, 2010		
8.2 Academic laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the laboratory, of the labor protection norms and of the conventional signs specific to the field of electric drives. 2. Introduction to the Matlab - Simulink simulation environment, with applications in electric drives 3. Using the Simulink program to simulate DC motors with separate excitation drives 4. Methods and schemes for starting DC motors 5. The study of an electric drive system with DC motor powered by PWM converter 6. Simulation of the operation of a DC motor drive system powered by VTC in closed circuit 7. Study of an electric drive system with DC motor controlled with PLC 8. Methods and schemes for starting asynchronous motors 9. Presentation of the ASMA program used for computer simulation of asynchronous machine drives 10. Changing the speed of drives with asynchronous machines by changing the frequency of the supply voltage 11. Closing the situation at the laboratory.	Students receive laboratory papers at least one week in advance, study them, inspect them, and take a theoretical test at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher	2 h 2 h 2 h 4 h 4 h 2 h 2 h 4 h 2 h 2 h 2 h
Bibliography 1. Silaghi H.,SpoialĂ V.,Costea C. - *Acţionări electrice* , Îndrumar de laborator, Lito Universitatea din Oradea, 2008 2. Viorica Spoială, Helga Silaghi, Dragoş Spoială – Acţionări electrice. Indrumator de laborator. Universitatea din Oradea, ISBN 978-606-10-1432-3, Ediţie CD-ROM, 140 pag, 2014		

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 can be found in the curriculum of Electrical Systems in 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 of the types of electric drives and their operation and design is a stringent requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods The evaluation can be done face-to-face or	10.3 Percent from the final mark

		online	
10.4 Course	Minimum required conditions for passing the exam (mark 5): in accordance with the minimum performance standard it is necessary to know the fundamental notions required in the subjects, without presenting details on them For 10: thorough knowledge of all subjects is required	**Written exam** Students receive for solving each a form with 3 subjects of theory and an application.	70 %
10.5 Laboratory	Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard recognition of the stands used to carry out the laboratory works, without presenting details on them For 10: detailed knowledge of how to perform all laboratory work	**Test + practical application** At each laboratory students receive a test and a grade. Each student also receives a grade for laboratory work during the semester and for the laboratory work file. This results in an average for the laboratory.	30%
10.6 Minimum performance standard: Course: Selection and independent use of learned methods and algorithms for known standard situations as well as completion of calculations (analytical and numerical) with physical quantities. Laboratory: Development and implementation of algorithms and automation structures based on electrical drives, microcontrollers, signal processors, PLCs, embedded systems, etc. by using the principles of project management The timely solution, in individual activities and group activities, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology. Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level. Elaboration and argumentative support of the application of a personal professional development plan.			

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	**Electric systems/ Bachelor of Engineering**

2. Data related to the subject

2.1 Name of the subject		**Microprocessor Systems**					
2.2 Holder of the subject		**Lect. PhD eng.** Kovendi Zoltan					
2.3 Holder of the academic laboratory/project		**Lect. PhD eng.** Kovendi Zoltan					
2.4 Year of study	III	2.5 Semester	6	2.6 Type of the evaluation	VP	2.7 Subject regime	DD

(I) Impusă

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 seminar/laboratory/project	-/1/-
3.4 Total of hours from the curriculum	42	Of which: 3.5 course	28	3.6 seminar/laboratory/project	-/14/-
Distribution of time					33 hours
Study using the manual, course support, bibliography and handwritten notes					15
Supplementary documentation using the library, on field-related electronic platforms and in field-related places					4
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays					10
Tutorials					
Examinations					4
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	(Conditions)
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	- Attendance at least 50% of the courses - The course can be held face to face or online
5.2.for the development of the academic laboratory/project	- Mandatory presence at all laboratories; - The laboratory/project can be carried out face to face or online

	- Students come with the observed laboratory works - A maximum of 4 works can be recovered during the semester (30%); - The frequency at laboratory hours below 70% leads to the restoration of the discipline

6. Specific skills acquired	
Professional skills	**C1.** Using knowledge of mathematics, physics, measurement, technical graphics, mechanical engineering, chemical, electrical and electronic engineering in control systems engineering **C5.** Application development and implementation of algorithms and automatic management structures, using the principles of project management, programming environments and technologies based on microcontrollers, signal processors, programmable logic controllers, embedded 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	▪ Assimilation by students of the necessary notions for the design and use of micrprocessor systems. In this sense the discipline approaches micrprocessor systems, hardware structures and their applications. The family of Intel microprocessors (I8086, Pentium I-IV), memory and interface circuits are shown. ▪ The laboratory works study the charactheristics and operation of microprocessor and support circuits with the experimentation of the operation and charactheristics of support circuits with the elaboration and running programs in Assembly language for a microsystem with 80C51 microcontroller
7.2 Specific objectives	▪ Creating the ability to design and use microprocessor systems ▪ Familiarizing students with the arhitecture of the microprocessor ▪ Identifying and exploiting the resources of a microprocessor system ▪ Highlighting the pecularities of communication in microprocesoor systems and input-output operations ▪ Creating the skills to design a hardware system witch microprocessos or microcontroller

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Chapter 1. MICROPROCESSORS: 1.1. Introductory aspects; 1.2. Evolution and charactheristics of microprocessors.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours

Chapter 2 2. MICROPROCESSOR I8086: 2.1. Configuration of the terminals. 2.2. Internal structura of the microprocessor I8086.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 2. MICROPROCESSOR I8086 (continuation): 2.3. Internal registers of the microprocessor I8086.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 2. MICROPROCESSOR I8086 (continuation): 2.4. Connecting the main memory in I8086 systems	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 2. MICROPROCESSOR I8086 (continuation): 2.5. Input and output operations in I8086 microsystems	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 3. MICROPROCESSOR INTEL PENTIUM, PENTIUM MMX, PENTIUM II, PENTIUM III, PENTIUM IV: 3.1. Microprocessor Intel Pentium.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 3. MICROPROCESSOR INTEL PENTIUM, PENTIUM MMX, PENTIUM II, PENTIUM III, PENTIUM IV (continuation): 3.2. Microprocessor Intel Pentium MMX.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 3. MICROPROCESSOR INTEL PENTIUM, PENTIUM MMX, PENTIUM II, PENTIUM III, PENTIUM IV (continuation): 3.3. Microprocesorul Intel Pentium II.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 3. MICROPROCESSOR INTEL PENTIUM, PENTIUM MMX, PENTIUM II, PENTIUM III, PENTIUM IV (continuation): 3.4. Microprocessor Intel Pentium III. 3.5. Microprocessor Intel Pentium IV.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 3. MICROPROCESSOR INTEL PENTIUM, PENTIUM MMX, PENTIUM II, PENTIUM III, PENTIUM IV (continuation): Microprocessor Intel Dual-Core, Quad-Core.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 4. Motherboards: 4.1. Design modes; 4.2. Types of motherboards.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 5. Main memory: 5.1. Primary and secondary storage systems; 5.2. ROM memory; 5.3. RAM memory; 5.4. Cache memory; 5.5 Memory circuit	Free exposure, with the presentation of	2 hours

encapsulation techniques	the course with video projector, on the board or online	
Chapter 6. Sets of chips and support circuits: 6.1. Chipsets; 6.2. Chipset functions; 6.3. System controller; 6.4. Controller for peripherial devices; 6.5. Memory controller	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours
Chapter 7. BUS Extensions 7.1. BUS functions ; 7.2. ISA şi EISA 7.3. VESA; 7.4. PCMCIA; 7.5. PCI.	Free exposure, with the presentation of the course with video projector, on the board or online	2 hours

Bibliography

1. Gergely E., Sisteme cu microprocesoare, Note de curs, http://egergely.webhost.uoradea.ro/materiale.html .
2. Hennessy J.L., Patterson D.A., Computer Architecture. A Quantitative Approach, Elsevier, USA, 2007.
3. Mueller S., Zacker C., PC depanare şi modernizare, Editura Teora, 2007.
   Balch M., Complete digital design. A Comprehensive Guide to Digital Electronics and Computer System Architecture, McGraw-Hill, USA, 2003.
5. Gergely E., ş.a., Sisteme cu microprocesoare, partea I, Curs, Lito Universitatea din Oradea, 1999.

8.2 Academic laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the laboratory, of the labor protection norms and of the conventional signs.	Summary of the papers and practical demonstration using the equipments from the laboratory	2 hours
2. Notions of boolean algebra, representation and minimization of logical functions by analitical methods and Veith-Karnaugh diagrams	Summary of the papers and practical demonstration using the equipments from the laboratory	2 hours
3. Study of multiplexors	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
4. Study of decoders and demultiplexors	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
5. Study of bistabiles JK asynchronous, synchronously, master-slave and type T	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
6. Study of synchronous and asynchronous counters	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
7. Study of registers	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
8. Description of the microcontroller INTEL 80C51.	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
9. Studying the way of work with mon552mv.exe.	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
10. Internal memory, registers with special functions (SFR) at microcontroller 80C51.	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
11. Counters/Timers T0 and T1 of microcontrollers 80C51	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour
12. Closing the situation of the laboratory	Summary of the papers and practical demonstration using the equipments from the laboratory	1 hour

Bibliography

1. Gavriş M., ş.a. Sisteme cu microprocesoare, Îndrumător de laborator, Universitatea din Oradea, 1996
2. Nagy Z.T., Codoban A. Gergely E.I., Microcontrolere în automatizări, Îndrumător de laborator, Universitatea din Oradea, 2005.
3. Murdocca M.J., Heuring V. P., Principles of computer architecture, Prentice Hall, 2000.
4. Rosch W. L., Totul despre hardware, Editura Teora, 1999.

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 other university centers from the country and abroad. For a better adaptation to the requirements of the field of work, meetings were held both with representatives of the socio-economic environment and with professors with similar fields of interest

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percent from the final mark
10.4 Course	- Minimum requirements for passing the exam**(note 5)**: In accordance with the minimum performance standard **- For 10 grade:** - thorough knowledge of the structure of microprocessor systems - thorough knowledge of microprocessor arhitecture; - thorough knowledge of microsystems memory transfers - thorough knowledge of communication between hierarchical levels in microprocessor systems - thorough knowledge of input-output operations	The evaluation can be done face-to-face or online	66,66%
10.5 Laboratory	- Minimum requirements for passing the exam**(note 5)**: In accordance with the minimum performance standard **- For 10 grade:** - thorough knowledge of the structure of the Intel 80C51microcontroller - thorough knowledge of the internal memory and registers of the Intel 80C51 microcontroller - thorough knowledge of the counters/timers of the Intel 80C51 microcontroller - thorough knowledge of Intel 80C51 microcontroller programming	The evaluation can be done face-to-face or online	33,33%

10.6 Minimum performance standard:

Course:

- knowledge regarding the structure of microprocessor systems
- knowledge of microprocessor architecture
- knowledge regarding myrosystems memory transfers
- knowledge of input-output operations

Laboratory:

- knowledge regarding the structure of the INTEL 80C51microcontroller;
- knowledge of programming the INTEL 80C51 microcontroller

Completion date:
29.08.2022

Date of endorsement in the

department:
22.09.2022

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				Electrical installations - Project			
2.2 Holder of the subject							
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	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	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	-	3.6 academic seminar/laboratory/project	-/-/14

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	12
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	6
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	14
Tutorials	-
Examinations	4
Other activities.	

3.7 Total of hours for individual study	36
3.9 Total of hours per semester	50
3.10 Number of credits	2

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. Simultaneous completion of teaching activities related to the discipline "Electrical installations" (Course + Lab)
4.2 related to skills	Computer skills

5. Conditions (where applicable)

5.1. for the development of the course	
5.2.for the development of the academic seminary/laboratory/project	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 activities can be held online.

6. Specific skills acquired

Professional skills	▪ **C4.5.** Use of appropriate methods to carry out projects specific to electrical systems
Transversal skills	▪ **CT1.** Identification of objectives to be achieved, available resources, conditions for their completion, stages of work, working times, deadlines and related risks

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

7.1 The general objective of the subject	▪ mastering the basic principles and methodology applied in the design of certain categories of electrical installations
7.2 Specific objectives	▪ creating the skills to work with norms, standards and regulations related to the field ▪ analysis of energy characteristics of consumers ▪ knowledge the basics and measures taken to ensure the quality of electricity to consumers, reliable operation of installations and reduction of losses ▪ knowledge of protection measures against electric shocks, as a principle and as a method of implementation in electrical installations ▪ skills regarding the sizing, choice and adjustment of equipment and apparatus in the structure of electrical installations ▪ mastering the methodology of designing certain categories of electrical installations: earthing installations, lightning protection installations, installations for compensating the reactive power consumption

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
-		
8.2 Seminar	Teaching methods	No. of hours/ Observations
-		
8.3 Laboratory	Teaching methods	No. of hours/ Observations
-		
8.4 Project	Teaching methods	No. of hours/ Observations
1. Presentation of project themes and assignment of initial design data	Presentation using laptop and video projector Assisting students in solving applications at each step of the project	2
2. Design of earthing installations - Summarize the basics of earthing installations presented in the course - Establishing the design steps and the calculation algorithm - Solving applications		4
3. Design of lightning protection installations - Basics on lightning protection installations - Choosing the type of installation and establishing design stages - Solving applications		4
4. Sizing of reactive power compensation installations		2
5. Project presentation. Presentation of the results obtained. Assessment		2

Bibliography (selection)

1. * * * - *Norm for the design, execution and operation of electrical installations related to buildings,* indicative I7 – 2011 (in Romanian), Official Gazette of Romania, part I, no. 802 bis, 14.11.2011
2. * * * - *Guide for the design and execution of earthing installations* - indicative 1 RE-Ip 30/2004

3. * * * - *ANRE Order no. 33/2014 for the approval of the Methodology regarding the establishment of the payment obligations of the reactive power and of the regulated price for the reactive power*
4. * * * - *Instructions for compensating reactive power in the electrical networks of energy suppliers and industrial and similar consumers* - indicative PE 120/94
5. * * * - SR CEI / TR 62066/2005 *Overvoltages and overvoltage protection in alternating low voltage networks*
6. IEC 62305 – *Designing for Protection Against Lightning*
7. D. Comșa, et al, *Design of industrial electrical installations* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983
8. P. Dinculescu, F.Sisak, *Electrical Instalations and equipments* (in Romanian), Didactic and Pedagogical Publishing House, Bucharest, 1983
9. P. Dinculescu, *Low voltage industrial electrical instalations* (in Romanian), Matrix Rom Press, Bucharest, 2003
10. SCHNEIDER - *Electrical Installation Guide* (in Romanian), Schneider Electric, Bucharest,2003
11. OBO BETTERMAN - Lightning, overvoltage and fire protection systems

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	-		
10.5 Seminar	-		
10.6 Laboratory	-		
10.8 Project	Grade obtained at the final evaluation of the project - P	Students will be evaluated at each step of the project. The final grade will be calculated as the arithmetic mean of the grades obtained at each stage. If special measures will be imposed in the epidemiological context generated by the COVID-19 pandemic, the evaluation of projects can be carried out on-site or online, in compliance with the requirements imposed by the *Methodology for carrying out teaching activities during the academic year*.	100 %
10.8 Minimum performance standard: - Passing the discipline (achieving the credits) involves: P ≥ 5			

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	Department of Electrical Engineering
1.4 Field of study	Electrical engineering
1.5 Study cycle	Bachelor (1st cycle)
1.6 Study program/Qualification	Eelectrical Systems / 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	IV	2.5 Semester	VII	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	3	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	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	10
Examinations	8
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	---
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 seminar 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

Bibliography

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.
4. Ignea, A., - Introducere in compatibilitatea electromagnetica, Timiosara, 1998.
5. Radu, S., Compatibilitate Electromagnetica. Vol. 1-2-3. Iasi, 1995.
6. Simion, E. - Interferenta Electromagnetica. Ed. Casa Cartii de Stiinta, Cluj-Napoca, 1999.
7. Munteanu, C., Topa, V., Grindei, L., Advanced Numerical Computation Methods in EMC, Ed. Casa Cărţii de Ştiinţă, Icluj-Napoca, 2001.
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
1. Presentation of the EMC Laboratory, of the endowment equipment. Labor protection rules.	Video projector, whiteboard, free speech	1
2. The study of galvanic couplings	Video projector, whiteboard, free speech	1
3. Study of inductive couplings	Video projector, whiteboard, free speech	1
4. The study of capacitive couplings	Video projector, whiteboard, free speech	1
5. Study of electrostatic discharges	Video projector, whiteboard, free speech	1
6. Study of conduction disturbances in the supply network	Video projector, whiteboard, free speech	1
7. Filters for suppression of common and differential interference	Video projector, whiteboard, free speech	1
8. Study of pulse propagation on transmission lines I	Video projector, whiteboard, free speech	1
9. Study of pulse propagation on transmission lines II	Video projector, whiteboard, free speech	1
10. The study of radiation disturbances I	Video projector, whiteboard, free speech	1
11. The study of radiation disturbances II	Video projector, whiteboard, free speech	1
12. Screens I	Video projector, whiteboard, free speech	1
13. Screens II	Video projector, whiteboard, free speech	1
14. Grounding and table	Video projector, whiteboard, free speech	1

Bibliography

1. Hathazi Francisc – Ioan – Compatibilitate electromagnetică – caiet de seminar, - in curs de editare;
2. Schwab, A. - Compatibilitate Electromagnetica. Bucuresti, 1996.
3. Hortopan, Gh., - Principii si tehnici de compatibilitate electromagnetica, Bucuresti, 2005.
4. Ignea, A., - Introducere in compatibilitatea electromagnetica, Timiosara, 1998.

5. Radu, S., Compatibilitate Electromagnetica. Vol. 1-2-3. Iasi, 1995.
6. Simion, E. - Interferenta Electromagnetica. Ed. Casa Cartii de Stiinta, Cluj-Napoca, 1999.
7. Munteanu, C., Topa, V., Grindei, L., Advanced Numerical Computation Methods in EMC, Ed. Casa Cărţii de Ştiinţă, Icluj-Napoca, 2001.
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.

8.3 Laboratory	Teaching methods	No. of hours/ Observations

8.4 Project	Teaching methods	No. of hours/ Observations
---		

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	80 %
10.5 Seminar	Final evaluation test	The evaluation can be done face-to-face or online. Oral assessment - test, report.	20%
10.6 Laboratory	---	---	---
10.7 Project	---		---
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:
29.09.2022

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. PAŞCA SORIN – Laboratory / Project**			
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	2 2
3.4 Total of hours from the curriculum	84	Of which: 3.5 course	28	3.6 laboratory project	28 28
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					**2**
Examinations					**3**
Other activities.					**-**

3.7 Total of hours for individual study	**20**
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 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 Paşca, 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. Şora – *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	4

	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.	4
Sizing of the outdoor lighting installation of the building	Presentation of calculation equations	2
Plan and scheme of the electrical lighting installation	Presentation of checking methods	2
Circuit sizing and choice of protection and switching devices	Presentation of circuit sizing methods and the choice of protection and switching devices.	2
Checking of the solution obtained by using dedicated software (DIALUX, ELBALUX, PHILIPS LIGHTING etc.)	Presentation of checking methods and lighting quality conditions.	6
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	The evaluation can be done	60 %

	must be treated to minimum standards; For grades > 5 all subjects must be treated to maximum standards;	face to face or online. In order to pass the exam, each subject must be treated for at least grade 5.	
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 of the teacher, the other students having the opportunity to intervene during the presentation.	For grade 6 - the elaborated project respects the format imposed by the elaboration procedure, i.e. the obtained results are close to the real ones; For grade 10 - the project is elaborated to maximum standards.	20 %
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	Electrical Systems 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

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[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.
[6]. N. Golovanov, I. Şora, ş.a. – *Electrotermie şi Electrotehnologii*. Vol. I. Editura Tehnică, Bucureşti, 1997
[7]. A.E. Sluhoţki, S.E. Râşkin – *Inductoare pentru încălzirea electrică*. Editura Tehnică Bucureşti, 1983.
[8]. V. Firețeanu, *Electrotermie*. Culegere de aplicaţii. Editura Politehnică Bucureşti, 1991
[9]. V. Firețeanu, *Procesarea electromagnetică a materialelor*. Editura Politehnică Bucureşti, 1995.
[10]. Şora, 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

MODERN COMMUTATION TECHNIQUES

1.1 Higher education institution	UNIVERSITY OF ORADEA
1.2 The Faculty	Electrical Engineering and Information Technology
1.3 Department	ELECTRICAL ENGINEERING
1.4 Field of study	ELECTRICAL ENGINEERING
1.5 Cycle of studies	LICENSE
1.6 Education / Qualification Program	ELECTRICAL / ENGINEERING SYSTEMS

2.1 Name of the discipline	**MODERN COMMUTATION TECHNIQUES**
2.2 Course holder	S.l.dr.ing. BURCA ADRIAN
2.3 The owner of the laboratory activities	S.l.dr.ing. BURCA ADRIAN

8.1 Course		
1. General Problems of Power Electronics		
2. Power electronic devices operating in switching		
3. Single and three-phase power rectifiers not recommended		
4. Single-phase and three-phase power rectifiers ordered		
5. AC converters		
6. Control of electronic power circuits		
7. Inverters		
8. Continuous voltage stabilizers		
9. Operating principle of cc-cc converter. PWM command		
10. Switching voltage sources		
11. cc-cc converters. Step-down converter (buck)		
12. Step-up converter (boost)		
13. Step-down-up converter (buck-boost)		
14. Power Chopper		
8.3 Laboratory		
1. Presentation of the laboratory. Labor protection. Generalities on laboratory activity.		
2. Circuit control for thyristors and triacs based on dedicated circuit UAA145.		
3. Single-phase rectifiers ordered and influence of the type of load		
4. Generation of PWM signals for control of electronic power converters		
5. Voltage Inverter (DC-AC)		
6. Step-up voltage cc-cc converter		
7. Step-down cc-cc converter		

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				**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

Bibliography

[1]. Livia Bandici, *Electrotermie. Aplicaţii*. (Îndrumător de proiectare). Editura Universităţii din Oradea, 2003.
[2]. Livia Bandici, *Electrotermie. Teorie şi aplicaţii*. Editura Universităţii din Oradea, 2016.
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[4]. Livia Bandici, *Electrotermie*. Editura Universităţii din Oradea, 2004.
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[6]. N. Golovanov, I. Şora, ş.a., *Electrotermie şi Electrotehnologii*. Vol. I. Editura Tehnică, Bucureşti, 1997.
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[8]. V. Fireţeanu, *Procesarea electromagnetică a materialelor*. Editura Politehnică Bucureşti, 1995.
[9]. T. Leuca, *Câmpul electromagnetic şi termic cuplat – Curenţi turbionari*. Editura Mediamira Cluj-Napoca, 1996.
[10]. A.E. Sluhoţki, S.E. Râşkin, *Inductoare pentru încălzirea electrică*. Editura Tehnică Bucureşti, 1983.

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	Electric Systems / 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	IV	2.5 Semester	VII	2.6 Type of the evaluation	Vp	2.7 Subject regime	Domain Discipline (DD)

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	- / - / 2
3.4 Total of hours from the curriculum	28	of which: 3.5 course	-	3.6 academic seminar/laboratory/project	- / - / 28

Distribution of time	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	2
Examinations	4
Other activities.	---

3.7 Total of hours for individual study	**36**
3.9 Total of hours per semester	**52**
3.10 Number of credits	**2**

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

8.2 Seminar	Teaching methods	No. of hours/ Observations

8.3 Laboratory	Teaching methods	No. of hours/ Observations

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. Issues and improving the quality of electricity.	Laptop, video projector, free 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	---	---	---
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.	100%
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:
28.09.2022

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	Equipments for nonconventional electrotechnologies						
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	12
Tutorials	-
Examinations	4
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	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 ▪ **C1.4.** Assesing of the quality, advantages and disadvantages of some methods and processes in the field of electrical engineering, as well as the level of scientific documentation of projects and the consistency of programs using scientific methods and mathematical techniques ▪ **C3.4.** Assessing the quality and functional performance of electrical systems by specific methods ▪ **C6.4**. Establish and use appropriate methods for assessing the quality of electrical components and 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	▪ 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
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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 – *Electrotechnologies* (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

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		**DESIGN OF ELECTRICAL SYSTEMS**					
2.2 Holder of the subject		Popa Monica					
2.3 Holder of the academic seminar/laboratory/project		Popa Monica					
2.4 Year of study	IV	2.5 Semester	VII	2.6 Type of the evaluation	Ex	2.7 Subject regime	O

(I) Imposed; (O) Optional;

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 project	1
3.4 Total of hours from the curriculum	42	of which: 3.5 course	28	3.6 academic project	14

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	12
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	6
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	10
Tutorials	3
Examinations	2
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	Electrical installations, Electrical equipments
4.2 related to skills	Computer operation

5. Conditions (where applicable)

5.1. for the development of the course	on-site
5.2. for the development of the academic project	on-site Computers and software packages for design of electrical installations

6. Specific skills acquired	
Professional skills	**C4** Design of electrical systems and their components **C4.3** Applying of design methods in representative electrical systems **C6** Diagnosis, troubleshooting and maintenance of electrical systems and components **C6.4** Evaluation el electical systems quality **C6.5** Elaboration and testing of an analysis program for a specific electrical systems

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

7.1 The general objective of the subject	▪ Design of electrical installations
7.2 Specific objectives	▪ Explanation and interpretation of software packages for design and optimization of representatives electrical sysstems ▪ Interpretation of results obtained with CAD software packages

8. Contents *

8.1 Course	Teaching methods	No. of hours/ Observations
Design stages. The architecture of low voltage systems.	notes on blackboard, Power Point presentation	2
Computation methods in low voltage electrical installation	notes on blackboard, Power Point presentation	2
CAD of lighting systems. DIALux software	notes on blackboard, Power Point presentation	2
CAD of low voltage installations. Ecodial software	notes on blackboard, Power Point presentation	2
Ladder language	notes on blackboard, Power Point presentation	2
Ladder programming	notes on blackboard, Power Point presentation	2
Implementation of intelligent relays	notes on blackboard, Power Point presentation	2
Computation of shortcircuit currents	notes on blackboard,	2

	Power Point presentation	
Exemplification of shortcircuit currents.	notes on blackboard, Power Point presentation	2
The overcurrent protection Thermal and electrodinamic stability.	notes on blackboard, Power Point presentation	2
CAD for conductors dimensioning Third harmonic	notes on blackboard, Power Point presentation	2
Comutation equipments – protection characteristics, Protection selectivity.	notes on blackboard, Power Point presentation	2
Electrical shock protection – computation methods in TT, TN, IT earthing systems	notes on blackboard, Power Point presentation	2
Electrical efficiency in low voltage distribution systems	notes on blackboard, Power Point presentation	2

Bibliography

1. Monica Popa – Note proiect, **http://webhost.uoradea.ro/mpopa/**
2. Colectii de STAS si Normative – SR EN 60364, NP/I7/2011 …
3. Ismail Kasicki – Short Circuit in Power Systems , Wiley – VCH Verlag GmbH, Weinheim, Germany 2002
4. Ghidul pentru instalatii electrice 2018 – editat de Schneider Electric
5. ECODIAL User's Manual
6. DIALUX User's Manual
7. CADDY ELECTRICAL User's Manual
8. Diagrame Ladder – Documentatie firme producatoare AP
9. I7-2011

8.2 Project	Teaching methods	No. of hours/ Observations
Project tasks. Elaboration steps	assisting the students in solving pplications on computer	2
Establishing of distribution network. The layout of electrical installation	assisting the students in solving pplications on computer	2
Interior lighting design – DIALux	assisting the students in solving pplications on computer	2
Low voltage installation design - Ecodial software	assisting the students in solving pplications on computer	2
Interpreting results in Ecodial.	assisting the students in solving pplications on computer	2
Intelligent relays. Ladder diagram	assisting the students in solving pplications on computer	2
Simulation of operation	assisting the students in solving pplications on computer	2

Bibliography

1. Ghidul pentru instalatii electrice 2018 – editat de Schneider Electric
2. ECODIAL User's Manual
3. DIALUX User's Manual
4. CADDY ELECTRICAL User's Manual

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	Ability to solve a CAD application	Oral examination, Application on computer	60%
10.5 Project	Solving the project tasks	Testing the project. Results inerpretation	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

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			**Special electrical drives**				
2.2 Holder of the subject			**Prof. PhD eng. Helga Silaghi**				
2.3 Holder of the academic laboratory/project			**Lect. PhD eng. Claudiu Costea**				
2.4 Year of study	**IV**	2.5 Semester	**7**	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	**3**	of which: 3.2 course	**2**	3.3 academic laboratory/project	**1**
3.4 Total of hours from the curriculum	**42**	Of which: 3.5 course	**28**	3.6 academic laboratory/project	**14**

Distribution of time	hours
Study using the manual, course support, bibliography and handwritten notes	16
Supplementary documentation using the library, on field-related electronic platforms and in field-related places	3
Preparing academic seminaries/laboratories/ themes/ reports/ portfolios and essays	10
Tutorials	
Examinations	4
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	(Conditions)
4.2 related to skills	

5. Conditions (where applicable)

5.1. for the development of the course	- Attendance at least 50% of the courses - The course can be held face to face or online
5.2.for the development of the academic laboratory/project	- Mandatory presence at all laboratories; - The laboratory/project can be carried out face to face or online - Students come with the observed laboratory works - A maximum of 4 works can be recovered during the semester (30%);

	- The frequency at laboratory hours below 70% leads to the restoration of the discipline

6. Specific skills acquired	
Professional skills	**C3.** Use of fundamental knowledge of electrotechnics **C5.** Design and coordination of experiments and tests
Transversal skills	**TC1.** 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 discipline has as objective the familiarization of the students with the field of special electrical drives. It provides theoretical and practical knowledge on research, design and use of special electric drives with asynchronous and synchronous servomotors, stepper motors, linear motors, piezoelectric motors.
7.2 Specific objectives	• The course aims to present the theoretical elements of special electric drives with asynchronous and synchronous servomotors, stepper motors, linear motors, piezoelectric motors. • The laboratory familiarizes students with practical aspects of the operation of the electric drive system, the control methods of electrical actions with DC and AC machines, including modern control methods with programmed logic and computer control. • The project provides the necessary knowledge to the students to be able to design an electric drive in the field of lifting and transport equipment.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
1. Advanced electric drives with asynchronous servomotors	Free exposure, with the presentation of the course with video projector, on the board or online	10h
2. Advanced electric drives with synchronous servomotors	Free exposure, with the presentation of the course with video projector, on the board or online	8h
3. Advanced electric drives with stepper motors	Free exposure, with the presentation of the course with video projector, on the board or online	5h
4. Advanced electric drives with linear motors	Free exposure, with the presentation of the course with video projector, on the board or online	3h

5. Advanced electric drives with piezoelectric motors	Free exposure, with the presentation of the course with video projector, on the board or online	2h

Bibliography

1. SILAGHI H., SPOIALĂ V., SILAGHI M. – *Acţionări electrice*, Editura Mediamira , Oradea, 2009
2. SILAGHI, H., SPOIALĂ, VIORICA, *Acţionări electrice-probleme fundamentale şi noţiuni de proiectare*, Ed. Universităţii din Oradea, 2002
3. SILAGHI H., SILAGHI M. – *Sisteme de acţionări electrice cu maşini asincrone*, Editura Treira , Oradea, 2000
4. IANCU V., SPOIALĂ D., SPOIALĂ VIORICA, *Maşini electrice şi sisteme de acţionări electrice*, vol.II, Ed. Universităţii din Oradea, 2006
5. RICHARD CROWDER, *Electric drives and electromechanical systems*, Elsevier, Great Britain, 2006
6. VIORICA SPOIALĂ, HELGA SILAGHI, *Acţionări electrice speciale,* Editura Universităţii din Oradea, 2010
7. HELGA SILAGHI, V. SPOIALA, D.SPOIALA, A. SILAGHI - *Acţionări electrice avansate*, Editura Universităţii din Oradea, Oradea, ISBN 978-606-10-2035-5, 157 pg., 2019

8.2 Academic laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the laboratory, of the labor protection norms and of the conventional signs specific to the field of electric drives.	Students receive laboratory papers at least one week in advance, study them, inspect them, and take a theoretical test at the beginning of the laboratory. Then, the students carry out the practical part of the work under the guidance of the teacher	2h
2.Control of the main shaft to the machine tool GPR 45 NC. Speed selection		2h
3. Control of advances to the GPR 45 NC machine tool		2h
4. Control the revolver head on the GPR 45 NC machine tool		2h
5. Microcontroller control of direct current servomotors		2h
6. Microcontroller control of stepper motors		2h
7. Closing the situation at the laboratory.		2h

Bibliography

1. Silaghi H.,SpoialĂ V.,Costea C. - *Acţionări electrice* , Îndrumar de laborator, Lito Universitatea din Oradea, 2008
2. Viorica Spoială, Helga Silaghi, Dragoş Spoială – Acţionări electrice. Indrumator de laborator. Universitatea din Oradea, ISBN 978-606-10-1432-3, Ediţie CD-ROM, 140 pag, 2014

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 can be found in the curriculum of Electrical Systems in 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 of the types of electric drives and their operation and design is a stringent requirement of employers in the field (Comau, Faist Mekatronics, Celestica, GMAB, etc.).

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods The evaluation can be done face-to-face or online	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 it is necessary to know the fundamental notions required in the subjects, without	**Written exam** Students receive for solving each a form with 3 subjects of theory and an application.	60 %

	presenting details on them For 10: thorough knowledge of all subjects is required		
10.5 Laboratory	Minimum required conditions for promotion (grade 5): in accordance with the minimum performance standard recognition of the stands used to carry out the laboratory works, without presenting details on them For 10: detailed knowledge of how to perform all laboratory work	**Test + practical application** At each laboratory students receive a test and a grade. Each student also receives a grade for laboratory work during the semester and for the laboratory work file. This results in an average for the laboratory.	40%
10.6 Minimum performance standard: Course: Selection and independent use of learned methods and algorithms for known standard situations as well as completion of calculations (analytical and numerical) with physical quantities. Laboratory: Development and implementation of algorithms and automation structures based on electrical drives, microcontrollers, signal processors, PLCs, embedded systems, etc. by using the principles of project management The timely solution, in individual activities and group activities, in conditions of qualified assistance, of the problems that require the application of principles and rules respecting the norms of professional deontology. Responsible assumption of specific tasks in multi-specialized teams and efficient communication at institutional level. Elaboration and argumentative support of the application of a personal professional development plan.			

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			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	8
Tutorials	3
Examinations	3
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	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	C3.2. Explanation of the constructive principles of component equipment C6.1. Definition of concepts regarding the diagnosis and maintenance of electrical system components C6.4. Establishing and using appropriate methods for evaluating the quality of electrical components and systems
Transversal skills	CT1 Identification of the objectives to be achieved, the available resources, the conditions for their completion, work stages, working times, deadlines and related risks

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 Parcul Industrial Oradea	
L11. Presentation of medium voltage cells 20kV		2
L12. Operational management by dispatch of the operation of an electric distribution station	Visit at DEER Oradea	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

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	Electric Systems / Bachelor of Engineering

2. Data related to the subject

2.1 Name of the subject				Modeling and simulation of electrical machines			
2.2 Holder of the subject				Lecturer phd.eng. **ARION MIRCEA NICOLAE**			
2.3 Holder of the academic seminar/laboratory/project				Lecturer phd.eng. **ARION MIRCEA NICOLAE**			
2.4 Year of study	4	2.5 Semester	8	2.6 Type of the evaluation	Ex – Exam 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	5	of which: 3.2 course	2	3.3 academic seminar/laboratory/project	-/1/2
3.4 Total of hours from the curriculum	70	Of which: 3.5 course	28	3.6 academic seminar/laboratory/project	-/14/28
Distribution of time					30hours
Study using the manual, course support, bibliography and handwritten notes					8
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					6
Tutorials					4
Examinations					4
Other activities.					-

3.7 Total of hours for individual study	**30**
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	(Conditions) – Minimum knowledge on fundamental notions of electromagnetic field theory, electric machines, constituent elements of electrical circuits and how they work.
4.2 related to skills	-Knowledge of electricity

5. Conditions (where applicable)

5.1. for the development of the course	The course can be presented online or face to face, in the amphitheater with modern techniques available: Video projector, Interactive board and Blackboard, Oral speech

5.2.for the development of the academic seminary/laboratory/project	- The laboratory activity and the project involve the analysis of different models of electric machines, models made using the modern means of working in the laboratory, using FEMM and ANSYS 2D and 3D numerical modeling software. - Preparation of the report (synthesis material); - Carrying out all laboratory works; - Attendance is mandatory at all laboratories - A maximum of two laboratory works can be recovered (30%); - The participation at laboratory hours below 70% leads to the restoration of the discipline.
6. Specific skills acquired	
Professional skills	- C4. Design of electrical systems and their components - C5. Design and coordination of experiments and tests - C6. Diagnosis, troubleshooting and maintenance of electrical systems and components
Transversal skills	CT1. Identifying the objectives to be achieved, the available resources, the conditions for their completion, the working stages, the working times, the related deadlines and the related 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 "Modeling and simulation of electric machines" aims to acquire the basic theoretical knowledge on the use of methods for modeling / simulation of the operation of electric machines using field models and circuit models. ▪ The analysis of electric machines using field models allows to take into account complex effects of an electromagnetic nature such as teeth harmonics, complex geometric shapes of magnetic cores, current discharge in massive conductors, the influence of magnetic nonlinearity, etc., difficult to considered by circuit models. ▪ Simulation of the operation of electric machines using circuit models allows the modeling of the dynamic regimes of electric machines with a low computational effort, showing interest especially in the case of electric drives.
7.2 Specific objectives	▪ The objectives of the discipline are to know and understand the functional relations in order to realize the corresponding theoretical models necessary to model / simulate the operating regimes of electric machines, by explaining and interpreting their behavior and performing calculations starting from the basic relations for physical systems studied with specialized software. . ▪ The project activity consists in designing an electric car ▪ The activity in the laboratory is focused on applications specific to the chapters taught in the course and aims to form skills in physical and numerical modeling of electric machines.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
CHAPTER.1. Introductory notions	Free speaking, presentation of the course by using video projector and blackboard	2
CHAPTER.2. Numerical solving of electromagnetic and thermal field problems	Free speaking, presentation of the course by using video	6

	projector and blackboard	
CHAPTER 3. Numerical modeling of the DC machine	Free speaking, presentation of the course by using video projector and blackboard	4
CHAPTER.4. Numerical modeling of the electrical transformer	Free speaking, presentation of the course by using video projector and blackboard	2
CHAPTER.5. Numerical modeling of the asynchronous machine	Free speaking, presentation of the course by using video projector and blackboard	6
CHAPTER.6. Numerical modeling of the synchronous machine	Free speaking, presentation of the course by using video projector and blackboard	2

Bibliography

1. M. Arion Modelarea și simularea masinilor electrice, suport curs - Note de curs
2. I.F.Hantila, N. Vasile, B. Crânganu-Creţu, M Silaghi, T. Leuca, "Elemente de circuit cu effect de câmp", Editura ICPE Bucuresti, 1998
3. T. Maghiar T., V.D. *Şoproni* "*Tehnica încălzirii cu microunde"* Editura Universitătii din Oradea, 2003.
4. V. Fireţeanu si T. Leuca, Inducţia electromagnetică si tehnologii specifice. Editura Mediamira, Cluj Napoca, 1997
5. Cioc I, Nica C: Proiectarea masinilor electrice, EDP, Bucuresti, 1994.
6. Parlog RC, Galan N, Vasile N, Soran IF, Mihalache M, Melcescu L.ANDREI Gabriel: Metode numerice si algorit:rni de modelare, Brltila, 1997.
7. ATANASJU Gheorghe, MUSUROI Sorin, POROVICI Dorin: Modelare dinamica prin Sirnulink masini electrice, actionari electrice, convertoare statice, Timisoara, 2006
8. BARA Alexandro: Modelarea si simularea sistemelor fuzzy. Cluj-Napoca, 2001.
9. BOBASU Eugen, CAUTIL loan: Modelare si simulare: teorie si aplicatii. Craiova, 2005
10. BOHOSIEVICI Cazimir: Modelarea si optimizarea proceselor de fabricatie. Iasi, 1999
11. BORZA, Emilian Proiectarea asistata de calculator, Ed. UTPress, Cluj Napoca, 2009
12. IANCU Craciun: Modelare matematica: teme speciale. Cluj-Napoca, 2002.
13. VLAD Simona, VLAD Radu: Modelarea si simularea sistemelor discrete. Cluj-Napoca, 2007.
14. ZETU Dumitru, CARA TA Eugen: Modelarea si simularea sistemelor de fabricatie. Iasi, 2001 .
15. ***: Ansys EM - Users Guide.
16. *** FEMM - Users Guide.

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Theoretical notions regarding the modeling and simulation of electric machines.	Free speech, use of existing software in the laboratory	2
2. Numerical modeling of the DC machine.	Free speech, use of existing software in the laboratory	2
3. Numerical modeling of the electrical transformer.	Free speech, use of existing	2

	software in the laboratory	
4. Numerical modeling of the asynchronous machine.	Free speech, use of existing software in the laboratory	2
5. Numerical modeling of stepper synchronous motors	Free speech, use of existing software in the laboratory	2
6. Numerical modeling of synchronous motors with permanent magnets.	Free speech, use of existing software in the laboratory	2
7. Evaluation test. Completion of the laboratory situation / Recovery of laboratory works	Free speech, use of existing software in the laboratory	2
8.3 Project		
Issue the project theme Design of a three-phase electrical transformer Design of an asynchronous electric machine Design of a synchronous electric car	Free speech, use of existing software in the laboratory	2
Determination / realization of geometry depending on the chosen solution	Free speech, use of existing software in the laboratory	4
Choice and definition of materials used. Associating the electromagnetic field model associated with the problem.	Free speech, use of existing software in the laboratory	4
Calculation of operating parameters by the finite element method	Free speech, use of existing software in the laboratory	4
Analysis of operating regimes.	Free speech, use of existing software in the laboratory	6
Verification and critical analysis of the results obtained.	Free speech, use of existing software in the laboratory	4
Completion of the project. Project verification and submission	Free speech, use of existing software in the laboratory	4

Bibliography

1. M. Arion Modelarea şi simularea masinilor electrice, suport curs - Note de curs
2. I.F.Hantila, N. Vasile, B. Crânganu-Creţu, M Silaghi, T. Leuca, "Elemente de circuit cu effect de câmp", Editura ICPE Bucuresti, 1998
3. V. Fireţeanu si T. Leuca, Inducţia electromagnetică si tehnologii specifice. Editura Mediamira, Cluj Napoca, 1997
4. Cioc I, Nica C: Proiectarea masinilor electrice, EDP, Bucuresti, 1994.
5. Parlog RC, Galan N, Vasile N, Soran IF, Mihalache M, Melcescu L.ANDREI Gabriel: Metode numerice si algorit:rni de modelare, Brltila, 1997.
6. ATANASJU Gheorghe, MUSUROI Sorin, POROVICI Dorin: Modelare dinamica prin Sirnulink masini electrice, actionari electrice, convertoare statice, Timisoara, 2006
7. BOBASU Eugen, CAUTIL loan: Modelare si simulare: teorie şi aplicatii. Craiova, 2005
8. BOHOSIEVICI Cazimir: Modelarea si optimizarea proceselor de fabricatie. lasi, 1999
9. BORZA, Emilian Proiectarea asistata de calculator, Ed. UTPress, Cluj Napoca, 2009
10. IANCU Craciun: Modelare matematica: teme speciale. Cluj-Napoca, 2002.
11. VLAD Simona, VLAD Radu: Modelarea si simularea sistemelor discrete. Cluj-Napoca, 2007.

12. ZETU Dumitru, CARA TA Eugen: Modelarea si simularea sistemelor de fabricatie, Iasi, 2001 .
13. ***: Ansys EM - Users Guide.
*** FEMM - Users Guide.

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 the minimum promotion grade - 5 it is necessary to know the fundamental notions required in the topics without presenting detailed details on their content. - For the maximum grade - 10, a thorough knowledge of the treated subjects is required	Oral examination	60,00%
10.6 Laboratory	Ability to apply in practice, in different contexts, the knowledge learned; - Ability to analyze, personal interpretation, originality, creativity;	Oral examination	20,00 %
10.6 Project	Ability to apply in practice the knowledge learned; - Ability to analyze, personal interpretation, originality, creativity;	Project evaluation.	20,00 %
10.8 Minimum performance standard: - Carrying out the works under the coordination of a teacher, in order to solve specific problems and applications, for solving problems specific to electric machines, with the correct evaluation of the existing situation, of the available resources, by correctly evaluating the workload, available resources, the necessary time of completion and risks, under the conditions of application of the 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. Datarelated to thesubject

2.1 Name of the subject	ENERGY SOURCES						
2.2 Holder of the subject	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.3 Holder of the academic seminar/laboratory/project	Assoc. prof. PANTEA MIRCEA DĂNUȚ						
2.4 Year of study	**4**	2.5 Semester	**8**	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	**4**	of which: 2.2 course		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	33 hours
Study using the manual, course support, bibliography and handwritten notes	6
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	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	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 of electricity

5. Conditions (where applicable)

5.1. for the development of the course	video projector, laptop, blackboard.
5.2.for the development of the academic	Mandatory presence at all laboratories;

seminary/laboratory/project	
6. Specific skills acquired	
Professional skills	- C1. Proper implementation of specific fundamental knowledge of mathematics, physics, chemistry, in the field of electrical engineering - C2. Use of fundamental concepts of computer science and information technology - C3. Use of fundamental knowledge of electrotechnics - C4. Design of electrical systems and their 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 course "New energy sources" aims to present energy phenomena in terms of applications in technology and is addressed to students in the engineering department, both in electrical engineering. 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	In addition to the skills offered by the laboratory sessions in the electrical field, they also offer the possibility to evaluate the errors in the experimental determinations performed, but also a better collaboration with colleagues in team work.

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations
Course I. Introduction and presentation of objectives	Video projector, slides Interactive blackboard teaching	2
Course II Solar energy		2
Course III Solar cells		
Course IV. Wind energy		2
Course V. Development of wind engineering		2
Course VI. Wind turbines. Basic principles		2
Course VII. The energy of the seas and oceans		2
Course VIII. Geothermal energy		2
Course IX. Geothermal systems		2
Course X. Hydrogen		2
Course XI. Fuel cells		2
Course XII. Thermoelectric conversion		2
Course XIII. Nuclear power		2
Course XIV. The current stage of installation of nuclear power plants		2

Bibliography

1. Mircea Pantea, New sources of renewable energy Volume 1 ISBN: 978-973-759-580-5, ISBN Vol 1. 978-973-759-581-2, 2008
2. Hall D. O., House J., Biomass as a Modern Fuel, ISES World Congress, Budapest, 1993
3. Ursu I., Physics and technology of nuclear materials, RSR Academy Publishing House, Bucharest, 1982
4. Buta A., General energy and energy conversion, “Traian Vuia” Polytechnic Institute of Timişoara, Faculty of Electrical Engineering, 1982
5. Nițu, V., ş. a., General energy and energy conversion, Didactic and Pedagogical Publishing House, Bucharest, 1980
6. Tomescu F. M., Energy conversion and sources, Bucharest Polytechnic Institute, 1975

8.2 Laboratory	Teaching methods	No. of hours/

		Observations
1. Speed regulation and tracing of operating characteristics (both current - voltage and current - resistance) to 6 12 V motors powered by a 1.5 W solar panel, and filtering the supply voltage	Laboratory presentation	2
2. Light-dependent resistance	Based on the report prepared by the students, after a discussion with the teacher on the paper, we proceed to identify the stand, the components necessary for the work, after which the students make the assembly of the practical part of the paper and only together with the teacher make inexhaustible determinations. At the end, the results obtained face to face are interpreted	2
3. Photodiode		2
4. The phototransistor		2
5. Heating of domestic hot water with the help of solar panels from the laboratory equipment.		2
6. Materials available for LED devices		2
7. Conversion of wind energy into electricity. Valslr PP-H HTM.DN 110. EN1451	Students take tests from all laboratory work.	2

Bibliography

1. Mircea Pantea, New sources of renewable energy Volume 1 ISBN: 978-973-759-580-5, ISBN Vol 1. 978-973-759-581-2, 2008
2. Buta A., General energy and energy conversion, "Traian Vuia" Polytechnic Institute of Timişoara, Faculty of Electrical Engineering, 1982
3. Tomescu F. M., Energy Conversion and Sources, Bucharest Polytechnic Institute, 1975
4. Ursu I., Physics and technology of nuclear materials, RSR Academy Publishing House, Bucharest, 1982
5. Nițu, V., ș. a., General energy and energy conversion, Didactic and Pedagogical Publishing House, Bucharest, 1980
6. Nițu, V., Theoretical bases of energy, RSR Academy Publishing House, Bucharest, 1977
7. Hall D. O., House J., Biomass as a Modern Fuel, ISES World Congress, Budapest, 1993
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9. http://www.lpelectric.ro/en/index_en.html
10. www.panosolare.com
11. www.naturenergy.ro
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	-	Written examination	70 %
10.6 Laboratory	-	Knowledge assessment test	30 %
10.8 Minimum performance standard: offers the formation of skills in the energy field and highlights both the phenomena and methods of conversion of solar, wind, nuclear, geothermal, etc. a. in electricity.			

	Signature of the course holder	Signature of the laboratory project holder
	Ș.l.dr.ing. Pantea Mircea	Ș.l.dr.ing. Pantea Mircea
	Contacts: University of Oradea, Faculty of I.E.T.I. Str. University, no. 1, Building Corp V, floor 2, room V 213 Postal code 410087, Oradea, Bihor county, Romania E-mail: mirceadanutpantea@gmail.com Discord MirceaPD # 1994	
Completion date: 29.08.2022		
Date of endorsement in the department: 01.09.2022	Signature of the department director Prof.univ.dr.ing.inf. Francisc - Ioan HATHAZI Contacts: University of Oradea, Faculty of I.E.T.I. Str. University, no. 1, Building Corp A, floor 2, room A 206 Postal code 410087, Oradea, Bihor county, Romania Tel: 0259-408172, E-mail: francisc.hathazi@gmail.com Signature of the Dean Prof.univ.dr.ing. Mircea Ioan GORDAN Contacts: University of Oradea, Faculty of I.E.T.I. Str. University, no. 1, Building I, Room I003, Postal code 410087, Oradea, Bihor county, Romania Tel .: 0259-408204, E-mail: mgordan@uoradea.ro	
Date of endorsement in the Faculty Board: 23.09.2022	Signature of the Dean Prof.univ.dr.ing. Mircea Ioan GORDAN Contacts: University of Oradea, Faculty of I.E.T.I. Str. University, no. 1, Building I, Room I003, Postal code 410087, Oradea, Bihor county, Romania Tel .: 0259-408204, 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	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		Equipment for Heating, Ventilation and Air Conditioning					
2.2 Holder of the subject		Lecturer phd.eng. ARION MIRCEA NICOLAE					
2.3 Holder of the academic seminar/laboratory/project		Lecturer phd.eng. ARION MIRCEA NICOLAE					
2.4 Year of study	4	2.5 Semester	7	2.6 Type of the evaluation	Ex – Exam 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					
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					8
Examinations					8
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	(Conditions) – Minimum knowledge on fundamental notions of thermodynamics, electromagnetic field theory, electric machines, constituent elements of electrical circuits and how they work.
4.2 related to skills	-Knowledge of the graphics symbols, specific to electrical diagrams

5. Conditions (where applicable)

5.1. for the development of the course	The course can be presented online or face to face, in the amphitheater with modern techniques available: Video projector, Screen, Blackboard, Oral speech

5.2.for the development of the academic seminary/laboratory/project	- The laboratory can be conducted face to face or online - The equipment related to the laboratory class; - Preparation of the report (synthesis material); - Carrying out all laboratory works; - The practical applications will be performed by using the experimental equipments existing in the laboratory (Experimental stands, electrical equipment, high-performance and current measuring devices, modeling software, etc.). - Attendance is mandatory at all laboratories - A maximum of two laboratory works can be recovered (30%); - The participation at laboratory hours below 70% leads to the restoration of the discipline.
6. Specific skills acquired	
Professional skills	- C4. Design of electrical systems and their components - 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 course " Equipment for Heating, Ventilation and Air Conditioning " aims to acquire the basic knowledge of heating, ventilation and air conditioning systems. Is presented the processes control that occur during the operation of heating, ventilation, filtration and air conditioning systems, but last but not least the influence of these systems upon the climatic parameters, the way of calculating the heat demand and the fundamental electrical parameters, ▪ The discipline tries to form the following attitudinal competencies: the manifestation of a positive and respectable attitude towards the scientific field, the optimal and creative capitalization of one's own potential in scientific activities, involvement in scientific innovation, participation in one's own development.
7.2 Specific objectives	▪ The objectives of the discipline are to know and understand the basic functional relationships of equipment for heating, ventilation and air conditioning systems regardless of the energy source used and the effects they produce on the environment, by explaining and interpreting the behavior of electrical circuits, performing calculations and determinations, experimental verification of the basic relations for physical systems encountered in industrial practice, simulation of the operation of electrical circuits with specialized software. ▪ The laboratory activity is focused on applications specific to the chapters taught in the course and aims at the experimental verification of the basic relationships for the physical systems encountered. Carrying out laboratory work offers, in addition to the formation of skills in the electrical field, the use of physical and numerical modeling, sizing of assemblies, correct use of measuring equipment, evaluation of errors in experimental determinations, functional verification, establishing and making ▪ necessary adjustments to achieve parameters design, respectively the performance of the maintenance works of the installations

8. Contents*

8.1 Course	Teaching methods	No. of hours/ Observations

1. Fundamentals regarding heating, ventilation and air conditioning systems	Free speaking, presentation of the course by using video projector and blackboard	2
2, Physiological climate bases	Free speaking, presentation of the course by using video projector and blackboard	2
3. Central heating systems	Free speaking, presentation of the course by using video projector and blackboard	2
4. Ventilation systems for civil premises	Free speaking, presentation of the course by using video projector and blackboard	2
5. Ventilation systems for industrial premises	Free speaking, presentation of the course by using video projector and blackboard	2
6. Air conditioning systems. Maintenance and repair of industrial air conditioning systems	Free speaking, presentation of the course by using video projector and blackboard	2
7. Evaluation test. Completion of the laboratory situation / Recovery of laboratory works	Free speech, use of existing software in the laboratory	2

Bibliography

1. M. Arion – *Echipamente pentru încălzire, ventilație și aer conditionat - Note de curs* , 2020
2. Andrei Damian, Andreea Vartires - *Instalatii de ventilare si climatizare* - partea I, Editura Matrixrom, Bucuresti, 2013.
3. Gheorghe Duţă, Iolanda Colda, Puiu Stoienescu – Instalaţii de ventilare şi climatizare. Editura ARTECNO, Bucureşti, 2002
4. Nagy Stefan – *Utilaj electromecanic industrial* Editura Universitatii din Oradea, 2013
5. Samuel C. Monger HVAC Systems: Operation, Maintenance and Optimization
6. Documentaţie tehnică instalaţii de filtrare si climatizare

AŞHRAE handbook

8.2 Laboratory	Teaching methods	No. of hours/ Observations
1. Presentation of the laboratory, labor protection measures, organization of the laboratory activity.	Free speaking.	2
2. Measuring devices and methods used in heating, ventilation and air-conditioning installations	Free speaking, use of an experimental stand and existing measuring devices in the laboratory	2
3. Study of the operation of electrical equipment intended for heating living premises.	Free speaking, use of an experimental stand and existing measuring devices in the laboratory	2
4. Study of ventilation systems. Experimental determination of pressure variation in air ducts	Free speaking, use of an experimental stand and existing measuring devices in the laboratory	2
5. Air conditioning system with variable refrigerant volume. Determination of operating parameters.	Free speaking, use of an experimental stand and existing measuring devices in the laboratory	2
6. Complex air treatment in an air conditioning system (heating-humidification)	Free speaking, use of an experimental stand and existing measuring devices in the laboratory	2
7. Evaluation test. Completion of the laboratory situation / Recovery of laboratory works	Free speaking, use of an experimental stand and existing	2

	measuring devices in the laboratory	

Bibliography

1 M. Arion – *Echipamente pentru încălzire ventilatie si aer condiționat* – Lucrari de laborator , 2020

2 Gheorghe Duţă, Iolanda Colda, Puiu Stoienescu – Instalaţii de ventilare şi climatizare. Editura ARTECNO, București, 2002

3 Documentaţie tehnică instalaţii de filtrare si climatizare

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 the minimum promotion grade - 5 it is necessary to know the fundamental notions required in the topics without presenting detailed details on their content. - For the maximum grade - 10, a thorough knowledge of the treated subjects is required	Oral examination	60,00%
10.6 Laboratory	Ability to apply in practice, in different contexts, the knowledge learned; Ability to analyze, personal interpretation, originality, creativity;	Oral examination	40,00 %
10.8 Minimum performance standard: Carrying out the works under the coordination of a teacher, in order to solve specific problems of maintenance and diagnosis of ventilation and air conditioning heating systems by correctly evaluating the workload, available resources, the necessary time of completion and risks, under the conditions of application of the 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