UNIVERSITY OF EAST SARAJEVO
FACULTY OF ELECTRICAL ENGINEERING
EAST SARAJEVO

FIRST STUDY CYCLE
STUDY PROGRAM
ELECTRIC POWER ENGINEERING

East Sarajevo, 2023.

ORGANIZATIONAL UNIT	
Name of the organizational unit	Faculty of Electrical Engineering
City	East Sarajevo
Municipality of the organizational unit	East New Sarajevo
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Organizational code in the Treasury of the RS	12510005
PIN of the organizational unit	4400592530093
VAT number of the organizational unit	400592530093
Identity number assigned by the Republic Institute of Statistics	01029606
Dean of the organizational unit	PhD Božidar Popović, Associate Professor

CURRICULUM

FIRST STUDY CYCLE

- ELECTRIC POWER ENGINEERING -

Teaching activities at the Faculty of Electrical Engineering in East Sarajevo are organized in three study cycles. Study cycles are carried out through study programs.

The first study cycle prepares students for a higher degree of study and enables them to acquire general and specific knowledge needed for employment in certain professional jobs. Upon completion of the first study cycle, the academic title of Bachelor of Science (B.Sc.) in Electrical Engineering is acquired, with an indication of the study program. Along with the diploma of the first study cycle, a diploma supplement is also issued for a more detailed insight into the level, nature, content, system and rules of study and the results achieved during studies. The educational degree of the first cycle in all study programs lasts four study years, i.e. eight semesters, which corresponds to 240 ECTS points.

The first study cycle is realized through the following study programs:

- Electric Power Engineering,
- Automation and Electronics,
- Computer Science and Informatics.

The decision for the final study program is made when enrolling at the faculty.

The general goals of the first study cycle at the Faculty of Electrical Engineering in East Sarajevo are efficient and rational higher education of personnel in the field of electrical engineering, through:

- guiding and helping the student during the teaching process,
- the introduction of only one-semester courses with a maximum of six hours of direct teaching,
- relieving teaching content of unnecessary repetitions and facts, with the necessary modernization that follows the rapid development in various areas of electrical engineering, increasing the number of hours of exercises and practical work compared to lectures,
- establishing a system of rules and criteria for quality assurance (QA) of the educational process,
- guidance through optional subjects,
- continuous monitoring and checking of students' knowledge,
- application of modern didactic methods.

Also, a modern multidisciplinary educated electrical engineering graduate who can successfully work in the economy and services where there is a need for this profile of personnel, is educated through:

- the introduction of optional subjects, which under certain conditions can also be subjects from another study program,
- introduction of common program contents for all study programs,
- the introduction of two practically oriented projects, which are valued as special subjects and obligations of professional practice.

The goal of the first study cycle is the professional preparation of the candidate for continuing education, in the second study cycle through:

- hiring teaching staff with recognized scientific results who are capable of motivating students for further professional and scientific training,
- introduction of the most modern teaching content in the professional part of studies, which can be a motivation and challenge for students to engage in scientific work.

General outcome of the learning process at the end of the first study cycle:

- knowledge and understanding of basic principles in the field of study,
- recognition of problems that arise in practice and the possibility of their quick and economical solution, using the most modern technical achievements in the specific field,
- ability to work in a team in a multidisciplinary environment,
- within the specialty and beyond, to follow the development and latest technical achievements and recognize the needs and opportunities to apply these achievements in the environment,
- developing the skills of self-learning, which enables to get the necessary comprehensive education,
- to respect legal regulations and social norms of behavior.

The first two years of study are common for all students, regardless of the chosen study program. All subjects in the first two years are compulsory. Here, students acquire the general knowledge necessary to continue with the chosen study programs.

In the third and fourth year of study, students are directed to the above three study programs. Students acquire knowledge specific to the study program they have chosen. A number of subjects are compulsory, while the rest are optional and chosen by students based on their interests and affinities. After completing eight semesters, each student works on and defends a final thesis. Students are able to apply the theoretical and practical knowledge acquired in targeted study programs in practice, and it also serves as a basis for continuing their studies in the second study cycle.

DEAN

Prof. Božidar Popović

Qualification model				
Study program	**The name of the qualification according to the Law on Professions in RS**	**English name of the qualification**	**Level of educational qualification according to the standard (EKO, EQF)**	**Work permit number**
I - the first cycle				
ELECTRIC POWER ENGINEERING	Дипломирани инжењер електротехнике - 240 ECTS - Електроенергетика	*Bachelor of Science in Electrical Engineering – 240 ECTS – Electric Power Engineering*	**7**	**07.023-3899/09** from 22. 06. 2009.

QUALIFICATIONS STANDARD FOR THE STUDY PROGRAM: ELECTRIC POWER ENGINEERING

1. BASIC CHARACTERISTICS

Study cycle: *First study cycle*
Degree: *Academic*
Study program: *Electric Power Engineering*

Name(s) of qualification (generic part + specific part):

Bachelor of science in Electrical Engineering – 240 ECTS – Electric Power Engineering

Language of study: *English*

Study duration: *The study lasts four years, and the year consists of two semesters (winter and summer).*

Minimum volume - number of ECTS: *240 ECTS credits*

Level: *7*

Conditions/method of admission: For the first study cycle, study program Electric Power Engineering, at the Faculty of Electrical Engineering, University of East Sarajevo, the conditions for the enrollment are prescribed by the law on higher education, the Statute and other acts of the University and the Faculty. All persons who have completed a four-year high school in the Republic of Srpska and Bosnia and Herzegovina, the Republic of Serbia (Agreement on special and parallel connections), as well as students who have completed a four-year high school abroad (subject to nostrification) have the right to enroll in the Faculty of Electrical Engineering. Upon enrollment, an entrance exam in mathematics is taken.

1.1. Introduction to Qualification

Teaching in the study program Electric Power Engineering at the Faculty of Electrical Engineering of the University of East Sarajevo is conducted according to the 2012 curricula. The study program Electric Power Engineering trains highly qualified experts in the field of general electrical engineering and power systems. Through the educational profile of Electrical Engineer - Electric Power Engineering, the skills and knowledge necessary to work with modern technologies in the field of power engineering are acquired. Mastering interdisciplinary areas, as well as collaboration and teamwork skills, which today represent one of the key factors in the areas of maintenance and development of power systems, round off the complete set of engineer education, which is dictated by the modern labor market.

Common program bases and elective contents educate a modern multidisciplinary graduate electrical engineer, who can successfully work in the economy and services where there is a need for this profile of personnel. This goal is achieved through:

- the introduction of optional subjects, which under certain conditions can also be subjects from another study programs,
- introduction of common program content for all study programs, and
- the introduction of two practically oriented projects, which represent special subjects and duties as part of professional practice.

Students are also trained to organize and conduct extracurricular activities at each cycle of education through the organization of competitive and sports content, which develops their leadership, entrepreneurial and team skills.

The first study cycle at the study program Electric Power Engineering aims to acquire fundamental and specialist knowledge and skills in the field of general electrical engineering, analysis of power systems, elements of power systems, production, transmission and electricity distribution. as well as the application of modern technologies from the mentioned and related fields. The student will also acquire the knowledge necessary for further education and training.

By successfully mastering the Electric Power Engineering study program, the student is enabled to effectively apply scientific and professional achievements in the field of general electrical engineering and power engineering in the process of education (secondary and higher education), independent and professional work (maintenance, design and development of power systems), as well as finding new achievements in multidisciplinary fields related to the core areas.

Objectives of the study program:

- achievement of competencies, academic knowledge and specific practically applicable knowledge and skills in the field of electric power engineering,
- application of modern technologies in the process of maintenance, design and development of power systems,
- recognition of problems that arise in practice and the possibility of their quick and economical solution using the most modern technological achievements,
- ability to work in a team in a multidisciplinary environment,
- monitoring the development and latest technical achievements, as well as recognizing the need and possibilities for their application in the environment,
- development of self-learning skills aimed at achieving lifelong education,
- respect for standards, legal regulations, as well as social norms of behavior.

1.2. Reasons for the existence of the qualification - justification

The purpose of this study program is the formation of highly educated personnel for the needs of the economy in the field of electric power engineering.

The current situation, development trends and the needs of the market for engineers in the field of electric power engineering served as the basis for defining the structure and content of this study program. The following strategies and opinions were additionally taken into account when designing the Electric Power Engineering study program:

- Strategy of scientific and technological development of the Republic of Srpska 2012-2016,
- Requirements of chambers of commerce and associations of electrical engineers,
- Opinions of business entities,
- Opinions of experts from various scientific and professional disciplines.

Graduates of this study program acquire a high level of knowledge in the aforementioned field, which will enable them to look at issues more complexly and make adequate decisions and conclusions. The social justification stems from the need for further development of the profession in the field of electric power engineering in the Republic of Srpska - Bosnia and Herzegovina and the surrounding area. The high-quality education offered by this study program is the basis for independent and lifelong pursuit of maintenance and development of power systems, which is one of the important elements that have recently been current and present on the labor market. Support for this study program is also in the function of raising the quality of education and improving the power industry in the Republic of Srpska - Bosnia and Herzegovina, as well as in the function of forming young engineering staff in the Republic of Srpska - Bosnia and Herzegovina.

The program is designed so that upon completion of the basic academic studies of the first cycle, students acquire knowledge and skills for working on engineering projects and tasks in the field of electric power engineering. Graduated students (graduated engineers) are able to apply the acquired knowledge to clearly define the problem and how to solve it, perform an assessment of the feasibility of the solution, create documentation, implement the solution, as well as the ability to work in a team and communicate with experts from other fields. In addition to basic knowledge in mathematics, physics, electrical engineering, electrical measurements, theory of electrical circuits, electronics, electromagnetism and telecommunications, students acquire knowledge and skills in the areas of: analysis of power systems, power plants, electric machines and electric drives, switchgear and protection systems, high voltage engineering, distribution networks and electrical installations, measurement and computer design in the power industry. In addition, the purpose of the study program is to enable permanent further training with the acquired education, that is, the program provides a basis for further master's studies in the field of electric power engineering.

On the basis of the above, it can be said that the justification is reflected in the additional goals of the Electric Power Engineering study program at the Faculty of Electrical Engineering of the University of East Sarajevo:

- Appreciation of the company's strategic determination in those domains that rely on the application of knowledge and skills from the scientific and professional fields of electric power engineering.
- Ensuring that the learning outcomes of the study program correspond to the needs and demands of the market.
- Improving learning outcomes by introducing modern teaching methods, with the use of appropriate laboratory equipment and modern software tools.

- Creating conditions for student mobility.
- Creating conditions for the work of professional practice and projects in successful business entities.
- Achieving national and international cooperation in the implementation of the teaching process within the study program.
- Creating opportunities for lifelong learning even after graduation.

2. COMPETENCES / LEARNING OUTCOMES

A student who completes the Electric Power Engineering study program at the Faculty of Electrical Engineering of the University of East Sarajevo, acquires general knowledge, skills and competences that cover broad areas of general electrical engineering, as well as specialist knowledge, skills and competences in the main areas of electric power engineering: analysis of power systems, electric machines and electric drives, switchgear and protection systems in the power system, electrical installations, computerized design in the power industry and high voltage technology. Regardless of the choice of subjects in the professional part of the study, which enables a narrower profiling towards certain areas of electric power engineering, the student acquires general theoretical and practical knowledge that is fundamental in the areas of general electrical engineering, and which enables an understanding of the area and easier orientation towards certain profiles, as well as easier adaptation to the needs of the labor market.

2.1. List of competencies at the qualification level

KNOWLEDGE

The knowledge that a graduate in electric power engineering should have includes the following:

- fundamental knowledge in the field of electrical engineering, natural sciences, foreign languages,
- fundamental knowledge in the field of electrical measurements, theory of electrical circuits, elements of power systems, production, transmission, distribution and consumption of electrical energy, power electronics, electrical machines and converters,
- specialist knowledge in the field of computer design in the power industry, high voltage techniques, power system protection, electric drives, high voltage measurement techniques, electrical apparatus and measuring systems, switchgear, power plants, electrical installations, management in engineering practice.

SKILLS

The skills that a graduate in electric power engineering should possess include the following:

- planning, design and maintenance of elements of the power system,
- voltage regulation, reactive power balance analysis and reduction of losses in the power system,
- designing insulation and solving problems caused by overvoltages in the power system,
- analysis and elimination of disturbances in the power system, caused by short circuits,
- work analysis, design, implementation and adjustment of relay protections,
- knowledge of electrical and mechanical calculation procedures for the design of switchgear,
- designing and knowledge of characteristics of the power plants and their operation,
- knowledge of operation and handling of high-voltage measuring equipment,

- modeling of elements and simulating the operation mode of the power system using a computer,
- project management in the power industry,
- designing and regulating the operation of electrical machines,
- converter design and operation management of electric drives,
- planning and designing electrical installations and grounding,
- communication and managerial skills,
- independent and team work.

COMPETENCES

Competences that should be possessed by a graduate in electric power engineering include the following:

- supervision and maintenance of the proper operation of the power system,
- identification, analysis and elimination of power system failure modes,
- analysis of the state and optimization of the elements of the power system,
- planning and development of new energy systems,
- supervision and maintenance of proper operation of industrial processes,
- participation and management of projects in the field of electric power engineering and creation of project documentation,
- permanent education and training in the profession,
- management of existing and development of own power companies.

COMPETENCY MATRIX OF STUDY PROGRAM ELECTRIC POWER ENGINEERING	General subjects	Fundamental subjects of engineering	Professional subjects	Projects and students practice	Final thesis
Fundamental knowledge in mathematics, physics, electronics, electrical engineering, computer science and programming technics	X	X			
Independent work with basic software tools	X	X			
Ability to analyse and model different physical manifestations and entities, simple components, devices, and systems from the field of electrical engineering	X	X			
Basic knowledge from the area of electrical measurements, electric circuits theory, elements of electric power systems, production, transmission, distribution and consumption of electrical energy, power electronics, electrical machines, and converters	X	X	X		
Independently conduct experiments, statistical processing of the experimental results, analyse and understand the experiments, formulate, and conduct conclusions to understand the processes, devices or systems	X	X	X	X	X
Ability to analyse the conditions and optimization of the electric power system		X	X	X	X
Ability to apply acquired theoretical knowledge in practice			X	X	X
Ability to apply standards, technical regulations, as well as to understand the influence of the components, devices and systems of electric power engineering, their operation and maintenance			X	X	X
Ability to successfully participate in various teams, to gain basic skills of leadership in the project teams			X	X	
Able to develop critical opinions, to identify and analyse problems, predict behaviour of the selected solution with clear outcome of good and/or bad choice			X	X	X
Able to use scientific and professional literature	X	X	X		
Specially trained for combination of basic knowledge from different scientific and professional areas, considering the specifics of the study program Electric Power Engineering			X	X	X
Competent to apply theoretical and practical knowledge based on scientific principles for solving complex and real problems from practice			X	X	X
Completely trained for continuation of the scientific work, trained for publication of scientific and professional papers in scientific fields, such as general electrical engineering, and electric power engineering		X	X		X
Has developed professional ethics and respect of professional norms			X	X	X
Understanding the importance and role of knowledge, experience and skills in making decisions on all levels of industrial/job environment			X	X	X

2.2. Qualification and course structure

SCHEDULE OF ECTS POINTS ACCORDING TO COURSE GROUPS/list of basic and elective subjects/

Subject group	ECTS (minimum)
General subjects important for the study of engineering	76 ECTS credits
− Mathematics - 1	7,0
− Mathematics - 2	7,0
− Mathematics – 3	6,0
− Numerical Mathematics	6,0
− Fundamentals of Electrical Engineering - 1	7,0
− Fundamentals of Electrical Engineering - 2	7,0
− Physics	6,5
− Physical Fundamentals of Electronics	5,5
− Fundamentals of Computer Technique	5,5
− Introduction to Programming	5,5
− Application Software	3,0
− English Language - 1	2,0
− English Language - 2	2,0

Subject group	ECTS (minimum)
− English Language - 3	2,0
− English Language - 4	2,0
− Introduction to Management	2,0
Fundamental subjects of engineering - compulsory	58 ECTS credits
− Electric Circuits Theory - 1	5,0
− Electric Circuits Theory - 2	5,0
− Electronics - 1	6,0
− Electronics - 2	5,0
− Electromagnetics - 1	6,0
− Electromagnetics - 2	5,0
− Electrical Measurements	5,0
− Object Oriented Programming	6,0
− Programming Languages	5,0
− Fundamentals of Telecommunications	5,0
− Process Computers	5,0
Vocational subjects	68 ECTS credits
− Electroenergetic Networks and Systems - 1	5,0
− Electrical Machines - 1	5,0
− Electrical Machines - 2	6,0
− Electrical Appliances - 1	5,0
− High Voltage Technique - 1	6,0
− High Voltage Technique - 2	5,0
− Power Distribution Facilities	7,0
− Electromotive Plants	5,0
− Power System Protection	7,0
− Computer Aided Design in Electroenergetics	6,0
− Power Electronics - 1	5,0
− Automatic Control Systems	6,0
Elective program - General	5 ECTS credits
− Management in Engineering Practice	5,0
Elective program - Professional	50 ECTS credits
− Electroenergetic Networks and Systems - 2	5,0
− Distribution and Industrial Networks	5,0
− Electrical Appliances - 2	5,0
− Power Plants	5,0
− Electrical Installations with Luminance	5,0
− Measurements in Electroenergetics	5,0
− Electrical Engineering Technologies	5,0
− Microprocessor Control of Electric Drives	5,0
− Power Electronics - 2	5,0
− Electric Power Converters	5,0
Projects and practice	7,0 ECTS credits
− Project – 1	2,0
− Project – 2	2,0
− Ferial Practice	3,0
Final work	5 ECTS credits
− Final Paper (Thesis)	5,0

2.3. Curriculum plan of the Study Program of Electric Power Engineering

	UNIVERSITY OF EAST SARAJEVO - FACULTY OF ELECTRICAL ENGINEERING	
	Study program:	**Electric Power Engineering**

Ordinal number	Subject code	Full name of the course	Status (Compulsory/ Elective)	Conditional subjects	Semester	Number of lessons/ teaching workload (weekly)			ECTS
						L	AE	LE	
FIRST YEAR									
1.	EE-08-1-001-1	Mathematics – 1	C	No	I	3	3	0	7.0
2.	EE-08-1-002-1	Physics	C	No	I	3	1	1	6.5
3.	EE-08-1-003-1	Fundamentals of Electrical Engineering – 1	C	No	I	3	2	1	7.0
4.	EE-08-1-004-1	Fundamentals of Computer Technique	C	No	I	2	0	2	5.5
5.	EE-08-1-005-1	Introduction to Management	C	No	I	2	0	0	2.0
6.	EE-08-1-007-1	English Language – 1	C	No	I	1	1	0	2.0
7.	EE-08-1-008-2	Mathematics – 2	C	No	II	3	3	0	7.0
8.	EE-08-1-009-2	Introduction to Programming	C	No	II	2	1	2	5.5
9.	EE-08-1-010-2	Fundamentals of Electrical Engineering – 2	C	No	II	3	2	1	7,0
10.	EE-08-1-011-2	Physical Fundamentals of Electronics	C	No	II	2	2	0	5.5
11.	EE-08-1-012-2	Application Software	C	No	II	0	0	2	3.0
12.	EE-08-1-013-2	English Language – 2	C	No	II	1	1	0	2.0
				IN TOTAL:		**25**	**16**	**9**	**60**
SECOND YEAR									
1.	EE-08-1-014-3	Mathematics – 3	C	No	III	3	2	0	6.0
2.	EE-08-1-015-3	Electric Circuits Theory – 1	C	No	III	2	2	0	5.0
3.	EE-08-1-016-3	Electrical Measurements	C	No	III	2	1	1	5.0
4.	EE-08-1-017-3	Electronics – 1	C	No	III	3	2	1	6.0
5.	EE-08-1-018-3	Programming Languages	C	No	III	2	1	1	6.0
6.	EE-08-1-019-3	English Language – 3	C	No	III	1	1	0	2.0
7.	EE-08-1-020-4	Numerical Mathematics	C	No	IV	2	2	1	6.0
8.	EE-08-1-021-4	Electric Circuits Theory – 2	C	No	IV	2	1	1	5.0
9.	EE-08-1-022-4	Electromagnetics – 1	C	No	IV	3	3	0	6.0
10.	EE-08-1-023-4	Electronics – 2	C	No	IV	2	1	1	5.0
11.	EE-08-1-024-4	Object Oriented Programming	C	No	IV	2	1	1	6.0
12.	EE-08-1-025-4	English Language – 4	C	No	IV	1	1	0	2.0
				IN TOTAL:		**25**	**18**	**7**	**60**
THIRD YEAR									
1.	EE-08-1-026-5	Electromagnetics – 2	C	No	V	2	2	0	5,0
2.	EE-08-1-027-5	Electrical Machines – 1	C	No	V	2	1	1	5,0
3.	EE-08-1-028-5	Electroenergetic Networks and Systems –1	C	No	V	2	2	0	5,0
4.	EE-08-1-029-5	Power Electronics – 1	C	No	V	2	2	1	5,0

5.	EE-08-1-030-5	Electrical Appliances – 1	C	No	V	2	1	1	5,0
6.	EE-08-1-031-5	Process Computers	C	No	V	2	1	1	5,0
7.	EE-08-1-135-6	Automatic Control Systems	C	No	VI	3	2	0	6,0
8.	EE-08-1-156-6	Electrical Machines – 2	C	No	VI	2	1	2	6,0
9.	EE-05-1-171-6	High Voltage Technique – 1	C	No	VI	3	1	1	6,0
10.	EE-08-1-035-6	Project – 1	C	No	VI	0	0	2	2,0
11.	EE-08-2-xxx-6	Optional subject EPE - 3.1	E	No	VI	2	2	0	5,0
12.	EE-08-2-xxx-6	Optional subject EPE - 3.2	E	No	VI	2	2	0	5,0
					IN TOTAL:	**24**	**17**	**9**	**60**
FOURTH YEAR									
1.	EE-08-1-041-7	Fundamentals of Telecommunications	C	No	VII	2	2	0	5,0
2.	EE-05-1-174-7	High Voltage Technique – 2	C	No	VII	2	1	1	5,0
3.	EE-08-1-128-7	Power Distribution Facilities	C	No	VII	3	1	1	7,0
4.	EE-08-1-044-7	Electromotive Drives	C	No	VII	2	1	1	5,0
5.	EE-08-1-045-7	Ferial Practice	C	No	VII	0	0	4	3,0
6.	EE-08-2-xxx-7	Optional subject EPE - 4.1	E	No	VII	2	2	0	5,0
7.	EE-08-1-136-8	Power System Protection	C	No	VIII	3	2	1	7,0
8.	EE-08-1-132-8	Computer Aided Design in Electroenergetics	C	No	VIII	2	2	1	6,0
9.	EE-08-1-053-8	Project – 2	C	No	VIII	0	0	2	2,0
10.	EE-08-2-xxx-8	Optional subject EPE - 4.2	E	No	VIII	2	2	0	5,0
11.	EE-08-2-xxx-8	Optional subject EPE - 4.3	E	No	VIII	2	2	0	5,0
12.	EE-08-1-054-8	Final Paper	C	No	VIII	0	0	4	5,0
					IN TOTAL:	**20**	**15**	**15**	**60**

Elective courses Electric Power Engineering									
THIRD YEAR									
1.	EE-08-2-036-6	Electrical Appliances – 2	E	No	VI	2	2	0	5,0
2.	EE-08-2-090-6	Power Electronics – 2	E	No	VI	2	2	0	5,0
3.	EE-08-2-038-6	Electrical Engineering Technologies	E	No	VI	2	2	0	5,0
4.	EE-08-2-084-6	Electroenergetic Networks and Systems – 2	E	No	VI	2	2	0	5,0
5.	EE-08-2-106-6	Measurements in Electroenergetics	E	No	VI	2	2	0	5,0
6.		One elective subject from III year of study, VI semester, from other study programs	E	No	VI	2	2	0	5,0
FOURTH YEAR									
1.	EE-08-2-202-7 EE-08-2-202-8	Distribution and Industrial networks	E	No	VII VIII	2	2	0	5,0
2.	EE-08-2-049-7 EE-08-2-049-8	Electric Power Converters	E	No	VII VIII	2	2	0	5,0
3.	EE-08-2-087-7 EE-08-2-087-8	Electrical Installations with Luminance	E	No	VII VIII	2	2	0	5,0
4.	EE-08-2-050-7 EE-08-2-050-8	Power plants	E	No	VII VIII	2	2	0	5,0
5.	EE-08-2-105-7 EE-08-2-105-8	Microprocessor Control of Electric Drives	E	No	VII VIII	2	2	0	5,0
6.	EE-08-2-047-7 EE-08-2-047-8	Management in Engineering Practice	E	No	VII VIII	2	2	0	5,0

7.		One elective subject from IV year of study, corresponding semester, from other study programs	E	No	VII VIII	2	2	0	5,0

FIRST YEAR

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**MATHEMATICS 1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-001-1	compulsory	I	7.0

Teacher	Assistant Professor Nataša Pavlović Komazec
Associate	Assistant Professor Nataša Pavlović Komazec

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	3	0	60	60	0	1.33

total teaching workload (in hours, per semester) W= 3*15 + 2*15 + 0*15 =90 hours	total student workload (in hours, per semester) T= 3*15*S_o + 3*15*S_o + 0*15*S_o = 120 hours

Total workload of the subject (teaching + student): In_{opt}= W + T =90 + 120 = 210 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. build his thought structures, i.e. mathematical thinking, which is the carrier of every scientific endeavor, and especially of engineering creations 2. master basic mathematical terms: relation, function and operation, as well as elements of combinatorics and graph theory 3. master algebraic structures: groupoid, group, ring, field, vector space, matrix 4. learn the methods for solving systems of linear equations 5. master the theory of limit values of real sequences and functions 6. master the elements of differential calculus and its applications
Prerequisites	There are no requirements for listening.
Teaching methods	The teaching process is realized mainly through a frontal form of work - lectures and an interactive form of work - auditory exercises
Subject content per weeks	1. Relations and Functions. Permutations and Combinations. Newton 's Binomial Theorem. 2. Graph Theory. 3. Introduction to Groups, Rings and Fields. The Field of Real Numbers. 4. The Field of Complex Numbers. Polynomial and Rational Functions. 5. Vector Space. Linear Operators. 6. Determinants and Matrices. 7. Systems of Linear Equations: Cramer's Rule, Gauss Elimination Method. 8. Rank of a Matrix. Kronecker-Capelli Theorem. Eigenvalues and Eigenvectors. 9. Scalar Product of Vectors. Unitary Vector Space. Vectors and Geometry in Three Dimensions. 10. Cardinal Number of a Set. A Sequence of Real Numbers. Monotone Sequences. Euler's Number (e). 11. Metric Space. Sequences and Convergence in Metric Spaces. Banach Fixed Point Theorem. 12. Limits of Real Functions. Continuous Function. 13.The Derivative Function. Mean Value Theorems. 14. Applications of the Mean Value Theorem. L'Hopital's Rule. Higher Order Derivatives.

	15. Convex Function. Taylor's Formula. Investigation of Functions.		
Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Murray H. Protter	Basic Elements of Real Analysis, Springer	1998	
R. Magnus	Fundamental Mathematical Analysis, Springer	2020	
H. Anton, C. Rorres	Elementary Linear Algebra -11th edition, Wiley	2014	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
A. Croft, R. Devison, M. Hargreaves, J. Flint	Engineering Mathematics, Person	2017	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	homework	5	5%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**PHYSICS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-002-1	compulsory	I	6,5

Teacher(s)	Dr Zoran Ljuboje, full professor
Associate(s)	Vesna Miletic, msc

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	1	1	$3*15*S_o$	$1*15*S_o$	$1*15*S_o$	1.4

total teaching workload (in hours, per semester) W=3*15 + 1*15 +1*15=75h	total student workload (in hours, per semester) $T=3*15*S_o+ 1*15*S_o +1*15*S_o = 105h$

Total workload of the subject (teaching + student): In_{opt}= 75 + 105 = 180 hours per semester

Learning outcomes	Introducing students to the basics of certain areas of physics that are necessary for electrical engineering students. Introducing students to classical mechanics. Introducing students to certain areas of thermodynamics and optics.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises, seminar papers, laboratory exercises
Subject content per weeks	1. Introduction. Introduction to Newtonian mechanics. Kinematics. Translational movement of a material point. 2. Kinematics. Rotational motion of a material point. 3. Dynamics of the material point. 4. Work, power and energy. 5. Introduction to the special theory of relativity 6. Dynamics of rotational motion of solid bodies. 7. Oscillatory motion. 8. Examples of harmonic oscillator 9. Mechanical waves. 10. Elements of thermodynamics. An ideal gas. 11. Work and heat. Laws of thermodynamics. 12. Basics of the molecular-kinetic theory of gases. 13. Maxwell-Boltzmann statistics. 14. Introduction to optics. Geometric optics 15. Wave optics

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Zoran Ljuboje	FIZIKA, ETF, Univerzitet u Istočnom Sarajevu.	2008.	3-132
G. Dimić, M. Mitrinović	ZBIRKA ZADATAKA IZ FIZIKE, Viši kurs D Beograd	1991.	-

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

I. V. Saveljev	OPŠTI KURS FIZIKE, prevod ETF Sarajevo	1969.	-

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	midterm exam I	20	20%
	midterm exam II	20	20%
	lab. exercises/practical work	15	15%
	final exam (written/oral)	40	40%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	
Full name of the course	**FUNDAMENTALS OF ELECTRICAL ENGINEERING – 1**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-003-1	Compulsory	I	7.0

Teacher(s)	PhD Srđan Lale, assistant professor
Associate(s)	MA Bojana Čolić, BA Zorana Mandić

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	1	60	40	20	1.33

total teaching workload (in hours, per semester) W= 3*15 + 2*15 + 1*15 =90 hours	total student workload (in hours, per semester) T= 3*15*So + 2*15*So + 1*15*So = 120 hours

Total workload of the subject (teaching + student): Inopt= W+T=Uopt= 90 + 120 = 210 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. Explain the basic concepts and laws of electrostatics and DC currents, 2. Calculates electric force, field, potential, voltage, flux and electric field energy, 3. Determine the expression for the capacitance of various systems of conducting bodies 4. Apply Ohm's law, Kirchhoff's laws, and electrical network theorems to solve electrical networks with DC currents, with and without capacitors, 5. Use the knowledge of this subject in the Fundamentals of Electrical Engineering - 2 and subsequent electrical engineering subjects
Prerequisites	There are no requirements for registering and listening to the subject.
Teaching methods	Lectures (with with the use of modern audiovisual equipment), auditory exercises and laboratory exercises. Students also receive homework.
Subject content per weeks	1. Concept of electric load. Coulomb's law and electric field vector. Distributed charges. 2. Electric field potential, potential difference and voltage. Electric dipole. 3. Vector flux. Gauss's law. Examples of the application of Gauss's law. 4. Conductors in an electrostatic field. Electrostatic induction. Mirroring method. 5. Capacitors and capacitance. Series, parallel and mixed connection of capacitors. 6. Dielectrics in the electric field. Generalized Gauss's Law. Boundary conditions. 7. Energy and forces in the electrostatic field. Movement of a charged particle. 8. Electric current. Kirchhoff's first law. Specific resistance and conductivity. 9. Resistors. Ohm's and Joule's law. Resistor connections. Ground resistance. Electric generators and the term emp. 10. Simple circuit. Maximum power transmission condition. Potential and voltage. Equivalence of voltage and current generator. 11. Kirchhoff's second law. Direct application of Kirchhoff's laws for solving electrical networks. Method of contour currents. 12. Node potential method. Triangle-star equivalences and vice versa. Linearity theorem. 13. Reciprocity theorem. Thevenen's and Norton's theorem. Theorem of compensation. Theorem of power conservation in electrical. networks. 14. Special forms of electrical network. Elements of non-linear electrical network. Electrical networks with capacitors. 15. Electrostatic networks and Kirchhoff's laws. Energy balance in networks with capacitors.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
David J. Griffiths	Introduction to electrodynamics 3rd edition, Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-805326-X	1999	
Viktor Hacker, Christof Sumereder	Electrical Engineering: Fundamentals, De Gruyter Oldenbourg	2020	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Charles A. Gross, Thaddeus A. Roppel	Fundamentals of Electrical Engineering 1st Edition, CRC Press	2012	
Leonard S. Bobrow	Fundamentals of Electrical Engineering (The Oxford Series in Electrical and Computer Engineering) 2nd Edition, Oxford University Press	1996	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures	5	5%
	lab. exercises/practical work	15	15%
	midterm exam I	25	25%
	midterm exam II	25	25%
	Final exam	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**FUNDAMENTALS OF COMPUTER TECHNIQUE**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-004-1	compulsory	I	5,5

Teacher(s)	PhD Nikola Davidović, Assistant professor
Associate(s)	Marko Malović, Teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	52.5	0	52.5	1.75

total teaching workload (in hours, per semester) W= 2*15 + 0*15 + 2*15 =60 hours	total student workload (in hours, per semester) T= 2*15*So + 0*15*So + 2*15*So = 105 hours

Total workload of the subject (teaching + student): In_{opt}= W + T =60 + 105 = 165 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. To understand the basic mathematical and electronic foundations of computers, as well as to design switching networks with basic logic circuits. 2. To understand the architecture of the processor and the working principle of memory and peripheral units. 3. To understand the functions of system software, especially operating systems. 4. To understand the concepts of algorithm and program, as well as the principle of algorithm application in computer programs.
Prerequisites	No requirements.
Teaching methods	lectures, laboratory exercises
Subject content per weeks	1. Composition, general and hierarchical model of a computer system. 2. Mathematical basics of computers, conversion of numbers from decimal to other number systems and vice versa. 3. Arithmetic operations in the binary system, signed numbers, 1st and 2nd complement. 4. Floating point numbers, BCD numbers, ASCII code. 5. Electronic basics of computers, Boolean algebra, logical operations AND, OR and NOT. 6. Logic circuits, logic functions, minimization. 7. Combination networks, adder. Sequential networks, RS flip-flop. Registers, buses. 8. Memories, hierarchy of memory devices, 2D and 3D memories, RAM, ROM and stack memories. 9. Computer architecture, processor, data transfer. 10. Phases in instruction execution, obtaining and executing Load, Add and Store commands. 11. Types of instructions. 12. Addressing modes. 13. Data structures. Scalar data, arrays, data structures, lists, stores and queues. 14. Peripheral devices. Input and output devices. Mass storage, tapes, disks. 15. Operating systems, division and composition, processor management, memory, file system.
Compulsory literature	

Author(s)	Publication title, publisher	Year	Pages (from-to)
Obradović, S.	Fundamentals of Computer Engineering, VISER	2014.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Stallings, W.	Computer organization and architecture	2013.	
Andrew Tanenbaum	Structured Computer Organization, Pearson	2013.	
Đorđević, Radivojević, Punt, Stanisavljević	Fundamentals of Computer Engineering, Akademska misao	2017.	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	homework	5	5 %
	lab. exercises/practical work	10	10%
	midterm exam I	25	25 %
	midterm exam II	25	25 %
	final exam (written/oral)	30	30%
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**INTRODUCTION TO MANAGEMENT**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-005-1	compulsory	I	2

Teacher(s)	Nenad Marković, asst. prof.
Associate(s)	-

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	0	30	0	0	1

total teaching workload (in hours, per semester) W= 2*15= 30 h	total student workload (in hours, per semester) T= 2*15*S_o= 30 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 30 + 30 = 60 hours per semester

Learning outcomes	After successful completion of the course, student will be able to: 1. critically understand key management theories, concepts and principles, 2. application of the management function to solve problems, identify the manager's position in the organization, 3. understand the historical influence of management on today's management process, 4. understand the internal and external environment of the organization and its culture, 5. identify the steps in the decision-making process, 6. understand the impact of organizational strategy and organizational structure, 7. understand the importance of leadership, teamwork and human resource management, 8. anticipates the problems they will face during career development as managers or team members.
Prerequisites	-
Teaching methods	Presentations, Case studies
Subject content per weeks	1. Management 2. History of management 3. Organizational environment and culture 4. Planning and decision making 5. Organizational strategy 6. Organizational structure and design 7. Human resource management 8. Team management 9. COLLOQUIUM 10. Leadership 11. Communication management 12. Change and innovation management

	13. Control 14. Motivating employees 15. Managing operations

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Stephen P. Robbins, Mary Coulter	Management Prentice Hall, Eleventh edition	2012	-

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
David Boddy	Management – An Introduction Prentice Hall, Fifth Edition	2011	-

Obligations, forms of knowledge assessment and grading	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	Activity and attendance at lectures	10	10%
	Midterm exam	39	39%
	final exam (written/oral)	51	51%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO **Faculty of Electrical Engineering**	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**ENGLISH LANGUAGE 1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-007-1	compulsory	I	2

Teacher(s)	Darko Kovačević, PhD, associate professor
Associate(s)	

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
1	1	-	15	15	-	1

total teaching workload (in hours, per semester) W=15 + 15 = 30	total student workload (in hours, per semester) T=15 + 15 = 30

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 hours per semester

Learning outcomes	1. basic knowledge of morphology and syntax of the English language; 2. fundamentals of conversation related to general topics and general professional topics in electrical engineering; 3. ability to understand, translate and describe verbally and in writing text units written in English and related to general topics and general professional topics in electrical engineering 4. ability to create shorter text units related to general topics and general professional topics in electrical engineering
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	method of demonstration, method of practical work, method of written work, method of reading and working on the text, method of conversation, method of oral presentation
Subject content per weeks	1. A Beginner's guide to Electrical Engineering. | Basic word order in English sentences (1). Present Simple Tense. Present Continuous Tense. 2. Electrical Laws and Theorems. | Basic word order in English sentences (2). Past Simple Tense. Past Continuous Tense. 3. Branches of Electrical Engineering. | Present Perfect Tense. Past Perfect Tense. 4. The History of the Smartphone. | Expressing Future. 5. The Importance of Computer Technology in Your Engineering Career | Nouns. 6. A Brief History of Automation | Pronouns. 7. A History of Automation: The Rise of Robots and AI. | Articles. 8. Computers - The Beginnings. | Adjectives and Adverbs. 9. The First and Second Generation of Computers. | Prepositions. . 10. What is Digital Technology? Different Types of Microcomputers. Differences between PLCs and Microcontrollers. | Conjunctions. 11. Augmented Reality. 12. Active and Passive Voice. 13. Augmented Intelligence. 14. Direct and Indirect Speech 15. Electrical Engineering: The 13 Most Influential Trends.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. Swan, C. Walker	A Good Grammar Book, Oxford University Press	1997	
D. Kovačević	English Language for Electrical Engineers 1: General Concepts | Faculty of Electrical Engineering of the University of East Sarajevo; Academic Mind	2021	

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	15	15 %
	positively evaluated seminar paper	5	5 %
	activity in lectures/exercises	10	10 %
	first test	20	20 %
	second test	20	20%
	Final examination		
	final examination (oral)	30	30 %
	TOTAL	100	100 %
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**MATHEMATICS 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-008-2	compulsory	II	7,0

Teacher(s)	Vidan Govedarica, PhD, full professor
Associate(s)	Vidan Govedarica, PhD, full professor; Nataša Pavlović Komazec, PhD, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	3	0	60	60	0	1.33

total teaching workload (in hours, per semester) W= 3*15 + 3*15 + 0*15 =90 h	total student workload (in hours, per semester) T= = 3*15*S_o + 3*15*S_o + 0*15*S_o = 120 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 90 + 120 = 210 hours per semester

Learning outcomes	By mastering this subject, the students will be able to: 1. build their thought structures, i.e. mathematical thinking, which is the carrier of every scientific endeavor, and especially of engineering creations 2. master the integrals of functions of one variable and their applications 3. master the differential calculus of functions of several variables 4. master curvilinear, multiple and surface integrals and their applications 5. master the methods for solving ordinary differential equations 6. uses acquired knowledge in professional subjects.
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	The teaching process is realized mainly through a frontal form of work - lectures and an interactive form of work - auditory exercises.
Subject content per weeks	1. The problem of calculating the area and the definition of the definite integral. Properties of integrable functions. 2. Primitive function and indefinite integral. The connection between the definite and the indefinite integral. Newton-Leibnitz formula. 3. Methods of integration. Improper integrals. 4. Integration of rational, irrational and trigonometric functions. Integrals that are not elementary functions. Applications of the definite integral. 5. Metric spaces. Functions of multiple variables. Convergence and continuity. 6. Differentiability of functions of several variables. Necessary and sufficient conditions of differentiability. Differentials of higher order and Taylor's formula. 7. Concept of mapping. Jacobian determinant. Implicit functions. The notion of a local extreme and the necessary conditions for its existence. 8. Sufficient conditions for the existence of a local extreme. Sylvester's criterion. Conditional extremes. 9. Curvilinear integrals by coordinates. Curvilinear arc integrals. 10. The concept of multiple integrals. Double integrals. Triple integrals. 11. Change of variables in multiple integrals. Green-Riemann theorem.

	12. Surface integrals by coordinates. Surface integrals per surface area. Stokes theorem and Ostrogradsky. 13. Scalar and vector field. Divergence and rotor. Classification of vector fields. 14. Ordinary differential equations. Differential equations of the first order. 15. Linear differential equations of higher order. Differential equations with constant coefficients. Euler's equation.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
R. Courant	Differential and integral calculus, Vol. I, Ishi Press	2010	-
Y. Zou	Multi-variable calculus – A first step, De Gruyter	2020	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Wei-Chau Xie	Differential equations for engineers, Cambridge University Press	2010	-
A. K. Sharma	Text book of multiple integrals, Discovery Publishing House	2005	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	Activity and attendance at lectures	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**INTRODUCTION TO PROGRAMMING**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-009-2	compulsory	II	5,5

Teacher(s)	Snježana Milinković, PhD, assistant professor
Associate(s)	Zorana Štaka, MSc, senior teaching assistant; Marko Malović, BSc, teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	2	36	18	36	1.2

total teaching workload (in hours, per semester) W= 2*15 + 1*15 + 2*15 =75 h	total student workload (in hours, per semester) T= = 2*15*S_o + 1*15*S_o + 2*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 75 + 90 = 165 hours per semester

Learning outcomes	By mastering this subject, the students will: 1. be capable of independent algorithmic solving of programming problems of low or medium complexity 2. be able to work with software development tools in the C programming language 3. be able to implement algorithmically solved problems in the C programming language 4. be able to use function modules of low or medium complexity in the C programming language.
Prerequisites	There are no requirements for registering and listening to the course. Required prior knowledge from the subject: Fundamentals of computer technique.
Teaching methods	Lectures, auditory exercises, laboratory exercises, knowledge verification tests, homeworks.
Subject content per weeks	1. Introduction to general programming fundamentals. Algorithms. 2. C program structure. Basic data types in the C programming language. Variables, declaration, format specifications. 3. Data input and output (printf, scanf). 4. Program development process: editing, compiling, linking, testing and debugging. 5. Preprocessor directives. Comments. Casting. 6. Operators in C. 7. Control flow: sequence. 8. Control flow: selection. 9. Control flow: iteration (loops). 10. Control flow: nested loops. 11. Arrays – General concepts. 12. 1D arrays of numbers. 13. 2D arrays of numbers. 14. Algorithms for working with 1D and 2D arrays. 15. Strings. U-I conversion. Strings functions.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

K. N. King	C Programming: A Modern Approach, W. W. Norton & Company, 2nd Edition	2008	-

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Kernighan, B.W., Ritchie, D.M.	Programming language C, Prentice Hall, Second edition	1988	-

Obligations, forms of knowledge assessment and grading	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	defense of laboratory exercises	15	15%
	knowledge verification tests	10	10%
	class activities (optional)	4	4%
	homework assignments (optional)	4	4%
	midterm exam I (optional)	25	25%
	midterm exam II (optional)	45	45%
	final exam (written/oral)	70	70%
	TOTAL	108	108%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**FUNDAMENTALS OF ELECTRICAL ENGINEERING – 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-010-2	Compulsory	II	7.0

Teacher(s)	PhD Srđan Lale, assistant professor
Associate(s)	MA Bojana Čolić, BA Zorana Mandić

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	1	60	40	20	1.33

total teaching workload (in hours, per semester) W= 3*15 + 2*15 + 1*15 =90 hours	total student workload (in hours, per semester) T= 3*15*So + 2*15*So + 1*15*So = 120 hours

Total workload of the subject (teaching + student): Inopt= W+T=Uopt= 90 + 120 = 210 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. Explain the basic concepts and laws of electromagnetism and time-varying currents, 2. Calculates magnetic force, induction, flux, magnetic field and magnetic energy, 3. Determine the expression for inductance and intermediate inductance of different contours, 4. Apply Faraday's law and Kirchhoff's law to the calculation of magnetic circuits, 5. Distinguish general equations of electrical networks with time-varying currents and simple periodic currents, 6. Apply the phasor and complex calculus for solving simple periodic current circuits, 7. Explain the basic concepts of symmetrical three-phase systems and the ways of forming a rotating magnetic field, 8. Use the knowledge of this subject in the following subjects of electrical engineering studies.
Prerequisites	There are no requirements for registering and listening to the subject.
Teaching methods	Lectures (with with the use of modern audiovisual equipment), auditory exercises and laboratory exercises. Students also receive homework.
Subject content per weeks	1. Electromagnetic force. Magnetic field and vector of magnetic induction. Bio-Savar's law. 2. Magnetic induction vector flux and the law of conservation of magnetic flux. The movement of the charged particle in the electr. and magn. field. Hall effect. 3. Ampere's law. Basic concepts about the magnetic properties of matter. Generalized Ampere's law. 4. Boundary conditions. Kirchhoff's laws for magnetic circuits. 5. Calculation methods. Permanent magnet magnetic circuit. Dielectrics in the electric field. Generalized Gauss's Law. Boundary conditions. 6. Induced electric field. Faraday's law electromag. induction. Eddy currents, surface effect and proximity effect. Inductances. Measurement of magnetic induction. Flow equation. 7. Energy and forces in the magnetic field. General method of calculating magnetic forces.

	8. General equations of electricity. network with time-varying currents. Generalized Kirchhoff laws. 9. Periodic and simple periodic quantities. Mean and effective value. Basic passive elements in the periodic regime. Rotating vectors. 10. Phasor diagrams. Resonance and anti-resonance. Active and reactive power. Power factor. 11. Kirchhoff's laws in complex form. Impedance and admittance. Equivalences. 12. Methods and theorems in complex form. Simply resonant and anti-resonant circuit. Transformers. 13. Polyphase and three-phase systems, generators and receivers. 14. Two-phase and three-phase rotating mag. field. Basic concepts of synchronous and asynchronous motor. 15. Frequency dependencies. Resonance and anti-resonance phenomena in more complex networks. R, L and C at high frequencies.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
David J. Griffiths	Introduction to electrodynamics 3rd edition, Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-805326-X	1999	
Viktor Hacker, Christof Sumereder	Electrical Engineering: Fundamentals, De Gruyter Oldenbourg	2020	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Charles A. Gross, Thaddeus A. Roppel	Fundamentals of Electrical Engineering 1st Edition, CRC Press	2012	
Leonard S. Bobrow	Fundamentals of Electrical Engineering (The Oxford Series in Electrical and Computer Engineering) 2nd Edition, Oxford University Press	1996	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures	5	5%
	lab. exercises/practical work	15	15%
	midterm exam I	25	25%
	midterm exam II	25	25%
	Final exam	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Firstyear of study	

Full name of the course	**PHYSICAL FUNDAMENTALS OF ELECTRONICS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-011-2	compulsory	II	5,5

Teacher(s)	Dr Zoran Ljuboje, full professor
Associate(s)	Vesna Miletic, msc

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	52.5	52.5	0	1.75

total teaching workload (in hours, per semester) W=2*15 + 2*15 +0*15 = 60 h	total student workload (in hours, per semester) T= 2*15*S_o + 2*15*S_o + 0*15* S_o = 105 h
Total workload of the subject (teaching + student): In_{opt}= 60 + 105 = 165 hours per semester	

Learning outcomes	1. Introducing students to the basics of atomic and quantum physics from the aspect of electronics development 2. Introduction to the electronic theory of metals and the zone theory of solids. 3. Getting to know the properties of semiconductors, contact phenomena and optoelectronics.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises, seminar papers.
Subject content per weeks	1. Introduction. Introduction to atomic physics. Movement of electrons in electric and magnetic fields. 2. Milliken's experiment. Absolute blackbody radiation. 3. Photoelectric effect. X-ray radiation. 4. Model of the atom. Bohr's model of the atom. 5. Introduction to quantum mechanics. Wave properties of a particle. The Schrödinger equation. 6. Tunnel effect. Heisenberg's uncertainty principle. 7. Quantum mechanical model of the atom. 8. Electronic theory of metals. Fermi-Dirac distribution function. 9. Distribution of electrons by momentum and energy. Electrical conductivity of metals. 10. Zone theory of solids. Strong link approximation. Weak link approximation 11. Effective mass of electrons. 12. Semiconductors. Specific conductivity of own and mixed semiconductors. 13. Current density equation for semiconductors. Hall effect. 14. Contact phenomena. Metal-semiconductor contact. Busbar contact, p-n contact. 15. Introduction to optoelectronics. Photoresistors. Photodiodes. LEDs. Lasers.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Zoran Ljuboje	Fizički osnovi elektronike, ETF, Univerzitet u Istočnom Sarajevu	2016.	3.-145.
G. I. Epifanov	Fizika čvrstog stanja, prevod ETF Sarajevo	1969.	8.-38., 147.-298.

Ž. Pržulj, Z. Ljuboje, Z. Ivić	Zbirka riješenih zadataka iz fizike čvrstog stanja, ETF, Univerzitet u Istočnom Sarajevu	2016.	7.-29., 121.-197.

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	midterm exam I	20	20%
	midterm exam II	20	20%
	test and seminar papers	15	15%
	final exam (written/oral)	40	40%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**APPLICATION SOFTWARE**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-012-2	compulsory	II	3,0

Teacher(s)	dr Marijana Ćosović, assistant professor
Associate(s)	dr Nikola Davidović, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
0	0	2	0	0	60	2

total teaching workload (in hours, per semester) W= 0*15 + 0*15 + 0*15 =30 h	total student workload (in hours, per semester) T= 0*15*S_o + 0*15*S_o + 2*15*S_o = 60 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 30 + 60 = 90 hours per semester

Learning outcomes	1. To understand the way a computer works, as well as to know the basic parts and programs necessary for its functioning. 2. To create and edit text documents using the tools offered by the word processing program. 3. To use and edit tabular documents in work. 4. To use various calculation operations by entering mathematical and logical formulas offered by the program for processing tabular calculations. 5. To create and edit a presentation using the tools offered by the program for creating presentations.
Prerequisites	There are no requirements for registering and listening to the course.
Teaching methods	Laboratory exercises
Subject content per weeks	1. Word processors. Working environment: menu, submenus. 2. Saving and exiting the program. Opening a saved document. 3. Text marking (copying, moving, deleting, clipboard - concept). 4. Paragraph (meaning: paragraph mark, procedures: insert, split, join). Paragraph editing 5. Programs for working with tables and spreadsheet calculations (concept). Starting up. 6. Working environment. Workbook, worksheet (comparison Word: document, page). 7. Cell, data entry, movement. Editing the contents of a cell. 8. Insertion, deletion: rows and columns; cell contents. Cell formatting. 9. Changing column width and row height. Work with worksheets. 10. Calculation using formulas. Copying formulas, absolute and relative addressing. Functions concept. Using the Help and Wizard. 11. Programs for creating presentations (concept). Starting up. Work environment. Help. Opening, recording, closing, finding documents. 12. Working with presentation pages in different views. 13. Inserting, deleting, and copying slides. Text input. Change the appearance of the text. 14. Entry of images and other objects. Formatting objects. Adding a diagram.

	15. Internet. Client-server architecture. Programs for working with electronic mail.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
J. Lambert, C. Frye	Microsoft Office Step by Step (Office 2021 and Microsoft 365)	2022	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	homework	5	5 %
	midterm exams	60	60 %
	final exam (written/oral)	30	30 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO **Faculty of Electrical Engineering**	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**ENGLISH LANGUAGE 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-013-2	compulsory	II	2

Teacher(s)	Darko Kovačević, PhD, associate professor
Associate(s)	

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
1	1	-	15	15	-	1

total teaching workload (in hours, per semester) W=15 + 15 = 30	total student workload (in hours, per semester) T=15 + 15 = 30

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 hours per semester

Learning outcomes	1. basic knowledge of morphology and syntax of the English language; 2. familiarization with terminology from different areas of information and communication technologies; 3. fundamentals of conversation related to general topics and general professional topics in electrical engineering; 4. ability to understand, translate and describe verbally and in writing text units written in English and related to general topics and general professional topics in electrical engineering 5. ability to create shorter text units related to general topics and general professional topics in electrical engineering
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	method of demonstration, method of practical work, method of written work, method of reading and working on the text, method of conversation, method of oral presentation
Subject content per weeks	1. How computers changed the world. The effect of cyberbullying on children. | Modal verbs (1) 2. What is a computer? | Modal verbs (2) 3. Peripherals you can use with your computer. | Modal verbs (3) 4. Inside a computer. | Conditional sentences (type 0 and 1) 5. Computing and health. | Conditional sentences (type 2) 6. What is an operating system. | Conditional sentences (type 3) 7. The software development cycle. Application | Mixed conditionals 8. What is graphics software? 9. Multimedia. 10. Programming languages. | Verbals: Participle 11. A day in the life of a computer operator/programmer | Verbals: Gerund 12. Computer network types. | Verbals: Infinitive 13. Computer network architecture. Network topology | Gerund and Infinitive 14. What are the advantages of the Internet? 15. Benefits of the Internet and social media.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. Swan, C. Walker	A Good Grammar Book, Oxford University Press	1997	
D. Kovačević	English Language for Electrical Engineers 2: ICT | Faculty of Electrical Engineering of the University of East Sarajevo; Academic Mind	2021	

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
S. R, Esteras & E. M. Fabre	Professional English in Use: ICT, Cambridge University Press	2007	1-67

	Type of student work evaluation	**Points**	**Percentage**

Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	15	15 %
	positively evaluated seminar paper	5	5 %
	activity in lectures/exercises	10	10 %
	first test	20	20 %
	second test	20	20%
	Final examination		
	final examination (oral)	30	30 %
	TOTAL	100	100 %
Certification date			

SECOND YEAR

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	

Full name of the course	**MATHEMATICS 3**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-014-3	compulsory	III	6,0

Teacher(s)	Vidan Govedarica, PhD, full professor
Associate(s)	Milica Bošković, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	0	63	42	0	1.4

total teaching workload (in hours, per semester) W= 3*15 + 2*15 + 0*15 =75 h	total student workload (in hours, per semester) T= = 3*15*S_o + 2*15*S_o + 0*15*S_o = 105 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 75 + 105 = 180 hours per semester

Learning outcomes	By mastering this subject, the students will be able to: 1. master the theory of degrees and Fourier series and their applications 2. solve systems of differential equations 3. master the theory of functions of a complex variable 4. master the Laplace transform and its applications 5. use acquired knowledge in professional subjects.
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	The teaching process is realized mainly through a frontal form of work - lectures and an interactive form of work - auditory exercises.
Subject content per weeks	1. Numerical series. 2. Uniform convergence of series of functions. Uniform convergence of series. 3. Graded series. Differentiation and power-order integration. Maclauren's series. 4. Systems of orthogonal functions. Generalized Fourier series. Bessel's inequality and Parseval's equality. Trigonometric series. 5. Fourier series. Convergence of the Fourier series. Dirichlet's theorem. Fourier integral and Fourier transform. 6. Gamma and beta functions. Solving differential equations using series. Bessel differential equation and Bessel functions. 7. Systems of ordinary differential equations. Systems of linear differential equations. 8. The concept of a function of a complex variable. Continuity and derivative. Cauchy-Riemann conditions. 9. Conformal mapping. Bilinear function. 10. Elementary functions of the Cauchy-Gursa integral theorem. 11. Cauchy's basic integral formula. Applications of Cauchy's basic integral formula. 12. Taylor's and Laurent's series. Singularities of analytical functions. The concept of residue and Cauchy's theorem on residues. 13. The concept of Laplace transform. Properties of the Laplace transform.

	14. Convolution of functions. Inverse Laplace transform and applications of Laplace transform. 15. Concept of partial differential equation. Partial equations of the first order. Equations of mathematical physics.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
R. Magnus	Fundamental mathematical analysis, Springer	2020	-
R. H. Dyer, D. E. Edmunds	From real to complex analysis, Springer	2014	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
P. Dyke	An introduction to Laplace transforms and Fourier series, Springer	2014	-
R. P. Agarwal, K. Perera, S. Pinelas	An introduction to complex analysis, Springer	2011	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	Activity and attendance at lectures	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	
Full name of the course	**ELECTRIC CIRCUITS THEORY – 1**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-015-3	compulsory	III	5,0

Teacher(s)	Srđan Lale, PhD, assistant professor
Associate(s)	Marko Ikić, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W= 2*15 + 2*15 + 0*15 =60 h	total student workload (in hours, per semester) T= = 2*15*S_o + 2*15*S_o + 0*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 90 = 150 hours per semester

Learning outcomes	Knowledge and skills are acquired for: 1. study of various physical and non-physical phenomena based on the terms model, element, characteristic. 2. analysis of electrical circuits in the frequency domain. 3. analysis of elements with two approaches (quadrupoles) as basic units of transmission systems. 4. understanding and application of the elementary theory of reactive electrical filters.
Prerequisites	There are no requirements for registering and listening to the course. Required prerequisites: Fundamentals of electrical engineering 1 and 2, Mathematics 1, 2, 3, Physics.
Teaching methods	Teaching is conducted in the form of lectures, auditory exercises and demonstration exercises on the computer. Learning, tests, assignments and consultations.
Subject content per weeks	1. Introduction. Electric circuit. Electric circuit element, characteristic of the element, division. 2. Single access elements, resistor, capacitor, inductor. 3. Elements with multiple accesses, coupled inductors, controlled voltage and current source. 4. Multi-access elements, impedance converter, gyrator, ideal and real operational amplifier. 5. Harmonic analysis of circuits with periodic nonsinusoidal sources. Representation of a periodic nonsinusoidal function using simple periodic functions. 6. Spectral analysis of a complex periodic function. Application of Fourier's series. The mean and effective value of a complex periodic quantity. 7. Factors that characterize the shape of the complex periodic curve. Power calculation. 8. Introduction to passive reciprocal networks with two approaches (quadrupoles). 9. Different systems of quadrupole equations, primary parameters. 10. Input impedances and four-pole transfer functions. Secondary parameters. 11. T and Pi quadrupole, gamma and reverse gamma quadrupole.

	12. Series, parallel and cascade connection of quadrupoles. 13. Elementary filter theory, filter cascade. General procedure for determining the bandwidth of symmetrical reactive filters. 14. K-filters LPF, HPF, bandpass and non-bandpass filters. Disadvantages of K-filters. 15. Filters with derived cells. Eliminating the shortcomings of K-filters, filter chains.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
R. C. Dorf, J. A. Svoboda	Introduction to Electric Circuits, 9th Edition, Wiley	2013	-
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
D. P. Kanoussis	Introduction to electric circuits theory, Vol. 1 (The electrical engineering series)	2017	-
C. P. Steinmetz	Theory and calculation of electric circuits, Watchmaker Publishing	2010	-

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	
Full name of the course	**ELECTRICAL MEASUREMENTS**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-016-3	compulsory	III	5,0

Teacher(s)	asst. professor PhD Miodrag Forcan
Associate(s)	asst. professor PhD Miodrag Forcan, asst. MA Goran Vuković, asst. MA Nikola Kukrić

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	45	0	45	1.5

total teaching workload (in hours, per semester) W= 2*15 + 0*15 + 2*15 =60 h	total student workload (in hours, per semester) T= = 2*15*S_o + 0*15*S_o + 2*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 90 = 150 hours per semester

Learning outcomes	1. Basic knowledge of metrology and standards of electrical measuring quantities. 2. Basic knowledge of measurement systems and statistical analysis of the measuring results. 3. Basic knowledge of measuring instruments, signal generators, sensors and transducers. 4. Basic knowledge of measuring methods, measurement-information technology, and measurement information systems. 5. Basic knowledge of measuring electrical and non-electric quantities.
Prerequisites	There is no conditionality related to other subjects (no prerequizites).
Teaching methods	Lectures(L), laboratory classes/exercises (LE).
Subject content per weeks	1. Introduction. Metrology, measurement standards, measurement traceability, and calibration hierarchy. 2. International System of Quantities (ISQ) and International System of Units (SI). Realization of SI units for electrical quantities. 3. Measurement errors and statistical analysis of the measuring results. Measurement uncertainty. 4. Measuring instruments. Instrument types and performance characteristics. 5. Electronic instruments. Data acquisition and signal processing systems. 6. Recording, storage, and display devices. Oscilloscopes. 7. Signal generators and analysers. 8. Measurement of resistance, inductance, and capacitance. 9. Measurement bridges and compensators. 10. Measurement of power and energy. Smart electricity meters. 11. Instrument transformers. 12. Sensors and transducers. 13. Measurement of non-electric quantities. Measurement of temperature. 14. Measurement reliability and safety systems. 15. Measurement-information technology and measurement information systems.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Prithwiraj Purkait, Budhaditya Biswas, Santanu Das, Chiranjib Koley	Electrical and Electronics Measurements and Instrumentation, McGraw Hill Education, New Delhi.	2013	-
Alan S. Morris, Reza Langari.	Measurement and Instrumentation - Theory and Application, Academic Press - Elsevier.	2016	
V. Radenković, V. Milenković	Električna mjerenja, EF Niš, ETF I. Sarajevo	2004	
S. Damjanović, M. Banjanin, M. Ćosović, M. Forcan	Praktikum za laboratorijske vježbe iz električnih mjerenja, ETF I. Sarajevo	2016	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
			-

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	I partial exam (colloquia)	20	20%
	II partial exam (colloquia)	20	20%
	laboratory exercises	15	15%
	seminar paper	10	10%
	Final exam		
	test paper	15	15%
	oral examination	15	15%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	Firs study cycle / Second year of study	

Full name of the course	**ELECTRONICS 1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-017-3	compulsory	III	6

Teacher(s)	PhD Božidar Popović, Associate Professor
Associate(s)	MSc Goran Vuković

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	1	45	30	15	1

total teaching workload (in hours, per semester) W=3*15 + 2*15 + 1*15 = 90 h	total student workload (in hours, per semester) T=3*15*S_o + 2*15*S_o + 1*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = = 90 + 90 = 180 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. Understanding and analyzing the operation of semiconductor diodes, making correct conclusions about polarization, ways and conditions of operation. 2. Understanding and analysis of bipolar transistor operation, making correct conclusions about polarization, methods and conditions of operation. 3. Understanding and analyzing the operation of unipolar transistors, making correct conclusions about polarization, methods and conditions of operation. 4. Understanding and knowledge of the basic concepts of operation and ways of connecting individual components in analog and digital electronic circuits. 5. Understanding, defining, analyzing, discussing and solving problems, tasks related to the operation of electronic components in direct current and alternating mode. 4. Understanding the principles of operation and analysis of single-stage amplifier circuits (BJT, JFET, MOSFET).
Prerequisites	No prerequisites.
Teaching methods	Lectures, auditory exercises, laboratory exercises
Subject content per weeks	1. Student obligations and assessment. Current-voltage characteristics of diodes, threshold voltage, static and dynamic resistance (ideal and real diodes). 2.Analysis of diode operation in direct polarization and inverse polarization (operating point, temperature dependence, capacitance). 3. Rectifiers, switches, Schottky diodes, Zener diodes, LEDs, photodiodes, Rectifier circuits with diodes. 4. Analysis of bipolar transistor (BJT) operation. Static characteristics of the bipolar transistor. Fields of operation of BJT transistors. 5. Determination of the operating point of the BJT transistor. Temperature stabilization of circuits with BJT transistors. 6. Polarization of BJT. Polarization of parallel connected BJTs. Limitations in the operation of BJT transistors.

	7. Ebers-Moll model of a bipolar transistor. Equivalent PI circuit of BJT transistor for small signals. Equivalent circuit of BJT transistor for small signals. TTL - logic circuit (inverting circuit). DTL - logic circuits (AND, OR, NOT, NOR). 8. JFET operation analysis. Static characteristic of JFET. Limitations in JFET operation 9. Polarization of JFET. Equivalent to the small signal circuit of the JFET. JFET in switching mode. 10. Analysis of operation of MOSFET with built-in channel. Static characteristics of embedded channel MOSFETs. Limitations in MOSFET operation. Analysis of MOSFET operation with an induced channel. 11. Static characteristics of MOSFET with an induced channel. Vertical MOSFET - VMOS, CMOS. Polarization of MOSFETs (built-in, induced channel). Equivalent to the MOSFET small-signal circuit. 12. Features of the amplifier. Single stage amplifiers. Analysis of AC-coupled amplifier with bipolar transistor in connection with ZE, ZB, ZC. 13. Analysis of an AC-coupled amplifier with a JFET coupled with ZS, ZG, ZD, Analysis of an AC-coupled amplifier. 14. Two-stage amplifier. Amplifiers with direct coupling-level shifters (with Zener diode, with transistor). Darlington configuration and cascode amplifier. Amplitude and phase characteristics of the amplifier - Bode diagrams. 15. Phototransistor. Optocoupler. IGBT. Thyristor and other semiconductor components from the same family.

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
G. McWhorter, A. J. Evans	Basic Electronics, Master Publishing, Inc.	2004	

Additional literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
A. S. Sedra, K. C. Smith	Microelectronics Circuits, Sounders College Publishing	1991	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	midterm exams	35	35%
	lab. exercises/practical work	10	10%
	final exam (written/oral)	50	50%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	

Full name of the course	**PROGRAMMING LANGUAGES**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-018-3	compulsory	III	6,0

Teacher(s)	Snježana Milinković, PhD, assistant professor
Associate(s)	Miljan Sikimić, MSc, senior teaching assistant; Zorana Štaka, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	60	30	30	2

total teaching workload (in hours, per semester) W= 2*15 + 1*15 + 1*15 =60 h	total student workload (in hours, per semester) T= = 2*15*S_o + 1*15*S_o + 1*15*S_o = 120 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 120 = 180 hours per semester

Learning outcomes	By mastering this subject, the student will: 1. understand advanced programming concepts in procedural programming languages, 2. be capable of practical implementation of advanced concepts of procedural programming in the programming language C, 3. be able to implement and test more complex programs in the C language using static and dynamic data structures, 4. be able to implement and test more complex programs in the C language using advanced concepts in working with functions.
Prerequisites	There are no requirements for registering and listening to the course. Required prior knowledge from the subjects: Fundamentals of computer technique, Introduction to programming.
Teaching methods	Lectures, auditory exercises, laboratory exercises, knowledge verification tests.
Subject content per weeks	1. Introduction. Chronology of development and characteristics of programming languages. 2. Classification of programming languages. 3. Syntax of programming languages. Formal syntax description. 4. Data types concept. 5. Pointers in C. 6. Advanced data types. 7. Dynamic memory allocation. Implementing arrays in a dynamic memory area in C programming language. 8. Subprograms – general concepts. Functions and procedures. Functions in C. 9. Transfer of arguments. Recursion.Memory classes. 10. Structures in C. 11. Union in C. 12. Files – general concepts.

	13. Input/output, text and binary files in C programming language. 14. Dynamic data structures. 15. Internet and web technologies - basic concepts.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Kernighan, B.W., Ritchie, D.M.	Programming language C, Prentice Hall, Second edition	1988	-

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
B. C. Pierce	Types and Programming Languages, The MIT Press	2002	-

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	defense of laboratory exercises	15	15%
	knowledge verification tests	10	10%
	midterm exam I (optional)	35	35%
	midterm exam II (optional)	35	35%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO **Faculty of Electrical Engineering**			
	Study program: *Electric Power Engineering*			
	First study cycle	Second year of study		
Full name of the course	**ENGLISH LANGUAGE 3**			

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-019-3	compulsory	III	2

Teacher(s)	Darko Kovačević, PhD, associate professor
Associate(s)	

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
1	1	-	15	15	-	1

total teaching workload (in hours, per semester) W=1*15 + 1*15 + 0*15= 30 h	total student workload (in hours, per semester) T=1*15*S_o + 1*15*S_o + 0*15*S_o = 30 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 30 + 30 = 60 hours per semester

Learning outcomes	1. familiarization with the characteristic language constructions related to the use of the English language in technical sciences, with special reference to the discourse of electrical engineering and information and communication technologies. 2. familiarization with terminology in English from various fields of technical sciences, with special reference to the discourse of electrical engineering and information and communication technologies; 3. advanced conversation related to various areas and topics related to technical sciences, with special reference to areas and topics from electrical engineering and information and communication technologies; 4. familiarization with terminology and ways of textual presentation of information related to the historical development of various phenomena, devices and inventions important for electrical engineering and information and communication technologies; 5. ability of understanding, translation and verbal and written description of textual units written in English and related to technical sciences, with an emphasis on electrical engineering and information and communication technologies; 6. ability to create text units related to technical sciences, with an emphasis on electrical engineering and information and communication technologies.
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	method of demonstration, method of practical work, method of written work, method of reading and working on the text, method of conversation, method of oral presentation
Subject content per weeks	1. Electricity Transmission. 2. A Brief History of Hydroelectricity. 3. History of Telephone. 4. History of Fiber Optics. 5. The History and Development of Batteries. 6. The History of Electric Motor Technology: a Journey through Time. 7. A Brief History of Programming: Why Functional Programming Matters? 8. A Brief History of the Early Internet. 9. The History of the Integrated Circuit. 10. Microprocessor History and Background. 11. A Brief History of Embedded Systems: Computer Hardware and Software. 12. A Brief History of Embedded Systems: Networking and IoT 13. A Brief History of Embedded Systems: Cloud, DC and SDN. 14. History and Origins of Magnetism. 15. The History of Digitalisierung in Five Phases.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

D. Kovačević	Collection of texts for English Language 3 with exercises and assignments	2020	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Obligations, forms of knowledge assessment and grading	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures/exercises	15	15 %
	positively evaluated seminar paper	5	5 %
	activity in lectures/exercises	10	10 %
	first test	20	20 %
	second test	20	20%
	Final examination		
	final examination (oral)	30	30 %
	TOTAL	100	100 %
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	

Full name of the course	**NUMERICAL MATHEMATICS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-020-4	compulsory	IV	6.0

Teacher	Assistant Professor Nataša Pavlović Komazec
Associate	Assistant Professor Nataša Pavlović Komazec

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	3	0	42	63	0	1.4

total teaching workload (in hours, per semester) W= 2*15 + 3*15 + 0*15 =75 hours	total student workload (in hours, per semester) T= $2*15*S_o + 3*15*S_o + 0*15*S_o$ = 105 hours

Total workload of the subject (teaching + student): In_{opt}= W + T = 75 + 105=180 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. master the numerical methods of solving nonlinear equations and systems 2. master various types of interpolation of functions and their applications 3. knows the methods of numerical integration 4. master various types of approximation of functions 5. knows the methods for numerical solution of ODE 6. uses acquired knowledge in professional subjects
Prerequisites	There are no requirements for listening
Teaching methods	The teaching process is realized mainly through a frontal form of work - lectures and an interactive form of work - auditory exercises.
Subject content per weeks	1. Introduction to Numerical Mathematics. Error Analysis. 2. Nonlinear Equations. Localization of the solution of the equation. Bisection Method. 3. Fixed-Point Iteration Method. 4. Secant Method. Newton's Method. 5. Linear Systems. Matrix Norm. Direct methods. Iterative methods. Jacobi and Gauss Seidel Method. 6. Eigenvalues and Eigenvectors. Leverrier Method, Krylov Method. 7. Interpolation by Polynomials. Lagrange Interpolation. 8. Newton Interpolation and Divide Differences. Interpolation Using Equally Spaced Points. Trigonometric Interpolation. 9. Piecewise Linear and Cubic Spline Interpolation. Inverse interpolation. 10. Numerical Differentiation. 11. Numerical Integration. Newton–Cotes quadrature formulas. 12. Quadrature Formulas of Gaussian Type. Orthogonal Polynomials 13. Approximation of functions. Mean Square Approximation. The Method of Least Squares. Uniform Approximation. 14. Numerical Ordinary Differential Equations. Euler's Method. Runge-Kutta Methods. 15. Boundary Value Problems of Ordinary Differential Equations. Finite Difference Methods. Shooting Methods.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

K. E. Atkinson	An Introduction to Numerical Analysis (2nd edition), Wiley	1989.	
S. D. Conte, Carl de Boor	Elementary Numerical Analysis - An Algorithmic Approach (3rd edition), McGraw-Hill	1981.	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Parviz Moin	Fundamentals of Engineering Numerical Analysis, Cambridge University Press	2010.	
R. W. Hamming	Numerical Methods for Scientists and Engineers, Dover Publications	1986.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	homework	5	5%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	
Full name of the course	**ELECTRIC CIRCUITS THEORY – 2**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-021-4	compulsory	IV	5,0

Teacher(s)	Srđan Lale, PhD, assistant professor
Associate(s)	Marko Ikić, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W= 2*15 + 1*15 + 1*15 =60 h	total student workload (in hours, per semester) T= = 2*15*S_o + 1*15*S_o + 1*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 90 = 150 hours per semester

Learning outcomes	Knowledge and skills are acquired for: 1. Study of electric circuits with time-space characteristics (electric circuits with distributed parameters, telegrapher's equations). 2. Analysis of electrical circuits in the time domain. State space and state equations. Analogies with similar dynamic systems. 3. Analysis of electrical circuits in the complex domain. Laplace transform. An example of the behavior of simple practical circuits during the transient process. 4. Studying the topology of electric circuits. Introduction to graph theory. Matrix methods for the analysis of electrical circuits. Computer methods for the analysis of electrical circuits. Work with self-developed software packages and professional package PSPICE.
Prerequisites	There are no requirements for registering and listening to the course. Required prerequisites: Fundamentals of electrical engineering 1 and 2, Mathematics 1, 2, 3, Numerical mathematics, Physics.
Teaching methods	Teaching is conducted in the form of lectures, auditory exercises and demonstration exercises on the computer. Learning, tests, assignments and consultations.
Subject content per weeks	1. Analysis of circuits with distributed parameters. Telegrapher's equations. 2. Propagation equations in the stationary state for the case of a simple periodic source. Propagation constant and characteristic impedance. 3. Representation of the stationary mode using traveling waves. Factor of voltage and current reflection. Line closed by impedance. 4. Line without distortion. Lossless line, quarter-wave transformer. Short-circuited and open line without losses, occurrence of standing waves and resonance. 5. Analysis of electrical circuits in the time domain. State sizes and state space. 6. Equations of state, independent initial conditions. Solving the equation of state, classical method. 7. Circuits of the first order, response of the circuit to a constant and simple periodic excitation function. Application of computers for solving equations of state of higher order.

	8. Integral transformations for the analysis of electric circuits. Ohm's law in the operational area. 9. Equivalent circuit method in the s-domain. Thevenen's and Norton's theorem in the s-domain. 10. Superpositional integrals in the analysis of electric circuits. Network functions. 11. Diamel's and convolutional integral for determining the response of an electric circuit. 12. Basic concepts from graph theory, subgraphs, path, contour, tree, section. 13. Topological matrices of circuits. Interrelationships of topological matrices of circuits. 14. Basic laws of electrical networks in matrix form. 15. Computer methods for the analysis of electrical circuits.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
R. C. Dorf, J. A. Svoboda	Introduction to Electric Circuits, 9th Edition, Wiley	2013	-
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
D. P. Kanoussis	Introduction to electric circuits theory, Vol. 1 (The electrical engineering series)	2017	-
C. P. Steinmetz	Theory and calculation of electric circuits, Watchmaker Publishing	2010	-

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	
Full name of the course	**ELECTROMAGNETICS - 1**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-022-4	compulsory	IV	6

Teacher(s)	Darko Šuka, Assistant Professor
Associate(s)	Darko Šuka, Assistant Professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	3	0	45	45	0	1,0

total teaching workload (in hours, per semester) W= 3*15 + 3*15 + 0*15 =90 hours	total student workload (in hours, per semester) T= 3*15*S_o + 3*15*S_o + 0*15*S_o = 90 hours

Total workload of the subject (teaching + student): In_{opt}= W + T = 90 + 90 = 180 hours in semester

Learning outcomes	By mastering this subject, the student will be able to: 1. evaluate the importance of fundamental experiments for the development of science in general, especially their basic role in electrical engineering, 2. recognize and understand problems that arise in practice, 3. realizes mathematical models of problems that arise in practice, 4. find a quick and economical solution using the most modern calculation and design techniques, 5. develop the skill of self-learning and upgrading knowledge, understand the importance of compliance with technical regulations and norms and legal regulations in this area of electrical engineering.
Prerequisites	Required prior knowledge of the subjects: Fundamentals of Electrical Engineering I and II and Mathematics I, II and III.
Teaching methods	The frontal method is used for lectures, and the interactive method is used for exercises. For seminar papers and homework, individual and group methods are combined
Subject content per weeks	1. Introduction to macroscopic electromagnetic fields. Definition and specificity of the electromagnetic field. 2. Electric and electrostatic field. Coulomb's law. Field and potential. Point and line electrostatic dipole. 3. Electrostatic field equations in vacuum. Conductors in an electrostatic field. Electrode systems. 4. Image theorems in the plane and spherical mirrors 5. Field of parallel differently charged threads. The field of two non-coaxial conducting sheaths 6. Image theorem in a cylindrical mirror. The electrostatic field in the material environment. Gauss's law of the vector field E, Di P. 7. Densities of bound charges and the field in the dielectric. Field equations in the material environment. Modified image theorem in a plane mirror, Boundary conditions, and the law of refraction in an electrostatic field. 8. Capacitance. Energy in the electrostatic field.

	9. Poisson's and Laplace's equation. Dirac function in electrostatics. The integral form of Poisson's equation. 10. Stationary current field. Current and current density. Continuity equation. Ohm's and Joule's law. The resistors. Point current source. Kirchhoff's laws in integral and differential form. 11. Boundary conditions and the law of refraction. Charge distribution in a stationary current field. Duality of stationary current and electrostatic field, Character theorem in the stationary current field. Conductors in a perfect dielectric. Grounding devices. 12. Stationary magnetic field. Magnetic scalar and magnetic vector-potential. Bio−Savar's law. 13. Magnetic field in the presence of matter. Boundary conditions and the law of refraction. 14. Character theorems in flat and cylindrical ferromagnetic mirrors. 15. Modified image theorem in a plane ferromagnetic mirror.

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Božidar M. Krstajić	Electromagnetics with a methodical collection of tasks, Faculty of Electrical Engineering, University of East Sarajevo	2016.	9 to 284

Additional literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Antonije R. Đorđević	Electromagnetics, Academic Thought and ETF Belgrade	2008.	
B. Notaroš, V. Petrović, M. Ilić, A. Đorđević, B. Kolundžija, M. Dragović	A collection of exam questions and assignments from Electromagnetics, ETF Belgrade and Academic Thought	2002.	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	Firs study cycle / Second year of study	

Full name of the course	**ELECTRONICS 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-023-4	compulsory	IV	5

Teacher(s)	PhD Božidar Popović, Associate Professor
Associate(s)	MSc Goran Vuković

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15 + 1*15 + 1*15 = 60 h	total student workload (in hours, per semester) T=2*15*S_o + 1*15*S_o + 1*15*S_o = 90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = = 60 + 90 = 150 hours per semester

Learning outcomes	1. Understanding and recognizing, constructing and analyzing the operation of electronic circuits. 2. Distinguishing, recognizing and understanding the characteristics of circuits with and without feedback as well as the type and topology of feedback. 3. Distinguishing and understanding the principles of operation and ways of applying power amplifiers, constant current sources, differential amplifiers, as well as possessing the knowledge for their application. 4. Understanding, recognition and application of linear circuits with OP for the realization of complex circuits. 5. Designing and analyzing the work of linear converters and oscillators.
Prerequisites	Attended course and basic knowledge of electronics 1
Teaching methods	Lectures, auditory exercises, laboratory exercises
Subject content per weeks	1. Equivalent circuit and current gain of BJT at high frequencies. Equivalent circuit of unipolar transistors at high frequencies. Miller's theorem. Cutoff frequency of the amplifier. 2. Feedback loops, circuit structure. Circular amplification, types, topology, properties of feedback circuits. Effect of negative feedback on bandwidth. 3. Effect of negative feedback on impedance. Series-parallel series-series, parallel-series, parallel-parallel feedback. 4. Basic characteristics and division of large signal amplifiers. Amplifier in class A with transformer coupling. Non-linear distortions. 5. Symmetric amplifier in class A, B. Complementary amplifier in class B. Class AB amplifiers. Amplifier overload protection. Amplifiers in class C and D 6. Current mirrors. Widlar current source, Wilson current source. MOS current mirrors. Widlar's current source with MOS transistors 7. Differential amplifiers. 8. Differential amplifier with BJT and active load, with FET transistors.

	9. Basic properties of OP. Ideal's OP. Linear circuits with ideal operational amplifiers. 10. Real OP. Frequency characteristics of operational amplifiers. 11. Block diagram. Diode rectifiers. Rectified voltage filtering. Zener diode stabilization. Parallel and sequential stabilization. 12. Linear voltage stabilizers. Integrated voltage stabilizers. Current and temperature protection 13. Oscillators of simple periodic oscillations. Oscillation condition and frequency. Nonlinear amplitude control of the output voltage amplitude. 14. RC oscillators. Wien bridge oscillator. Phase shift oscillator. Stabilization of frequency and amplitude of oscillation. LC oscillators (Collpic, Hartley), Quartz crystal, Pierce oscillator.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
A. S. Sedra, K. C. Smith	Microelectronics Circuits, Sounders College Publishing	1991	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
G. McWhorter, A. J. Evans	Basic Electronics, Master Publishing, Inc.	2004	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	midterm exams	35	35%
	lab. exercises/practical work	10	10%
	final exam (written/oral)	50	50%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	

Full name of the course	**OBJECT-ORIENTED PROGRAMMING**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-024-4	compulsory	IV	6,0

Teacher(s)	Danijel Mijić, PhD, Associate Professor
Associate(s)	Milica Vuković, teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	60	30	30	2

total teaching workload (in hours, per semester) W= 2*15 + 1*15 + 1*15 = 60 h	total student workload (in hours, per semester) T= $2*15*S_o + 1*15*S_o + 1*15*S_o$ = 120 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 120 = 180 hours per semester

Learning outcomes	1. Knowledge of the basic concepts of object-oriented programming 2. Application development skills using the object-oriented paradigm 3. Application of object-oriented concepts in a specific programming language 4. Ability to apply acquired knowledge to solve specific problems in practice
Prerequisites	None
Teaching methods	lectures, auditory exercises, laboratory exercises
Subject content per weeks	1. Introduction to object-oriented programming. Object-oriented paradigm. 2. Abstraction. Definition of objects. 3. Encapsulation. 4. Definition of class. 5. Creation of objects. 6. Constructors. 7. Destructors. Destruction of objects. 8. Access to class functions and attributes. 9. Class inheritance. Generalization. Inheritance. Methods of performance. 10. Abstract classes. Polymorphism. 11. Virtual basic classes. 12. Templates. Generic mechanism. Generating template functions. 13. Exceptions. Syntax. Exception handling. 14. Input/output. Streams. Classes for input/output streams. 15. Standard library. Container classes. General purpose classes.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Lafore, R.	Object-Oriented Programming in C++, Sams Publishing	2002	

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Obligations, forms of knowledge assessment and grading	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	lab. exercises/practical work	20	20%
	midterm exams	50	50%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO **Faculty of Electrical Engineering**	
	Study program: *Electric Power Engineering*	
	First study cycle / Second year of study	

Full name of the course	**ENGLISH LANGUAGE 4**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-025-4	compulsory	IV	2

Teacher(s)	Darko Kovačević, PhD, associate professor
Associate(s)	

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
1	1	-	15	15	-	1

total teaching workload (in hours, per semester) W=1*15 + 1*15 + 0*15 = 30 h	total student workload (in hours, per semester) T=1*15*S_o + 1*15*S_o + 0*15*S_o = 30 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 30 + 30 = 60 hours per semester

Learning outcomes	1. familiarization with the characteristic language constructions related to the use of the English language in technical sciences, with special reference to the discourse of electrical engineering and information and communication technologies. 2. familiarization with terminology in English from various fields of technical sciences, with special reference to the discourse of electrical engineering and information and communication technologies; 3. advanced conversation related to various areas and topics related to technical sciences, with special reference to areas and topics from electrical engineering and information and communication technologies; 4. ability of understanding, translation and verbal and written description of textual units written in English and related to technical sciences, with an emphasis on electrical engineering and information and communication technologies; 5. ability to create text units related to technical sciences, with an emphasis on electrical engineering and information and communication technologies.
Prerequisites	There are no special requirements for taking courses and taking exams.
Teaching methods	method of demonstration, method of practical work, method of written work, method of reading and working on the text, method of conversation, method of oral presentation
Subject content per weeks	1. Evolution of machine learning. 2. The top myths about advanced AI 3. Future proof: cool gadgets to look forward to 4. Foldable gadgets are the future of tech 5. How much overengineering do you do? 6. What is IoT? – A Simple Explanation of the Internet of Things 7. Embedded systems - an overview 8. Introduction to embedded systems 9. Wireless power transmission 10. What is Web 3.0? A brief introduction and it's benefits. 11. What is the semantic web? 12. A complete guide to 7 renewable energy sources. 13. Energy efficiency. Guide to energy efficient devices. 14. What is the smart grid? 15. 5 ways smart grid technology is pushing renewable energy.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
D. Kovačević	Collection of texts for English Language 4 with exercises and assignments	2019	

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Lj. Bartolić	Technical English in Electronics and Electrical Power Engineering, Školska knjiga, Zagreb	1994	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	15	15 %
	positively evaluated seminar paper	5	5 %
	activity in lectures/exercises	10	10 %
	first test	20	20 %
	second test	20	20%
	Final examination		
	final examination (oral)	30	30 %
	TOTAL	100	100 %
Certification date			

THIRD YEAR – COMPULSORY SUBJECTS

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering ***Study program:*** *Electric Power Engineering* First study cycle | Third year of study	

Full name of the course	**ELECTROMAGNETICS - 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-026-5	compulsory	V	5

Teacher(s)	Darko Šuka, Assistant Professor
Associate(s)	Darko Šuka, Assistant Professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W= 2*15 + 2*15 + 0*15 =60 hours	total student workload (in hours, per semester) T= 2*15*S_o + 2*15*S_o + 0*15*S_o = 90 hours

Total workload of the subject (teaching + student): In_{opt}= W + T = 60 + 90 = 150 hours in semester

Learning outcomes	By mastering this subject, the student will be able to: 1. evaluate the importance of Maxwell's equations for the development of science in general, especially their basic role in electrical engineering, 2. recognize and understand problems that arise in practice, 3. realizes mathematical models of problems that arise in practice, 4. find a quick and economical solution using the most modern calculation and design techniques, 5. develop the skill of self-learning and updating knowledge, 6. understand the importance of compliance with technical regulations and norms and legal regulations in this area of electrical engineering.
Prerequisites	Required prior knowledge of the subjects: Fundamentals of Electrical Engineering I and II, Mathematics I, II and III and Electromagnetics -1.
Teaching methods	The frontal method is used for lectures, and the interactive method is used for exercises. For seminar papers and homework, individual and group methods are combined.
Subject content per weeks	1. Time-varying fields. Quasi-stationary magnetic fields, 2. Own and mutual inductances. Quasi-stationary field energy. 3. Inductances of a two-wire line, coaxial cable, one phase of a three-phase line and mutual inductance of two parallel two-wire lines. 4. Maxwell's equations. Continuity equation, Maxwell's equations for stationary media. 5. Characteristics of Maxwell's equations. Vorticity and origin of the field of vectors E, D, H, and B 6. Boundary conditions and the law of refraction. Potential matching. Hertz's potential. 7. Complex vectors. 8. Complex form of Maxwell's equations. Pointing's theorem 9. Complex Pointing vector, the mean value of the Pointing vector.

	10. Propagation of electromagnetic waves. 11. Uniform waves in a homogeneous dielectric. 12. A plane wave in a homogeneous conductive medium (cases of a good, ideal conductor and a real dielectric. 13. Reflection and refraction of plane waves, Standing waves. 14. Reflection and refraction of waves whose direction of propagation is normal to the separating plane 15. Reflection and refraction of waves whose direction of propagation is at an arbitrary angle to the plane of separation. Fresnel coefficients. Snell's law. Snell's law in complex form.

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Božidar M. Krstajić	Electromagnetics with a methodical collection of tasks, Faculty of Electrical Engineering, University of East Sarajevo	2016.	285 to 443

Additional literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Antonije R. Đorđević	Electromagnetics, Academic Thought and ETF Belgrade	2008.	
B. Notaroš, V. Petrović, M. Ilić, A. Đorđević, B. Kolundžija, M. Dragović	A collection of exam questions and assignments from Electromagnetics, ETF Belgrade and Academic Thought	2002.	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10%
	midterm exam I	30	30%
	midterm exam II	30	30%
	final exam (written/oral)	30	30%
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**ELECTRICAL MACHINES – 1**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-027-5	compulsory	V	5

Teacher(s)	Srđan Jokić, PhD, assistant professor
Associate(s)	Srđan Jokić, PhD, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15+1*15+1*15=60 h	total student workload (in hours, per semester) T=2*15*S_o+1*15*S_o+1*15*S_o=90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60+90 = 150 hours per semester

Learning outcomes	1. Getting to know the working principles of transformers and induction machines 2. Ability to determine the parameters and characteristics of electrical machines 3. Getting to know the principles of regulation and starting of electrical machines 4. Getting to know the operation of electrical machines in the power system 5. Getting to know the procedures for modelling of transformers and induction machines.
Prerequisites	There are no requirements for registering and listening to the course. Required prior knowledge from the subjects: Fundamentals of electrical engineering 1 and 2, Electric circuits theory 1 and 2 and Electromagnetics-1.
Teaching methods	lectures, auditory exercises, laboratory exercises, seminar work, field teaching
Subject content per weeks	1. Transformers: Kapp's diagram, Autotransformer, 2. Three-phase transformation, 3. Heating and cooling, 4. Laws of similarity, 5. Open-circuit and short-circuit experiments, 6. Starting transformer in open-circuit mode, 7. Higher harmonics, Asymmetries, 8. Asynchronous machines, Phase voltage, 9. Rotating field, 10. Slip ring asynchronous machines, 11. Torque in the slip function M=f(x), 12. Equivalent scheme and parameter estimation, 13. Starting of the machines, 14. Speed regulation, 15. Single-phase motor.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
S. N. Vukosavić	Electrical Machines, 2013th Edition, Springer	2012	
I. Boldea, L. N. Tutelea	Electric Machines: Steady State, Transients, and Design with MATLAB®, 1st Edition, CRC Press	2009	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10 %
	test/midterm exam	30	30 %
	lab. exercises	10	10 %
	final exam (written/oral)	50	50 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	

Full name of the course	**ELECTROENERGETIC NETWORKS AND SYSTEMS –1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-028-5	compulsory	V	5

Teacher(s)	PhD Aleksandar Simović, associate professor
Associate(s)	PhD Nada Cincar, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	$2*15*S_o$	$2*15*S_o$	0	1,5

total teaching workload (in hours, per semester) W=2*15 + 2*15 = 60	total student workload (in hours, per semester) T= T=2*15* S_o + 2*15* S_o = 90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	1. Familiarity with power systems, with the parameters of all its elements. 2. Detailed introduction to the laws of propagation of voltage and current along lines. 3. Detailed introduction to voltage regulation in the power system. 4. Detailed analysis of normal and disturbed states of power networks and systems.
Prerequisites	There is no prerequisites for other subjects.
Teaching methods	Lectures, auditory exercises, laboratory exercises, seminar papers.
Subject content per weeks	1. Introduction. Student obligations and assessment. Electric power system and its division, development. 2. Deregulation in the field of electric power systems in the world, current legislation. 3. Overhead lines, transmission lines and their parameters, replacement schemes. 4. Electrical characteristics of power transformers, type of transformers. 5. Autotransformers, electrical characteristics of generators, electrical characteristics of consumers. 6. Asynchronous and synchronous motors, distribution network. Spreading current along the overhead line. 7. Ideal line, infinitely long line, line impedance, natural transmission power and equivalent schemes. 8. Calculation of load and voltage distribution in the transmission network. 9. Voltage regulation in the power system, general notes and methods of regulation. 10. Voltage regulation in ring networks. Determination of the reactive power of the compensator. 11. Reactive power balance in the power system and reduction of power losses in the power system. 12. Disturbances in the power system, types of short circuits and earth faults. Calculation of short circuit currents. 13. Vector display of short-circuit voltages and currents, short-circuit power and short-circuit current limits.

	14. Earth fault on the overhead line, analysis, compensation of the earth fault current and harmful consequences. 15. Transmission stability in the power system, maximum possible transmission power, required reserve.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. S. Ćalović, A. T. Sarić	Basics of analysis of electric power networks and systems, Akademska misao, Belgrade	2004.	
S. Softić	Electricity transmission 1; ETF Sarajevo	1972.	
N. Rajaković	Analysis of power systems 1; Akademska misao, Belgrade	2002.	
N. Rajaković, M. Ćalović, P. Stefanov, A. Savić	100 solved tasks from Analysis of power systems; ETF Belgrade	2002.	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. Đurić	Elements of power systems; ETF Belgrade	2001.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	homework		
	lab. exercises/practical work	10	10%
	midterm exams	40	40%
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**POWER ELECTRONICS 1**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-029-5	compulsory	V	5

Teacher(s)	Prof. dr Milomir Šoja, full professor
Associate(s)	MSc Marko Ikić, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15+1*15+1*15=60 h	total student workload (in hours, per semester) T=2*15*S_o+1*15*S_o+1*15*S_o=90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	Upon successful completion of the course the students will be able to: 1. Understand the importance usage of power converters, their functional and technical characteristics, 2. Calculate the parameters of the power switching device in the specific application and select the switching device with calculated specification, and optimal trigger methods and protection, 3. Select the converter for the specific application, with the appropriate topology and functional and technical characteristics, 4. Design power stage of specific power converter.
Prerequisites	Prerequisites require knowledge of fundamental of electrical engineering, circuit theory and electronics (courses: Fundamentals of Electrical Engineering I and II, Electric Circuits Theory I and II, Electronics I and II), while passing the exam requires ≥50% points in each forms of knowledge assessment.
Teaching methods	Lectures, auditory practical lectures, labs.
Subject content per weeks	***Modul: Introduction*** **1.1** Student obligations and assessments. **1.2** Introduction in PE: Definition of PE, significance and application. Power converters, general characteristics and classification. ***Modul: Power electronics components*** **2.1** Ideal and real power switching devices: characteristics and models. **2.2** Power semiconductor devices: Diode, thyristor, MOSFET, IGBT - characteristics. ***Modul: AC-AC converters*** **3.1** Single-Phase AC-AC Voltage Controller: Topologies. Work principles. **3.2** Three-Phase AC-AC Voltage Controller: Topologies. Work principles. **4.** Applications of AC-AC Converters: Static switches. Starters. ***Modul: AC-DC converters (rectifiers)*** **5.** Single-Phase Rectifiers: Topologies. Work principles. **6.** Three-Phase Rectifiers: Topologies. Work principles. **7.** Applications of AC-DC Converters: Battery charging and DC motor control. ***Modul: DC-DC converters (choppers)***

	8.1 Introduction to DC-DC converters: Basic principle of DC-DC conversion. Classification of DC-DC converter. **8.2** Non-insulated DC-DC converters: buck and boost converter. **9.** Buck-boost, Cuk, half and full bridge converter. **10.** Insulated DC-DC converters: forward, flyback, insulated half and full bridge, push-pull converter. **11.** Application of DC-DC converters: Power supplies. DC motor control. Optimizers. **12.** Resonant DC-DC converters: Topologies, work principles and application. ***Modul: DC-AC converters (inverters)*** **13.1** Introduction to DC-AC converters: AC voltage output types and its quality indicators. Harmonic filtering. **13.2** Single-Phase inverters: Topologies. Work principles. **14.1** Three-Phase inverters: Topologies. Work principles**.** **14.2** Multi-level inverters: Topologies. Work principles. **14.3** Application of inverters: AC power supplies. Three-phase motor control. **15.1** Current inverters: Topologies. Work principles. Application. **15.2** Resonant inverters: Topologies. Work principles. Application.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
B. L. Dokić, B. Blanuša	POWER ELECTRONICS: Converters and Regulators, Springer	2015.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
N. Mohan	POWER ELECTRONICS: A First Course, John Wiley & Sons	2012.	
Erickson, R. W., Maksimović, D.	Fundamental of Power Electronics, Springer Science+Business Media, LCC	2001.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	homework	5	5 %
	lab. exercises/practical work	10	10 %
	midterm exams	25+25	25 %+25 %
	final exam (written/oral)	30	30 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / First year of study	

Full name of the course	**ELECTRICAL APPLIANCES – 1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-030-5	Compulsory	V	5.0

Teacher(s)	PhD Jovan Mikulović, full professor
Associate(s)	PhD Jovan Mikulović, full professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W= 2*15 + 2*15 + 0*15 =60 hours	total student workload (in hours, per semester) T= 2*15*So + 2*15*So + 0*15*So = 90 hours

Total workload of the subject (teaching + student): Inopt= W+T=Uopt= 60 + 90 = 150 hours per semester

Learning outcomes	By mastering this subject, the student will be able to: 1. Explain the working principles of the electrical switchgears, 2. Describe the basic parts of the electrical appliances, 3. Design high voltage plants, 4. Know everything about electric arc.
Prerequisites	There are no requirements for registering and listening to the subject. Required prior knowledge from: Physics, Mathematics 1, Fundamentals of electrical engineering 1 and 2.
Teaching methods	Lectures and auditory exercises.
Subject content per weeks	1. Classification of the electrical switchgears, Electric contacts. 2. Determination of the layer component of the contact resistance, Plate contacts. 3. Heating of the contacts, transmission of the materials, contact materials, typical constructions. 4. Electric arc, Conditions for occurrence of the electric arc discharge in the gas, structure of the electric arc. 5. Volt-ampere characteristics of the electric arc, static and dynamic characteristics. 6. Electric arc and extinguishing of the electric arc of DC and AC currents. 7. Linear and transversal electric arc blowing. 8. Constructions of the switches, Vacuum switch. 9. SF6 switch on autopneumatic, autoexpansion and electric arc rotation principle. 10. Interaction of the electrical appliances and power grid. 11. Bus short circuit, Close short circuit, kilometres effect. 12. Switching off small induction current. 13. Stress of the electrical switchgears, First pole coefficient. 14. Symmetrical and aperiodic fault current. 15. Subtransient, transient and permanent fault current.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

M. S. Savić	Visokonaponska rasklopna oprema, ETF Beograd, Akademska misao Beograd.	2004	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Bharat Heavy Electricals Limited	Handbook of Switchgears, 1st Edition, The McGraw-Hill Companies, Inc	2007	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures	5	5%
	seminar paper	15	15%
	midterm exam I	25	25%
	midterm exam II	25	25%
	Final exam	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**PROCESS COMPUTERS**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-031-5	compulsory	V	5.0

Teacher(s)	PhD Slobodan Lubura, full professor
Associate(s)	Zorana Mandić, BSCEE

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	45	0	45	1.5

total teaching workload (in hours, per semester) W= 2*15 + 0*15 + 2 *15 =60 h	total student workload (in hours, per semester) T= 2*15*S_o + 0*15* S_o + 2*15*S_o =90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	Upon completion of the course the student will be able: 1. Describe various types of PLC and their application in industrial systems, 2. Identify the inputs and outputs of a PLC in various industrial applications, 3. Use counters, timers, algebraic and Boolean operations, memory, subroutines etc. of PLC to do a certain task 4. Write and test PLC Programs for small industrial automation applications.
Prerequisites	Digital electronics, Introduction to programming in C
Teaching methods	• Interactive lectures and communication with students • Discussion and Group Works • Presentation • Homework • Project
Subject content per weeks	1. PLC evolution, history, application in industrial automatization 2. Basic hardware components of PLC: CPU modules, I/O modules, Communication processor 3. Memory structure of PLC, memory areas of PLC, data types 4. Digital I/O modules 5. Analog I/O modules 6. Basic concept of PLC programming and standard programming languages 7. PLC Programming devices 8. Boole's algebra and bit logic functions 9. PLC's timer instructions: TON, TONR, TOF, typical industrial timing tasks 10. PLC's counter instructions: CTU, CTD, CTUD, typical industrial counting tasks 11. PLC's program control Instructions, jump & MCR instructions 12. Instructions for transferring data, data conversion and data manipulation 13. Compare, math and logic instructions 14. Installation, commissioning, and maintenance of PLCs 15. STEP7 – Micro/WIN IDE for programming the S7 200 series PLK

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Frank Petruzella	Programmable logic controllers, 4th edition McGraw Hill	2013	all
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
John W. Webb, Ronald A. Reis,	Programmable Logic Controllers: Principles and Applications (5th Edition)	2003	all

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10%
	lab. exercises/practical work	40	40%
	final exam (written/oral)	50	50%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	

Full name of the course	**AUTOMATIC CONTROL SYSTEMS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-135-6	compulsory	VI	5

Teacher(s)	Tomislav Šekara, Full professor
Associate(s)	Marko Bošković, Assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	0	45	30	0	1

total teaching workload (in hours, per semester) W=3*15 + 2*15 + 0*15 =75 hours	total student workload (in hours, per semester) T= 3*15*S_o + 2*15*S_o + 0*15*S_o = 75 hours

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	The course aims to: 1. teach students classic theory of linear time-invariant systems, closed-loop control systems. 2. teach students analysis and synthesis of servosystems as elements of more complex control systems. 3. teach students fundamentals of digital control systems and basics of nonlinear systems. 4. create a basis for further study of teaching courses using knowledge from control theory.
Prerequisites	There are no prerequisites for enrolling the course. It is necessary to have prior knowledge of the following subjects: Mathematics - 2, Mathematics - 3, Physics and Electric Circuits Theory.
Teaching methods	Teaching is conducted in the form of lectures, auditory and demonstration exercises on the computer. The colloquium and the written part of the exam are taken in written form, while the oral part of the exam is taken orally. The final grade of the exam will be based on the success of the colloquium, the written part and the oral part of the exam. The Moodle platform is used for creating the content of teaching units, storing teaching materials and results of pre-examination obligations and final examinations, as well as for communication with students.
Subject content per weeks	1. Introduction. Definition and importance of automatic control systems (ACS). Simple control structure and its functional elements. Examples. 2. Mathematical models of elements and systems. Transfer function. Modeling of mechanical systems. Interconnections of elements and subsystems in the system. 3. Algebra of structural block diagrams and signal flow graph-Mason's rule. Electromechanical analogies. 4. The transfer function of linear electrical networks and the representation of the system in state space. 5. Description of the elements of the control loop: plant, sensors, actuators,, amplifiers, two-phase asynchronous motor, direct current motor, servo systems, mechanical reducers, controllers. 6. Responses of elements and systems. Characteristic responses: impulse, step, parabolic. Determination of responses based on the transfer function. Frequency response of the

	system and methods for graphical representation. Amplitude-frequency and phase-frequency characteristics. Nyquist plot. Bode plots. Processes in linear systems. 7. Stability of linear systems. Necessary and sufficient conditions of stability. Routh and Hurwitz algebraic stability criteria. 8. Frequency stability criteria. Mikhailov stability criterion. Nyquist stability criterion. Nyquist curve sketching procedure and Tsipkin's intersection rule. Bode's criterion. 9. Evaluation of the quality of behavior of linear systems. Error constants. Assessment of system behavior in transient and stationary regimes. 10. The root-locus method of Evans-Teodorchik. Rules for the construction of GMK. 11. Integral criteria of system quality. Sensitivity. Robustness. Invariance. 12. Synthesis of compensators of simple control loops. Synthesis of differential compensator. Synthesis of integral and differential-integral compensator and PI/PID controller. 13. Controller design by pole placement technique by closing the feedback loop via states and outputs of the system. 14. Basic terms in digital control systems, Nyquist-Shannon discretization theorem and discretization procedures, Z-transform. 15. Basic concepts of non-linear systems, methods of their linearization and on-off controllers.

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
K. Ogata	Modern control engineering, Fifth edition, Prentice Hall	2010.	
R.C. Dorf, R.H. Bishop	Modern control systems, Pearson Prentice Hall	2008	

Additional literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
K.J. Åström, R.M. Murray	Feedback systems, Princeton University Press	2008.	
G.F. Franklin, J.D. Powell, A. Emami-Naeini, J.D. Powell	Feedback control of dynamic systems (Vol. 4), Upper Saddle River: Prentice hall	2002.	
D. Xue, Y. Chen, D.P. Atherton	Linear feedback control: analysis and design with MATLAB. Society for Industrial and Applied Mathematics.	2007.	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	1st test	25	25%
	2nd test	25	25%
	midterm exams		
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**ELECTRICAL MACHINES – 2**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-156-6	compulsory	VI	6

Teacher(s)	Petar Matić, PhD, full professor
Associate(s)	Srđan Jokić, PhD, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	1	42	42	21	1.4

total teaching workload (in hours, per semester) W=2*15+2*15+1*15=75 h	total student workload (in hours, per semester) T=2*15*S_o+2*15*S_o+1*15*S_o=105 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 75+105 = 180 hours per semester

Learning outcomes	1. Understanding the working principles of the direct current and synchronous machines. 2. Ability to estimate the parameters and characteristics of the electrical machines. 3. Understanding the control principles and starting of the electrical machines. 4. Understanding the integration and operation of the electrical machines in electric power systems. 5. Understanding the operating modes of the electrical machines. 6. Derivation of the basic theoretical considerations in the functioning of the electrical machines.
Prerequisites	There are no requirements for registering and listening to the course. Required prior knowledge from the subjects: Fundamentals of electrical engineering 1 and 2, Electric circuits theory 1 and 2 and Electromagnetics-1.
Teaching methods	lectures, auditory exercises, laboratory exercises, seminar work, field teaching
Subject content per weeks	1. Commutating machines: Coil with the commutator. 2. Rotation voltage E. 3. Rotating torque M. 4. Armature reaction, auxiliary poles. 5. Compensation coil, commutation. 6. Characteristics of the generators and motors. 7. Speed regulation with voltage and main poles field. 8. Synchronous machines: Armature reaction. 9. Synchronous reactances Xd and Xq, phasor diagram, synchronization of the V-curve, excitation. 10. Regulation of Q(var) and P(W), oscillations. 11. Short circuit, asymmetries. 12. Generalized theory of the electrical machines: Rotating machine represented as two coupled inductors. 13. Fundamental machine with linear and transversal axis (d, q, D, Q). 14. Transformation of three-phase A, B, C machine in two-phase machine. 15. Transformation from two-phase in stationary system, synchronous and asynchronous machine.
Compulsory literature	

Author(s)	Publication title, publisher	Year	Pages (from-to)
S. N. Vukosavić	Electrical Machines, 2013th Edition, Springer	2012	
I. Boldea, L. N. Tutelea	Electric Machines: Steady State, Transients, and Design with MATLAB®, 1st Edition, CRC Press	2009	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10 %
	test/midterm exam	30	30 %
	lab. exercises	10	10 %
	final exam (written/oral)	50	50 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	

Full name of the course	**HIGH VOLTAGE TECHNIQUE – 1**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-171-6	compulsory	VI	6

Teacher(s)	associate professor Mladen Banjanin, PhD
Associate(s)	assistant professor Srdjan Jokić, PhD

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient So**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	1	1	63	21	21	1.4

total teaching workload (in hours, per semester) W=3*15 + 1*15 + 1*15 = 75 h	total student workload (in hours, per semester) T=3*15*S_o + 1*15*S_o + 1*15*S_o = 105 h

Total workload of the subject (teaching + student): W + T = 180 hours per semester

Learning outcomes	By passing this subject, the student will be able to: 1. Analyzes lightning, switching and temporary overvoltages in the electric power system, and proposes appropriate protection systems. 2. To recognize, analyze and solve problems caused by different types of overvoltages that appear in the electric power system.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises, numerical exercises.
Subject content per weeks	1. Introduction. Rules of work on the subject. Definitions and classification of overvoltages. Causes and basic characteristics. 2. Lightning transients. Formation of thunder clouds. Development of lightning discharge. Electrical and meteorological parameters of lightning discharges. 3. Modeling of electric power system elements in calculation of lightning transients. (lightning strike, overhead line, HV cable, overhead line tower and its grounding). 4. Flashover models of line insulators. Model of operating voltage on phase conductors. Modeling of high voltage equipment. Surge arrester model. 5. Metal oxide surge arresters. 6. Calculations of lightning transients in the electric power system. Analytical calculations (Thevenen's method, lattice diagram, Bergeron's method). Numerical calculation of lightning transients. 7. Lightning protection of overhead lines (lines with and without ground wire, induced voltages on phase conductors). 8. Lightning protection of high voltage substations (strikes into impigning transmission lines, direct strikes into the substation, HVDC substations). 9. Voltage distribution along the transformer windings and overvoltage transfer through the transformer. 10. Internal overvoltages. Modeling of system elements in calculation of internal overvoltages. 11. Switching overvoltages (overvoltages due to interruption of capacitive and inductive currents). 12. Overvoltages during the switching of transmission lines. Overvoltages during automatic reclosure operation. 13. Overvoltages during disconnector operations. Transient reverse voltage. Modeling of the electric arc. 14. Temporary overvoltages. Overvoltages due to earth faults. Overvoltages due to intermittent electric arc earth faults. 15. Overvoltages due to resonance and ferroresonance. Overvoltages caused by inadequate voltage regulation.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
A. R. Hileman	Insulation Coordination for Power Systems, Taylor & Francis Group.	1999.	-
R.Smeets, L. van der Sluis, M. Kapetanovic, D. F. Peelo, A. Janssen	Switching in Electrical Transmission and Distribution Systems, John Wiley & Sons.	2014.	-
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	I colloquium	12,5	12,5%
	II colloquium	12,5	12,5%
	numerical exercises	25	25%
	final exam (written/oral)	45	45%
	Total	100	100%
Web page			
Certification date			

FOURTH YEAR – COMPULSORY SUBJECTS

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering ***Study program:*** *Electric Power Engineering* First study cycle / Fourth year of study	

Full name of the course	**FUNDAMENTALS OF TELECOMMUNICATIONS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-041-7	compulsory	VII	5,0

Teacher(s)	Mirjana Maksimović, PhD, Associate Professor
Associate(s)	Miodrag Forcan, PhD, Assistant Professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15 + 1*15 + 1*15 =60 hours	total student workload (in hours, per semester) T= 2*15*S_o + 1*15*S_o + 1*15*S_o = 90 hours

Total workload of the subject (teaching + student): In_{opt}= W + T = 60+90 = 150 hours per semester

Learning outcomes	The course aims to teach students: 1. basic procedures for analyzing analog and digital signals, 2. linear and non-linear transmission systems, 3. the principles of transmission of analog and digital signals in the basic and transposed ranges, and 4. working in the laboratory and becoming familiar with practical communication systems.
Prerequisites	There are no prerequisites for enrolling the course. It is necessary to have prior knowledge of the following subjects: Fundamentals of Electrical Engineering, Analysis of Signals and Systems, Mathematics I, II, and III.
Teaching methods	Teaching is conducted in the form of lectures, auditory and laboratory exercises. The Moodle platform is used to create the content of teaching units, store teaching materials and results of pre-exam obligations and final exams, as well as for communication with students.
Subject content per weeks	1. Introduction. Model of the telecommunication system. 2. Classification of signals. Analysis of deterministic signals: Fourier series (periodic signals) and Fourier transform (aperiodic signals). 3. Signal characteristics of real messages (telegraphy, data transmission, speech, music, TV image). 4. Signal transmission through linear and non-linear systems (linear and non-linear distortions). 5. Modulation and demodulation of analog signals: amplitude (KAM, AM-DSB, AM-SSB, AM-NSB, QAM). 6. Modulation and demodulation of analog signals: phase modulation and frequency modulation. 7. Principles of frequency multiplexing. 8. Sampling theorem. Quantization. 9. Impulse modulation: PAM, PWM, PPM, PCM. 10. Multiplex with time distribution of channels. 11. Model of the digital transmission system and basic characteristics of digital signals.

	12. Model of the transmission system in the baseband frequency range. 13. Signal transmission in the baseband frequency range. Influence of noise and intersymbol interference. 14. Nyquist's criteria. 15. Modulation and demodulation of digital signals: ASK, PSK, FSK.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. Maksimović	Lecture presentations available on the Moodle platform		
R. L. Freeman	Fundamentals of Telecommunications, Wiley	1999.	
R. G. Gallager	Principles of Digital Communications, MIT, Cambridge University Press	2012.	
V. Milošević, M. Maksimović	Fundamentals of Telecommunications – Practicum, East Sarajevo	2013.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	midterm exam I	20	20%
	midterm exam II	20	20%
	Laboratory exercises	10	10%
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**HIGH VOLTAGE TECHNIQUE – 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-174-7	compulsory	VII	5

Teacher(s)	associate professor Mladen Banjanin, PhD
Associate(s)	assistant professor Srdjan Jokić, PhD, MSc Bojana Novaković, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient So**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15 + 1*15 + 1*15 = 60	total student workload (in hours, per semester) T=2*15*S_o + 1*15*S_o + 1*15*S_o = 90

Total workload of the subject (teaching + student): W + T = 150 hours per semester

Learning outcomes	By passing this subject, the student will be able to: 1. Recognize the various problems that occur in the insulation of high-voltage devices. 2. Analyzes and understands the processes that take place inside gaseous, liquid and solid dielectrics. 3. Performs simple high voltage tests and measurements.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises, laboratory exercises, numerical exercises.
Subject content per weeks	1. Introduction. Rules of work on the subject. Dielectrics and high voltage insulation. Gaseous, liquid and solid dielectrics. Dielectric constant. 2. Dielectric losses. Specific electrical resistance and insulation resistance. 3. Dielectric strength. Electrical breakdown of gaseous dielectrics. 3. Electrical breakdown of liquid and solid dielectrics. Thermal breakdown of liquid and solid dielectrics. 4. Electrochemical breakdown of solid dielectrics. Electromechanical breakdown of solid dielectrics. 5. Flashovers on the surface of polluted insulation. Impurities in dielectrics (SF6 gas and transformer oil). 6. Laboratory testing of high voltage equipment. Dielectric testing of equipment. Testing of equipment with high power frequency voltage. 7. Testing of equipment with impulse voltages. Testing equipment with high DC voltage. 8. Testing of equipment on partial discharges. Generation of high voltage with high frequency. Testing of equipment with complex and combined voltages. 9. Thermal and electrodynamic testing of equipment. Testing of equipment with impulse currents. Equipment testing with rated operating current. 10. Testing equipment with short circuit current. Testing equipment in high power laboratories. 11. Mechanical, chemical and thermal testing of power equipment. Field tests of power equipment. 12. Measurement of undistorted and distorted signals. Measurement of high voltages. Voltage instrument transformers. Electrostatic voltmeter. 13. Ammeter in series with a resistor or capacitor. Measuring sphere gaps. High voltage dividers. 14. Devices for measuring the maximum voltage value. Oscilloscopes, high-voltage probes and digital measuring systems. Measurement of high currents. 15. Current instrument transformers. Rogowski coil. Current shunt. Measuring devices based on the Hall effect.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
E. Kuffel, W.S. Zaengl, J. Kuffel	High Voltage Engineering Fundamentals, second edition, Butterworth-Heinemann.	2000.	-
R. Arora, W. Mosch	High Voltage and Electrical Insulation Engineering, second edition, John Wiley & Sons.	2022.	-
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	I colloquium	12,5	12,5%
	II colloquium	12,5	12,5%
	laboratory exercises	13	13%
	numerical exercises	12	12%
	final exam (written/oral)	45	45%
	Total	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**POWER DISTRIBUTION FACILITIES**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-128-7	compulsory	VII	7

Teacher(s)	associate professor Mladen Banjanin, PhD
Associate(s)	assistant professor Nada Cincar, PhD

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient So**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	0	81	54	0	1.8

total teaching workload (in hours, per semester) W=3*15 + 2*15 + 0*15 = 75	total student workload (in hours, per semester) T=3*15* S_o + 2*15* S_o + 0*15* S_o = 135

Total workload of the subject (teaching + student): W + T = 210 hours per semester

Learning outcomes	By passing this subject, the student will be able to: 1. Analyzes different configurations and recognizes elements of high voltage substations. 2. Understands and calculates the parameters required for dimensioning of high voltage substations elements. 3. Performs simplified calculations and design of the main circuits of high voltage substations.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises.
Subject content per weeks	1. Introduction. Rules of work on the subject. Three phase short circuit. Characteristic periods of three phase short circuit current: subtransient, transient and steady-state period of short circuit current. 2. Dynamic and thermal short circuit currents. Breaker interuption current. 3. Unsymmetrical short circuit faults and symmetrical components. 4. Electrothermal calculation. Thermal equilibrium equation. Heating of the conductor in normal and intermittent operation, and in the period of short circuit. Conductor cooling. 5. Calculation of the force acting on the substation elements. Force between conductors. The force between a conductor and a ferromagnetic material. Forces between conductors of a three-phase system during a short circuit. 6. Busbars and non-insulated conductors. Insulators. 7. Main schemes and dispositions of high voltage substations. 8. Power cables. Breakers. 9. Switches. Disconnect switches. High voltage fuses. Reclosers and disconnectors. 10. Instruments transformers (current and voltage). 11. Power transformers. Inductors for limiting short-circuit currents. 12. Lightning protection of high voltage substations. SF6 high voltage substations. 13. Earthing of high voltage substations. 14. Basics of high voltage substations reliability. Basics of high voltage substations protection. 15. Single line diagrams of high voltage substations.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
J. D. McDonald	Electric Power Substations Engineering, third edition	2012.	-

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Obligations, forms of knowledge	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures/exercises	5	5%

assessment and grading	I colloquium	15	15%
	II colloquium	15	15%
	seminary work	20	20%
	final exam (written/oral)	45	45%
	Total	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	
Full name of the course	**ELECTROMOTIVE DRIVES**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-044-7	compulsory	VII	5

Teacher(s)	Petar Matić, PhD, full professor
Associate(s)	Marko Ikić, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15+1*15+1*15=60 h	total student workload (in hours, per semester) T=2*15*S_o+1*15*S_o+1*15*S_o=90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60+90 = 150 hours per semester

Learning outcomes	1. Understanding the role and significance of the electric drives, their types, and structures. 2. Ability to analyse of the electric drives in static and dynamical regimes. 3. Ability to choose the components of the electric drives. 4. Ability to perform modelling of the electric drives.
Prerequisites	There are no requirements for registering and listening to the course. Required prior knowledge from the subjects: Fundamentals of electrical engineering 1 and 2, Electric circuits theory 1 and 2, Electromagnetics 1 and 2, Electronics 1 and 2, and Electrical machines 1 and 2.
Teaching methods	lectures, auditory exercises, laboratory exercises, seminar work, field teaching
Subject content per weeks	1. General features of electric motor drive (EMP), nature of EMP problems, mechanical characteristics of working machines, general equation of motion and basic operating states of EMP. 2. EMP with direct current motors: independent, parallel, sequentially excited motors with direct currents, static electromechanical characteristics. 3. Braking states of EMP with DC motors. 4. EMP with asynchronous and synchronous motors, electromechanical characteristics. 5. Braking states of EMP with asynchronous and synchronous motors. 6. Commissioning of EMP. 7. Static stability of EMP. 8. Multi-motor drives, electric shafts, cascade connections of asynchronous motors. 9. Regulation of the rotation speed of EMP with DC motors. 10. Regulation of the rotation speed of EMP with asynchronous motors. 11. Dynamic operating modes of EMP with DC motors. 12. Dynamic operating modes of EMP with asynchronous and synchronous motors. 13. Reduction of losses in dynamic modes, heating of EMP. 14. Choice of engine for EMP. 15. Overload, network interference, explosion protection.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

S. N. Vukosavić	Electrical Machines, 2013th Edition, Springer	2012	
I. Boldea, L. N. Tutelea	Electric Machines: Steady State, Transients, and Design with MATLAB®, 1st Edition, CRC Press	2009	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
A. Hughes, B. Drury	Electric Motors and Drives: Fundamentals, Types and Applications, 5th Edition, Newnes,	2019	

Obligations, forms of knowledge assessment and grading	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	seminar paper	10	10 %
	test/midterm exam	50	50 %
	final exam (written/oral)	35	35 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**POWER SYSTEM PROTECTION**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-136-8	compulsory	VIII	7

Teacher(s)	asst. professor PhD Miodrag Forcan
Associate(s)	asst. professor PhD Miodrag Forcan

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
3	2	1	60	40	20	1.33

total teaching workload (in hours, per semester) 3*15 + 2*15 + 1*15 = 90 h	total student workload (in hours, per semester) $3*15*S_o + 2*15*S_o + 1*15*S_o$ = 120 h

Total subject workload (teaching + student): 90 + 120 = 210 hours per semester

Learning outcomes	1. Basic knowledge of protective relaying operating principles. 2. Basic knowledge of numerical relays, signal processing, and protection algorithms. 3. Basic knowledge of protection of power system elements (lines, generators, transformers, busbars, and motors). 4. Basic knowledge of relay protection testing procedures.
Prerequisites	There is no conditionality related to other subjects (no prerequizites)
Teaching methods	Hybrid teaching methods. Lectures(L), theoretical classes/exercises (TC/E), laboratory classes/exercises (LC/E), seminar papers, and consultations are partially done in a traditional way (synchronous learning - live), and partially done electronically (synchronous and asynchronous distance learning). Lectures are carried out in the form of face-to-face and group work. Teaching is organized in an interactive way with regular discussions. Theoretical and numerical exercises are carried out in the form of interactive solving of examples. The seminar paper is realized based on an individual student work with regular consultations. The Moodle platform is used to create the content of teaching units, store teaching materials and results of pre-exam obligations and final exams, as well as communication with students.
Subject content per weeks	1. Introduction to protective relaying. Power system faults and abnormal conditions. Typical protective relays and relay systems. Basic objectives of system protection. 2. Relay operating principles. Protection of individual power system elements. Protection coordination. 3. Relay protection schemes within substations. Supply sources and circuit breaker connections. 4. Relay protection inputs. Potential and current transformers. 5. Classification of relays. Electromechanical, static, and numerical relays. 6. Signal processing for numerical relays. Protection algorithms. 7. Line protection. Equipment for line protection. Coordination fundamentals and general setting criteria. 8. Nonpilot overcurrent protection of transmission lines. Ground fault protection. 9. Nonpilot distance protection of transmission lines. 10. Pilot protection of transmission lines.

	11. Rotating machinery protection. Generator protection/intertie protection for distributed generation. 12. Transformer protection. 13. Busbars protection. 14. Load protection. Motor protection. 15. Testing of relay protection devices. Monitoring performance of power systems.

Mandatory literature			
Authors	**Title of publication, publisher**	**Year**	**Pages**
S. H. Horowitz, A. G. Phadke	Power System Relaying, Third Edition, John Wiley & Sons Ltd,, Chichester, England	2008	/
J. L. Blackburn, T. J. Domin	Protective Relaying Principles and Applications, Third Edition, CRC Press, Taylor & Francis Group, London	2006	/
M. Forcan	Presentations from lectures and exercises available on the platform Moodle LMS	2021	/
M. Đurić, Z. Stojanović	Relejna zaštita, KIZ centar, Beograd	2014	/
Additional literature			
Authors	**Title of publication, publisher**	**Year**	**Pages**
M. Alkalaj, F. Božuta	Zbirka zadataka iz relejne zaštite elektroenergetskih postrojenja, ETF Sarajevo	1986.	/

	Types of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge testing and evaluation	Pre-exam obligations		
	attendance at lectures/exercises	5	5%
	I partial exam (colloquia)	20	20%
	II partial exam (colloquia)	20	20%
	laboratory exercises	10	10%
	seminar paper	10	10%
	Final exam		
	test paper	15	15%
	oral examination	20	20%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**COMPUTER AIDED DESIGN IN ELECTROENERGETICS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-1-132-8	compulsory	VIII	6

Teacher(s)	Nada Cincar, PhD, assistant professor
Associate(s)	Goran Vuković, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	1	42	42	21	1.4

total teaching workload (in hours, per semester) W=2*15+2*15+1*15=75 h	total student workload (in hours, per semester) T=2*15*S_o+2*15*S_o+1*15*S_o=105 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 75+105 = 180 hours per semester

Learning outcomes	1. Detailed introduction to the implementation of the modeling and simulation procedure through the development process. 2. Training for creating reports using certain software tools. 3. Getting to know aspects of project management and using the MS PROJECT program for that purpose. 4. Implementation of all acquired knowledge on certain practical examples.
Prerequisites	There are no requirements for registering and listening to the course.
Teaching methods	lectures, auditory exercises, laboratory exercises
Subject content per weeks	1. Introduction. Student obligations and assessment. Computer modeling and simulation. 2. Definition, motivation, role of computers in modeling and simulations. 3. Formation of a mathematical model and a computer program. Simulations, goal and examples. 4. Development of a program for impact characteristics of grounding devices. Elements of MATLAB and the GIC program. 5. Forming examples of modeling and simulation of impulse characteristics of grounding devices. 6. Basics of the EMTP/ATP + ATPDRAW program. 7. Examples and applications of the EMTP/ATP + ATPDRAW program. Examples and applications of Excel in calculations. 8. Creating macros in Excel. Principles of working with databases and application in the power industry. 9. Creation of graphic documentation of the project. Basics and application of AUTOCAD. 10. Advanced AUTOCAD techniques. Program for creating action and binding schemes (EPLANCADdy++). 11. Project management. Project definitions. 12. Phases of the project. Participants in the implementation of the project. 13. Types of project. Project content, terms of reference and contract. 14. Project management using the MS PROJECT program. 15. Examples and applications.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Z. Stojkovic	Computer- Aided Design in Power Engineering, Application of Software Tools, Springer, Academic Mind	2012	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	midterm exam I	20	20 %
	midterm exam II	20	20 %
	laboratory exercises	10	10 %
	final exam (written/oral)	45	45 %
	TOTAL	100	100 %
Web page			
Certification date			

THIRD YEAR – ELECTIVE SUBJECTS

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	

Full name of the course	**ELECTRICAL APPLIANCES – 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-036-6	elective	VI	5.0

Teacher(s)	PhD Srđan Jokić, assistant professor
Associate(s)	Bojana Čolić, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	45	0	45	1.5

total teaching workload (in hours, per semester) W= 2*15 + 0*15 + 2*15 =60 hours	total student workload (in hours, per semester) T= 2*15*So + 0*15*So + 2*15*So = 90 hours
Total workload of the subject (teaching + student): Inopt= W+T=Uopt= 60 + 90 = 150 hours per semester	

Learning outcomes	1. Introducing students to the advantages of monitoring the state of electrical appliances 2. Getting to know the types of testing of electrical devices 3. Monitoring of standards and regulations that define the procedures for testing electrical appliances. 4. Observance of safety measures when performing tests 5. Selection of electrical devices for use in specific conditions.
Prerequisites	There are no requirements for registering and listening to the subject. Required prior knowledge from Electrical appliances 1.
Teaching methods	Lectures and laboratory exercises.
Subject content per weeks	1. Introduction. Monitoring of the condition of electrical appliances. Selection of parameters for monitoring. 2. Selection of monitoring parameters. Signal processing. 3. Intelligent switching operations (on, off). Requirements to be fulfilled for the power switch. 4. Examples of application of intelligent switching operations. Aspects of reliability and economy. 5. Short-circuit and circuit tests. Division of laboratories. High power laboratories. 6. Direct examinations. Synthetic tests. Examples of tests. Type tests. 7. Dielectric tests. Radio frequency interference voltage testing. 8. Heating test. 9. Measuring the resistance of the main circuit. 10. Testing with short-term tolerable current and tolerable peak current value. 11. Piece tests. Selection of electrical appliances. 12. Selection of indicated characteristics. Choice of operating conditions. 13. Normal operating conditions. 14. Special operating conditions.

	15. Automation of the selection procedure of electrical appliances.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
M. Kapetanović	Visokonaponski prekidači, ETF Sarajevo	2002	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Bharat Heavy Electricals Limited	Handbook of Switchgears, 1st Edition, The McGraw-Hill Companies, Inc	2007	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures	5	5%
	seminar paper	15	15%
	midterm exam I	15	15%
	midterm exam II	15	15%
	Final exam	50	50%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**POWER ELECTRONICS – 2**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-090-6	elective	VI	5

Teacher(s)	Prof. dr Milomir Šoja, full professor
Associate(s)	MSc Marko ikić, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	45	0	45	1.5

total teaching workload (in hours, per semester) W=2*15+0*15+2*15=60 h	total student workload (in hours, per semester) T=2*15*S_o+0*15*S_o+2*15*S_o=90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	Upon successful completion of the course the students will be able to: 1. Understand the specifics of particular usage of power converters, including applicable standards and regulation, 2. More detail knowledge in the functional and technical characteristics of power electronics converters, 3. Select the optimal converter for the specific application, 4. Start up the specific converter and adjust its parameters.
Prerequisites	Prerequisites require knowledge of power electronics (course: Power Electronics I), while passing the exam requires ≥50% points in each forms of knowledge assessment.
Teaching methods	Lectures, auditory practical lectures, labs.
Subject content per weeks	***Modul: Introduction*** **1.** Student obligations and assessments. Application of power electronics converters. Standards. ***Modul: Semiconductor switches*** **2.** AC, DC switches. Solid-state relay. Hybrid switches. ***Modul: AC-AC converters*** **3.** Static switches. Static VAR compensators. **4.** Thyristors AC motor starters. ***Modul: AC-DC converters (rectifiers)*** **5.** Battery chargers. **6.** DC motor control. **7.1** Multi-quadrant rectifiers, HVDC. **7.2** Harmonics generation in rectifiers. Ideal rectifier. ***Modul: DC-DC converters (choppers)*** **8.** Power supplies. **9.** Multi-quadrant choppers. DC motor control. **10.** Topologies and characteristics of DC-DC converters in renewable energy systems. **11.** Uninterruptible DC power supply. ***Modul: DC-AC converters (inverters)*** **12.** Uninterruptible DC power supply. **13.** AC motor control.

	14. Topologies and characteristics of inverters in renewable energy systems**.** ***Modul – Specialized power systems*** **15.** Electric vehicles. Power supplies in aviation. Power supplies in medicine.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Mohan, N.	POWER ELECTRONICS, Converters, Applications, and Design, John Wiley & Sons, Inc	2001.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Skvarenina, T.	The Power Electronics Handbook, CRC Press	2001.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	homework	5	5 %
	lab. exercises/practical work	10	10 %
	midterm exams	25+25	25 %+25 %
	final exam (written/oral)	30	30 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**ELECTRICAL ENGINEERING TECHNOLOGIES**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-038-6	elective	VI	5

Teacher(s)	PhD Aleksandar Simović, associate professor
Associate(s)	PhD Nada Cincar, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W=2*15 + 2*15 = 60	total student workload (in hours, per semester) T=2*15* S_o + 2*15* S_o = 90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	1. Basic knowledge of applied materials and technologies of their production in electrical engineering. 2. Detailed knowledge of degradation mechanisms and component failures in the power system. 3. Detailed knowledge of application technologies of gaseous, liquid and solid dielectrics. 4. Detailed knowledge of procedures for development and operational testing of electrical materials and determination of their characteristics.
Prerequisites	There is no prerequisites for other subjects.
Teaching methods	Lectures, auditory exercises, laboratory exercises, seminar papers.
Subject content per weeks	1. Introduction. Student obligations and assessment. Basics of materials science, structure of matter, stress and environmental influence. 2. The most commonly used materials in electrical engineering, semiconductor materials: basic properties. 3. Technology of production and processing of semiconductor materials, construction materials. 4. Magnetic materials and permanent magnets: properties of processing technologies, use of materials. 5. Insulating materials: gaseous, liquid and solid, properties, production, use of insulating materials. 6. Mechanisms that lead to failure in power system components, mechanisms after electrical stress. 7. Mechanisms of gradual degradation (electrochemical, water tracking, partial discharges). 8. Application of various technologies in the execution of components. 9. Application of air, SF6 and other gases. 10. Application of plastic and liquid insulating materials. 11. Application of solid dielectrics. 12. Application of dielectric compositions in cables, capacitors, conductive insulators, etc.

	13. Development and exploitation testing of electrical materials and components. 14. Determination of characteristics of electrical materials, resistance to degradation processes. 15. Specific dielectric tests, lifetime assessment, aging processes.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
P. Nikolić, D. Raković	Electrotechnical materials, Scientific book Belgrade	1987.	
K. Sokolija	Practicum of laboratory exercises in insulation technique, ETF Sarajevo	1989.	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	lab. exercises/practical work	10	10%
	midterm exams	40	40%
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	

Full name of the course	**ELECTRICAL NETWORKS AND SYSTEMS - 2**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-084-6	elective	VI	5

Teacher(s)	PhD Aleksandar Simović, associate professor
Associate(s)	PhD Nada Cincar, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W=2*15 + 2*15 = 60	total student workload (in hours, per semester) T=2*15* S_o + 2*15* S_o = 90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	1. Acquaintance with high-voltage transmission lines, with individual elements of construction and electrical equipment. 2. Detailed knowledge with the calculation of overhead line deflection, stress, line length and conductor state changes, calculation of combined conductors, critical span and temperature, limit and ideal span. 3. Detailed knowledge of overvoltages, atmospheric discharges and protection of overhead lines from atmospheric discharges. 4. Detailed analysis of route selection and construction of the overhead line, up to the installation of equipment, final works, technical inspection and commissioning of the overhead line.
Prerequisites	There is no prerequisites for other subjects.
Teaching methods	Lectures, auditory exercises, laboratory exercises, seminar papers.
Subject content per weeks	1. Introduction. Student obligations and assessment. Electric high-voltage transmission line. Functional units, planning, design and construction. 2. Overview of basic norms used for design, laws, regulations, standards. 3. Poles for overhead lines, different constructions. 4. Conductors and protective ropes, structural forms, material, selection of sections. 5. Calculation of the deflection of the overhead line, stress, line length and change of conductor condition. 6. Calculation of combined conductors, critical range and temperature, limiting and ideal range. 7. Insulators, general notes, types, material, characteristics and sizing. 8. Insulator chains, protective equipment. 9. Overvoltages, atmospheric discharges and protection of overhead lines from atmospheric discharges. 10. Grounding and grounding of overhead line poles. 11. Vibrations on conductors of overhead lines, vibration dampers.

	12. Transmission capabilities of overhead lines. 13. Selection of the route of the overhead line, recording of longitudinal profiles, determination of the position of the poles. 14. Construction of an overhead line, general notes, stages of work, preparation, term of the work plan. 15. Installation of overhead line equipment, finishing works, technical inspection and commissioning.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Č. Vujović	High-voltage transmission lines, ETF Sarajevo	2008.	
N. Rajaković	Analysis of power systems 2, Akademsaka misao, Belgrade	2008.	
N. Rajaković, M. Ćalović, P. Stefanov, A. Savić	100 solved tasks from Analysis of power systems; ETF Belgrade	2002.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	lab. exercises/practical work	10	10%
	midterm exams	40	40%
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Third year of study	
Full name of the course	**MEASUREMENTS IN ELECTROENERGETICS**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-106-6	elective	VI	5.0

Teacher(s)	PhD Srđan Jokić, assistant professor
Associate(s)	MA Bojana Čolić, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	0	2	45	0	45	1.5

total teaching workload (in hours, per semester) W=2*15 + 0*15 + 2*15 = 60 hours	total student workload (in hours, per semester) T=2*15* S_o + 0*15* S_o + 2*15* S_o = 90 hours

Total workload of the subject (teaching + student): Inopt= W + T = 60 + 90 = 150 hours per semester

Learning outcomes	1. Introducing measurement techniques and methods in the power systems. 2. Compliance with safety measures when performing measurements. 3. Training for carrying out measurements. 4. Strengthening teamwork in a multidisciplinary environment. 5. Technical and economic optimization of resources when conducting measurements with regard to the required accuracy of results and availability of equipment. 6. Monitoring the latest technical achievements in the field and recognizing the need to accept, improve and apply these achievements in the environment.
Prerequisites	There are no requirements for registering and listening to the subject. Required prior knowledge of the subject Electrical Measurements.
Teaching methods	Lectures and laboratory exercises. During the teaching process, students are encouraged to actively follow the lectures.
Subject content per weeks	1. Introduction. Measuring transformers. Inductive voltage transformers: equivalent circuit, diagram, voltage and phase error, Mellinger-Gewecke diagram. 2. Inductive voltage transformers: measures to reduce errors, classification according to accuracy, power, selection, cascade transformers, designs. 3. Current transformers: current and phase error, diagrams, error reduction procedures, accuracy, power, selection, behavior at increased primary current. 4. Current transformers: cascade current transformers, designs. Marking of measuring transformer terminals. 5. Special measuring transformers: capacitive voltage transformers, current transformers for direct current. Measurement of measuring transformer errors. 6. Measurement of high voltages using spherical spark plugs, devices that measure the rectified current of capacitors, electrostatic voltmeters. Measurement of inrush currents using shunts, Rogowski coil, Hall probe, ferromagnetic recorders. 7. Voltage dividers (measurement with a divider and an oscilloscope). 8. Power measurement in circuits with direct current, alternating current in single-phase and three-phase systems, measurement of reactive power, semi-direct and indirect power measurements.

	9. Electric meters. 10. Frequency measurement. 11. Measurements of electrical parameters – U-I methods and bridge methods for measuring R, L and C, measuring grounding resistance, measuring intermediate inductance, Schering's bridge for measuring capacitance. 12. Magnetic measurements - measurements of magnetic flux, magnetic induction and magnetic field. 13. Measurements of non-electric quantities by electrical methods: passive and active measuring transducers. 14. Determining the location of faults on lines (types of faults, methods for finding faults, classic and modern methods for determining the location of faults) 15. Unconventional measuring devices: passive devices with optical effects, microwave current measuring device, active measuring devices.

Compulsory literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
Sydenham P. H., Thorn R.	"Handbook of Measurement System and Design", Vol. 1,2 and 3, Wiley, New York, 2005.	2005.	
Wright A.	"Current transformers", Pittman, London, 1968.	1968.	
E. Kuffel, W.S. Zaengl	High voltage engineering, Pergamon press, 1994.	1994.	

Additional literature

Author(s)	Publication title, publisher	Year	Pages (from-to)
IEC	IEC standards		
V. Bego	Mjerenja u elektrotehnici, Graphis, Zagreb (Original title)	2003	
Lj. Milanković	Tehnika visokog napona, ETF Beograd (Original title)	1977.	373-449
Mihailović P., Petričević S., Stojković Z., Radunović J.	Development of a portable fiber-optic current sensor for power systems monitoring, IEEE Transactions on Instrumentation and Measurement, Vol. 53, No. 1	Feb 2004	24-30
Petričević S., Stojković Z., Radunović J.	Practical application of fiber-optic current sensor in power system harmonic measurement; IEEE Transactions on Instrumentation and Measurement, Vol. 55, No. 3	June 2006	923-930
Petričević S, Stojković Z, Mihailović P, Radunović J	Development of a Fibre Optic Impulse Current Sensor for high voltage equipment tests, International Journal of Electrical Engineering Education (IJEEE), Vol.45, No.1	Jan 2008	1-16
M. Popović	Сензори и мерење, Завод за уџбенике и наставна средства, Српско Сарајево ((Original title)	2004.	

Obligations, forms of knowledge	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures	5	5 %
	seminary work	15	15 %

assessment and grading	midterm exam 1	15	15 %
	midterm exam 1	15	15 %
	Final exam	50	50 %
	TOTAL	100	100 %
Web page			
Certification date			

FOURTH YEAR – ELECTIVE SUBJECTS

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering ***Study program:*** *Electric Power Engineering* First study cycle | Fourth year of study	

Full name of the course	**DISTRIBUTION AND INDUSTRIAL NETWORKS**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-202-7 EE-08-2-202-8	elective	VII, VIII	5

Teacher(s)	PhD Aleksandar Simović, associate professor
Associate(s)	PhD Nada Cincar, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W=2*15 + 2*15 = 60	total student workload (in hours, per semester) T=2*15* S_o + 2*15* S_o = 90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	1. Detailed introduction to concepts, technologies, planning and exploitation of distribution and industrial networks. 2. Acquaintance with the economic aspects of network operation, with the quality of electricity supply and thermal limit regimes. 3. Familiarity with distributed generation of electricity, as well as the impact of distributed generation on the distribution network. 4. Students will be trained to work independently on design, planning, analysis and optimization of distribution and industrial networks.
Prerequisites	There is no prerequisites for other subjects.
Teaching methods	Lectures, auditory exercises, laboratory exercises, seminar papers.
Subject content per weeks	1. Introduction. Student obligations and assessment. General considerations on distribution systems. 2. Characteristics of electricity consumption. 3. Principle solutions of networks of different voltage levels. 4. Forecast of electricity and power consumption. 5. Voltage drops and power losses in network lines. 6. Calculation of power flows and voltage conditions in distribution networks. 7. Losses of electricity. 8. Reconfiguration of distribution networks. 9. Short circuits. 10. Reliability and security of networks. 11. Technical and economic aspects of power grids. 12. Thermal aspects of loading network elements. 13. Compensation of reactive power. 14. Voltage regulation in distribution networks.

	15. Distributed production of electrical energy.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
N. Rajaković, D. Tasić	Distribution and industrial networks, Akademska misao, Belgrade	2008.	
N. Rajaković, D. Tasić, N. Arsenijević, M. Stojanović	A collection of assignments from distribution and industrial networks, Akademska misao, Belgrade	2005.	
D. Stojanović, L. Korunović	Transmission and distribution of electricity, collection of solved tasks, SX PRINT-COPY, Niš	2004.	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	lab. exercises/practical work	10	10%
	midterm exams	40	40%
	final exam (written/oral)	45	45%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	
Full name of the course	**ELECTRIC POWER CONVERTERS**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-00-2-049-8	elective	VII, VIII	5

Teacher(s)	Prof. dr Milomir Šoja, full professor
Associate(s)	MSc Marko ikić, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W=2*15+1*15+0*15=60	total student workload (in hours, per semester) T=2*15*S_o+2*15*S_o+0*15*S_o=90

Total workload of the subject (teaching + student): In_{opt}= W + T = 150 hours per semester

Learning outcomes	Upon successful completion of the course the student will be able to: 1. Understand the specifics of individual topologies and applications of power electronics converters in the electric power industry, including valid standards and regulations, 2. Know in detail the functional and technical characteristics of power electronics converters, 3. Model the basic types of converters in the Matlab/Simulink environment, 4. Select the optimal converter for a specific application, 5. Select converters for use in power supply systems with renewable energy sources and electrical energy storage systems.
Prerequisites	Prerequisites require knowledge of power electronics (course: Power Electronics I), while passing the exam requires ≥50% points in each forms of knowledge assessment.
Teaching methods	Lectures, auditory practical lectures, labs.
Subject content per weeks	***Modul: Introduction*** **1.** Student obligations and assessments. Overview of power electronics converters. ***Modul: Devices*** **2.** Characteristics of components used in power converters. ***Modul: AC switches/voltage regulators*** **3.** Static switches and compensators. **4.** Three-phase AC motors starters ***Modul: AC-DC*** **5.** Multi-pulse diode and thyristor rectifiers. Power factor correction. **6.** Three-phase PWM rectifiers. **7.** HVDC transmission. ***Modul: DC–DC*** **8.** Converters topologies in PFC circuits. Bridgeless converter. **9.** 4Q bridge converters. DC motor control. ***Modul: DC-AC*** **10.** Inverter topologies in AC uninterruptible power supply systems. **11.** Inverter topologies for AC motor control. **12.** Active filters. ***Modul: Converters in renewable energy sources***

	13. Converters in PV power systems. **14.** Converters in wind power systems. **15.** Application of power converters in electric energy storage systems.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Mohan, N.	POWER ELECTRONICS, Converters, Applications, and Design, John Wiley & Sons Inc	2001.	
Rashid, M.H.	POWER ELECRONICS HANDBOOK, Circuits, Devices, and Aplications, Elsevier Inc.	2011.	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
Chakraborty, S., Simoes, M.G., Kramer W.E.	Power Electronics for Renewable and Distributed Energy Systems, Springer-Verlag London	2013.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5 %
	homework	50	50 %
	lab. exercises/practical work	15	15 %
	final exam (written/oral)	30	30 %
	TOTAL	100	100 %
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**ELECTRICAL INSTALLATIONS WITH LUMINANCE**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-087-7 EE-00-2-087-8	elective	VII, VIII	5

Teacher(s)	associate professor Mladen Banjanin, PhD
Associate(s)	assistant professor Nada Cincar, PhD, MSc Goran Vuković, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient So**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15 + 1*15 + 1*15 = 60	total student workload (in hours, per semester) T=2*15* S_o + 1*15* S_o + 1*15* S_o = 90

Total workload of the subject (teaching + student): W + T = 150 hours per semester

Learning outcomes	By passing this subject, the student will be able to: 1. Understands the method of supplying consumers with electricity. 2. Understands the method of imlementation and functioning, as well as protection measures in low-voltage networks and installations. 3. Performs analysis and design of simple power installations.
Prerequisites	There are no requirements for listening and passing the course.
Teaching methods	Lectures, auditory exercises, laboratory exercises.
Subject content per weeks	1. Introduction. Rules of work on the subject. Low voltage electrical installations, characteristics and terms. 2. Low voltage electrical distribution network. 3. Supplying objects with electricity. 4. Components of electrical installations (electric meters, installation conductors and cables ...). 5. Components of electrical installations (switches, fuses, FID, contacts, sockets and plugs...). 6. Protection measures against excessive touch voltages. Simultaneous protection from direct and indirect touch voltage. Protection against direct touch voltage. 7. Protection against indirect touch voltage. 8. Lightning protection installations. Lightning discharges. Determination of the required level of lightning protection. 9. External and internal lightning protection systems. 10. Reactive energy. Reactive energy compensation. 11. Electric lighting. Photometric quantities. Electric light sources. 12. Interior and exterior lighting design. 13. Communication installations. 14. Testing of electrical installations. The effect of electric current on man body. 15. Technical and electrotechnical regulations. Basics of electrical installations design.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
J. D. McDonald	Electrical Installation Work, seventh edition	2011.	-

Additional literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

Obligations, forms of knowledge	**Type of student work evaluation**	**Points**	**Percentage**
	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	I colloquium	12,5	12,5%

assessment and grading	II colloquium	12,5	12,5%
	seminary work	25	25%
	final exam (written/oral)	45	45%
	Total	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	
Full name of the course	**POWER PLANTS**	

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-050-7 EE-00-2-050-8	elective	VII, VIII	5.0

Teacher(s)	PhD Srđan Jokić, assistant professor
Associate(s)	PhD Srđan Jokić, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W= 2*15 + 2*15 + 0*15 =60 h	total student workload (in hours, per semester) T= 2*15*So + 2*15*So + 0*15*So = 90 h

Total workload of the subject (teaching + student): Inopt= W+T=Uopt= 60 + 90 = 150 hours per semester

Learning outcomes	1. Ability to analyze processes in power plant design 2. Knowledge of the characteristics of power plants and their operation 3. Knowledge of the parameters of regulation in the operation of the hydroelectric power plant 4. Acquiring an idea about the operation of power plants in the electric power system 5. Knowledge of basic processes in the operation of renewable energy sources 6. Getting to know the integration of distributed sources of energy into the power system.
Prerequisites	There are no requirements for registering and listening to the subject.
Teaching methods	Lectures, auditory exercises, field teaching.
Subject content per weeks	1. Basic about energy sources. 2. Conventional hydropower plants (HE). Water energy. The power of the river flow. 3. Types of hydraulic turbines. Specific number and favorable number of revolutions of the turbine. 4. Types of hydroelectric power plants. Reversible and pump-accumulation HPPs. HE utilization rate. Individual power and number of turbines in HE. 5. Auxiliary equipment and systems in HE. Small HPP. Advantages and disadvantages, description of small HPP. Losses in pipeline. 6. Flow measurement methods. Turbines in small HPPs. Speed regulation. Voltage regulation and synchronization. 7. Thermal power plants. Steam turbines. Types of heat schemes TE. Own consumption of TE. 8. Degree of utilization of TE. Characteristic operating modes of TE. TPP with gas turbines. 9. Use of solar energy. Solar collectors, panels and thermal systems. 10. Photovoltaic systems. Connecting to the network. 11. Wind power plants. Description of the wind farm. Electrical aspects of exploitation. 12. Geothermal energy. Application of geothermal energy. Geothermal power plants. Examples of direct use.

	13. Cogeneration plants. Application examples. 14. Using biomass for electricity production. 15. Energy storage systems. Classic batteries, advanced technologies, ultracapacitors, super-conducting magnetic materials, inertial masses. Application examples.

Compulsory literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
F. Zabihian	Power Plant Engineering, CRC Press	2021	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	midterm exam I	25	25%
	midterm exam II	25	25%
	Final exam	50	50%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	Firs study cycle / Fourth year of study	

Full name of the course	**MICROPROCESSOR CONTROL OF ELECTRIC DRIVES**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-105-7 EE-08-2-105-8	elective	VII, VIII	5

Teacher(s)	Branko Blanuša, PhD, full professor
Associate(s)	Goran Vuković, MSc, senior teaching assistant

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	1	1	45	22.5	22.5	1.5

total teaching workload (in hours, per semester) W=2*15 + 1*15 + 1*15 = 60 h	total student workload (in hours, per semester) $T=2*15*S_o + 1*15*S_o + 1*15*S_o = 90$ h

Total workload of the subject (teaching + student): In_{opt}= W + T = = 60 + 90 = 150 hours per semester

Learning outcomes	By mastering this subject, the students will be able to: 1. Understand basic types of electric drives and their characteristics. 2. Understand the structure, peripherals and programming of the microprocessors for digital signal processing (DSP). 3. Understand basic methods for digital control of electric drives, pulse-width modulation (PWM), space-vector modulation (SVM) and their implementation on the DSP. 4. Implement linear speed and position control methods on the DSP.
Prerequisites	Required prior knowledge from: Electric machines and plants, Power electronics converters control 1 and 2, Digital control systems, and Microprocessor systems.
Teaching methods	Lectures, auditory exercises, laboratory exercises, seminar papers and consultations.
Subject content per weeks	1. Structure, peripherals and programming of modern DSPs. 2. Overview and basic characteristics of the electric drives with direct current motors. 3. Overview and basic characteristics of the electric drives with induction motors. 4. Overview and basic characteristics of the electric drives with synchronous motors. 5. Overview and application of basic topologies of power electronics converters for control of electric drives. 6. Application of DSPs for control of electric drives. 7. Programming of the DSPs in C language, examples. 8. PWM, SVM. 9. Digital control of current, torque and flux in direct current motors. 10. Digital control of current, torque and flux in induction motors. 11. Digital control of current, torque and flux in synchronous motors. 12. Scalar control of the induction motors. 13. Vector control of the induction motors. 14. Design of the digital speed and position controllers. 15. Practical realization.
Compulsory literature	

Author(s)	Publication title, publisher	Year	Pages (from-to)
R. Koziol, J. Sawicki, L. Szklarski	Digital Control of Electric Drives (Studies in Electrical and Electronic Engineering Book 43), Elsevier Science	2013	
Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
W. Leonhard	Control of Electrical Drives, 3rd Edition, Springer	2001	

	Type of student work evaluation	Points	Percentage
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	5	5%
	test/midterm exam	40	40%
	lab. exercises/practical work	15	15%
	seminar paper	10	10%
	final exam (written/oral)	30	30%
	TOTAL	100	100%
Web page			
Certification date			

	UNIVERSITY OF EAST SARAJEVO Faculty of Electrical Engineering	
	Study program: *Electric Power Engineering*	
	First study cycle / Fourth year of study	

Full name of the course	**MANAGEMENT IN ENGINEERING PRACTICE**

Subject code	**Subject status**	**Semester**	**ECTS**
EE-08-2-047-7 EE-08-2-047-8	elective	VII, VIII	5

Teacher(s)	Nenad Marković, PhD, assistant professor
Associate(s)	Miodrag Forcan, PhD, assistant professor

Number of lessons/teaching workload (weekly)			**Individual student workload (in hours per a semester)**			**Student workload coefficient S_o**
L	**AE**	**LE**	**L**	**AE**	**LE**	**S_o**
2	2	0	45	45	0	1.5

total teaching workload (in hours, per semester) W=2*15+2*15+0*15=60 h	total student workload (in hours, per semester) T=2*15*S_o+2*15*S_o+0*15*S_o=90 h

Total workload of the subject (teaching + student): In_{opt}= W + T = 60+90 = 150 hours per semester

Learning outcomes	1. Basic knowledge about companies as business entities. 2. Knowledge related to design, consulting services and contractor engineering. 3. Knowledge related to the quality and financial feasibility of projects. 4. Specialist knowledge related to project control and management.
Prerequisites	There is no requirement for other subjects.
Teaching methods	Lectures, auditory exercises, seminar papers, tests.
Subject content per weeks	1. Introductory considerations. 2. The company as a business entity: company (objectives of the company; legal form of the company). 3. Company strategy, company organization, company culture. 4. Environment (goals; tax system; financial markets and sources of funds). 5. Principles of systems engineering: introductory considerations. Continuous design. 6. Preliminary design. Detailed design. 7. Contractor engineering (services of consulting companies, contractor engineering). 8. Responsibility of consultants, selection of consultants, price for consulting services, offer, contract. 9. Reengineering. The place and role of information technologies in reengineering. 10. Fundamentals of the quality system. Quality system and standards; Quality system documentation. 11. Financial feasibility of the project: introduction; financial possibilities of investors. 12. Project profitability, project financing. 13. Project management: introduction; project manager and organization; planning; cost estimates. 14. Project control; the team; documentation; approach to project implementation. 15. Tools and methods: introduction; basic elements of the project.

Compulsory literature

Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
P. Trott	Innovation management and new product development, Pearson, Sixth Edition	2017.	

Additional literature			
Author(s)	**Publication title, publisher**	**Year**	**Pages (from-to)**
P. O'Connor	The Practice of Engineering Management: A New Approach, 1st Edition, Wiley	1994.	
Harvard Business Review	Harvard Business Review Manager's Handbook: The 17 Skills Leaders Need to Stand Out (HBR Handbooks), Harvard Business Review Press	2017.	

	Type of student work evaluation	**Points**	**Percentage**
Obligations, forms of knowledge assessment and grading	Pre-examination obligations		
	attendance at lectures/exercises	10	10 %
	midterm exam	30	30 %
	final exam (written/oral)	60	60 %
	TOTAL	100	100 %
Web page			
Certification date			