Program Overview – Power Engineering

Year I						
Semester I			Hours/Week			
Nr.	M/E	Courses	L	NE	Lab	ECTS
1.	M	Mathematics 1	3	3	0	7
2.	M	Physics 1	3	1	1	6
3.	M	Fundamentals of electrical engineering	3	3	0	7
4.	M	Programming Language	2	0	2	5
5.	E	Non-technical courses:				
		1.English Language	1	2	0	5
		2.German Language	1	2	0	5
		3.Communication skills	2	1	0	5
Semester II						
1.	M	Electric Circuits	3	3	0	7
2.	M	Physics 2	3	1	1	6
3.	M	Mathematics 2	3	3	0	7
4.	M	Algorithms and Data Structures	2	0	2	5
5.	M	Digital Circuits	2	1	1	5

Year II						
Semester III			Hours/Week			
Nr.	M/E	Courses	L	NE	Lab	ECTS
1.	M	Electrical Materials	2	1	1	5
2.	M	Mathematics 3E	2	2	0	5
3.	M	Signals and systems	3	2	0	5
4.	M	Automation	2	1	1	5
5.	M	Electronics	2	1	1	5
6.	M	Electrical Measurements	3	0	2	5

Semester IV						
1.	M	Measuring Instrumentation	2	0	2	5
2.	M	Power Plants	3	2	0	6
3.	M	Electromagnetic Fields and Waves	3	0	1	6
4.	M	Electrical Machines 1	3	2	1	7
5.	E	Non-technical courses:				
		1. Management	2	1	0	6
		2. Project Management	2	1	0	6

Year III

Semester V			Hours/week			
Nr.	M/E	Courses	L	NE	Lab	ECTS
1.	M	Transmission and Distribution of Electric Power	2	2	0	6
2.	M	Electrical Machines 2	2	1	1	6
3.	M	Low Voltage Power System	2	2	1	6
4.	M	Power Electronics	2	1	1	6
5.	E	1. Energy and	2	0	2	6
		environment	2	2	0	6
		2. Power System Facilities				

Semester VI						
1.	M	Protective relaying	2	2	0	5
2.	M	Electrical drives	2	0	2	5
3.	E	Elective courses:				
		1. Renewable energy resources	2	0	1	4
		2. Dynamics of power plants operations	2	1	1	4
		3. Special electrical machines	2	1	1	4
		4. Software Application in Power Systems	2	0	2	4
		5. Power market	2	2	0	4

5.	O	Internship	6
6.	O	Bachelor thesis	6

Course Descriptions

Course title: Mathematics 1 (Mandatory, Sem. I, 7 ECTS)
The objective of the course: The purpose of the course is to enable students that knowledge gain through this course can apply as an auxiliary device in the professional courses of electrical engineering and computer study.
Learning outcomes: On successful completion of the course, students will be able to: 1. Know and designs to solve various problems in the field of their profession, when dealing with operations with complex numbers. Using matrices and determinants, as well as, they are able to solve and apply problems associated with systems of linear equations. 2. Understand and apply the concepts of vectors and other elements of analytical geometry in space, designs and develops these problems. 3. In research finds various electrical phenomena functional connections sizes that phenomenon of differential calculus then describes and examines them about functional, know to find their maximum values and a whole through the graphical presentation noting all properties them.
Course content. Real and complex numbers. Matrices, determinants and solving linear systems. Operations with vectors and linear combination of vectors. Scalar product of two vectors and the angle between them. Vector product, scalar triple product and vector triple product of vectors. Liner independence of vectors and basis decomposition of vectors. The functionofone realvariable, limits and its continuity. Limit of sequences. Definition of series and their convergence. Criteria for convergence of series. Derivative of a function and applications.
Methods of teaching: 45 hours of lectures + 45 hours of auditoria exercises. Approximately 120 hours of personal study and exercise.
Grading System: Homework 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. Hamiti E. - Matematika I, Prishtinë 1995.
2. Hamiti E. - Matematika II, Prishtinë 1997.
3. Peci H, Doko M. - Përmbledhje detyrash të zgjidhura nga Matematika I, Prishtinë 1997.
4. Loshaj Z. - Përmbledhje detyrash të zgjidhura nga Matematika II, Prishtinë 1996.

Course title: Physics 1 (Mandatory, Sem. I, 6 ECTS)
The goal : Using the physical laws to solve the basic problems of engineering.
Learning outcomes: 1. Analyze simple mechanical systems and solve equations of motion. 2. Apply principles of conservation of energy and momentum to particle collisions.3. Explain the conditions of statics of rigid bodies and the equation of motion for rotation of the rigid body around fixed axis. 4.Understand the first law of thermodynamics and analyze thermodynamic cycles.
Course content: The international system of Units. Physical methods, dimensions and units. Kinematics of particle, linear, rotational and curvilinear motion. Newton s laws. System of particles, center of mass, conservation of momentum. Work, energy, power. Conservative

non conservative forces. Statics. Mechanics of rigid body. Gravitation. Inertial and non inertial frames. Statics of fluids, flow of ideal and real fluids. Heat and thermometry, Kinetic theory of heat. Thermodynamics, cyclic processes, entropy.
Methods of teaching: 45 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 75 hours of personal study.
Grading System:
Seminar 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. S. Skenderi, R,Maliqi, "Physic for thechnical faculty", UP, Pristina, 2005.
2. J. Serway, Physics for scientists and engineering , Thomson Books, 2004.
3. D. Haliday, R.Resnick, J.Walker, Fundametals of Physics, John Wiley &Sons, 2001.

Course title: Fundamentals of electrical engineering (Mandatory, Sem. I, 7 ECTS)

The goal : The purpose of the course is to introduce the basic principles of electrical and magnetic field.
Learning outcomes: On successful completion of the course, students will be able to: 1. Explain fundamental laws of electromagnetism (Coulomb's, Biot-Savart, F araday's and Gauss's law). 2. Apply the fundamental laws of electromagnetism to solution of electromagnetic field problems, 3. Classify problems of electromagnetic fields into static electric, static magnetic, static current and dynamic fields. 4. Apply calculation of electromagnetic fields, inductances and capacitances to solution of practical problems. 5. Apply Matlab software for soving basic problems in both elctrical and magnetic field. 6. Apply gained knowledge of electromagnetic skills in other fields
Course content: Basics of electricity, Coulomb's law and field intensity. Gauss's law. Electric potential. An electric dipole and flux lines. Electrostatic induction. Electric generator. Polarization in dielectrics. Generalized Gauss's law. Boundary conditions. Capacitance. Electrostatic networks. Energy and forces in electrostatic fields. Electrostatic field analysis using MATLAB. Basics of magnetism. Magnetic flux density. Lorentz force. Biot-Savart's law. Forces due to magnetic field. Magnetic torque and moment. Ampere's law. Magnetic dipole. Magnetization in materials. Generalized Ampere's law. Magnetic boundary conditions. Magnetostatic field analysis using MATLAB. Faraday's law. Inductors and inductances. Magnetic energy. Magnetic circuits.
Teaching Methodology: 45 hours of lectures + 45 hours of tutorials. Approximately 70 hours of personal study and exercise including seminars.
Grading System: First assesment:30%, Second assesment: 25%, Home exercises 10%, Attendance: 5%, Final exam, 30%, Total:100%
Literature:

1. Nexhat Orana, *Bazat e elektroteknikës 1*, Prishtinë, 1994
2. Nexhat Orana, *Bazat e elektroteknikës 2,* Prishtinë, 1994
3. M.N. *Sadiku, Elements of electromagnetic*, Oxford University Press, New York, 2001

Course title: Programming Language (Mandatory, Sem. I, 5 ECTS)
The goal : The purpose of the course is to introduce the basic principles of programming and algorithms, for solution of problems with computer and writing of respective programs in C++ programming language.

Learning outcomes: On successful completion of the course, students will be able to write programs in C++ programming language, including the use of different functions.
Course content: Introduction to algorithms: sum, product and factoriel. Array operations and algorithms: sum/product of the array members, counting members, searching and sorting. Matrix manipulations: creation, sum/product of the members, searching, creationg vector from the matrix members. Introduction to C++ programming language: variable types, operators, statements. Input and output: input of numbers, arrays, strings and their output, use of manipulators. Branching: if, goto, switch( ). Loops: while, do-while, for. Loops: breaking, continuing and exiting. Functions: defining and executing, parametters and arguments, mathematical and string functions. Using vectors and matrices with functions. Recursion, pointers, references. User defined types: enumerations, structures, classes.
Methods of teaching: 30 hours of lectures + 30 hours of auditorial/lab exercises. Approximately 100 hours of personal study and exercise including home problems/tasks.
Grading System: Attendance 10%, Mid-term problems 30 %, Collocui/Final Exam 60 %
Literature:

1. Agni Dika, "Algoritmet, me programe në C++", Universiteti i Prishtinës, Fakulteti Elektroteknik, Prishtinë, 2004, http://www.agnidika.net/algoritmetCpp.pdf
2. Agni Dika Bazat e Programimit në C++, Universiteti i Europës Juglindore, Tetovë, ISBN 9989-866-23-6, http://www.agnidika.net/programimiCpp.pdf
3. H.M. Deitel, P. J. Deitel, How to Program C++, Prentice Hall, Upper Saddle River, New Jersey, ISBN 0-13-111881-1
4. Robert Lafore, Object-Oriented Programming in C++, Sams, Indianopolis, Indiana, ISBN-10:0-672-32308-7

Course title: English Language (Elective, Sem. I, 5 ECTS)
The goal: The aim of the course is to develop students' communication skills inEnglish Language, in both oral and written form,with special focus in the field of electrical and computer engineering.
Learning outcomes: Upon successful completion of this course students will be able:1. To apply active English Language in their everyday life; 2. To communicate in English Language in both oral and written form at appropriate level, primarily in their professional field of study; 3. To ask and respond questions from the field of electrical and computer engineeringin English Language; 4. To translate texts from the field of electrical and computer engineering.
Teaching methodology: 15 hours lectures, 30 hours exercises. Approximately 100 hours of independent work including the seminar paper.
Assessment: Seminar paper 10%, intermediate assessment 30 %, final exam 60 %
Basic literature:

1. Markovic, Jelica, *Engleski jezik za studente elektrotehnickog fakulteta*, Beograd, 1989
2. D. Nastić, V. Kosovac: "Engleski jezik za elektrotehnicke i masinske fakultete", Svjetlost Sarajevo, 1984.

Course title: Communication skills (Elective, Sem. I, 5 ECTS)
The goal: The goal of this course is to develop written and verbal communication skills and group work.
Learning outcomes: On successful completion of the course, students will be able to:

1. write different official and business letters; 2. write formal and informal emails; 3. write a five-paragraph essay; 4. write different reports (visit r., field r., feasibility r., progress r.); 5. write laboratory reports; 6. use the Internet to find specific information; 7. use the computer to write different reports; 8. write minutes of meetings; 9. write a paper on a particular problem or issue; 10. write CVs and applications for work; 11. hold oral presentations; 12. respond to job interviews.

Course content: Introduction to communication skills. Words and sentences. Writing process. Technical information. Internet information and e-mail: World Wide Web (www). Essays and exam answers. Laboratory reports. Reports. Proposals, specifications and manuals. Final year projects and reportss. Spoken presentations. Group work and meetings. Letters. CVs and job applications. Interviews: Interview for job.

Methods of teaching: 30 hours of lectures + 15 hours of exercises. Approximately 100 hours of personal study and exercise including home-work.

Grading System: 1st Exam: 25%; 2nd Exam: 25%; 50%, Home-work: 25 %, Final exam: 25 %

Literature:

1. Majlinda Nishku, *Si të shkruajmë: procesi dhe shkrimet funksionale*, CDE, Tiranë, 2004.
2. Rami Memushaj, *Shqipja standarde. Si ta flasim dhe ta shkruajmë.* Toena, Tiranë, 2004.
3. Bardhyl Musai, *Si të shkruajmë ese*, CDE, Tiranë, 2004.
4. John W. Davies, *Communication Skills. A Guide for Engineering and Applied Science Students*, Prentice Hall, 2001.

Course title: Electric Circuits (Mandatory, Sem. II, 7 ECTS)

The goal: The purpose of the course is to introduce the basic principles of electrical circuits.

Learning outcomes: On successful completion of the course, students will be able to: 1. Understand and apply Kirchhoff's Laws to DC and AC circuit analysis. 2. Understand and apply phasors for sinusoidal steady-state AC circuit analysis 3. Analyze DC and AC circuits by following circuit analysis methods and theorems (nodal analysis, mesh analysis, star-delta transformation, transformation between real source models, Millman's, Thévenin's and Norton's theorems 4. Understand and apply the principle of linearity and superposition to AC and DC circuits 5. Analyze transient response of first order circuits (series RC and RL). 6. Use software PSPICE for solving DC and AC circuits. 7. Apply gained knowledge of electric circuit skills in other fields

Course Content: Concepts, elements and topology of electric circuits**.** – Types of electrical circuits. Elementary DC circuits – Circuit Elements, Electrical resistance- Ohm’s law. Construction of circuitmodel.Voltage and potential in electric circuit. Current source. Kirchoff’s laws. Analysis of a Circuit Containing Dependent Sources. Complex DC circuits. DC circuit analysis using SPICE. Current and voltage waveforms. Techniques of Circuit Analysis. Sinusoidal Steady-State Analysis. The Sinusoidal Response, The Passive Circuit Elements in the Frequency Domain, Sinusoidal Steady-State Power Calculations, Maximum Power Transfer. AC circuit analysis using SPICE. Magnetically coupled circuits. Response of First-Order *RL* and *RC* Circuits. Transient circuit analysis using SPICE. Balanced Three-Phase Circuits. SPICE analysis of three phase circuits.

Teaching methodology: 45 hours lectures, 45 hours tutorials, and approximately 70 hours independent work.

Assesment: First assesment:30%, Second assesment: 25%, Home work 10%, Attendance: 5%, Final exam, 30%, Total:100%

Literature :

1. Nexhat Orana, *Bazat e elektroteknikës 1*, Prishtinë, 1994
2. Nexhat Orana, *Bazat e elektroteknikës 2,* Prishtinë, 1994
3. Ch. Alexander, M. N. Sadiku, Electric circuits, McGraw Hill, New York, 2000

Course title: Physics II (Mandatory, Sem. II, 6 ECTS)

The goal: Using the physical laws of modern physics in modeling and solving specific engineering problem.

Learning outcomes: On successful completion of the course, students will be able to: 1. Apply the linearization technique to equations of motion of oscillatory 2. Explain the wave equation in non dispersive medium 3. Analyze optical systems using the methods of geometrical optics.4 . Explain the phenomena of interference, diffraction and polarization of light.5. Explain Planck's law of black body radiation. 6. Relate the atomic spectrum to quantization of energy levels.

Course content: Solid state materials elasticity. Mechanical oscillation and mechanical waves. Sound waves. Doppler s effect. Electromagnetic waves. Maxell s equation s. Wave equation, wave propagation. Geometrical optics, mirrors, lenses and prisms. Physical optics. Interference, diffraction and polarization. Photometry. Quantum nature of light. Blackbody radiation, quantization. Photo effect and Compton s effect. Atom structure. Atomic specters. X-rays. Atomic nucleus. Radioactivity. Relativistic mechanics.

Methods of teaching: 45 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 75 hours of personal study.

Grading System: Seminar 10%, Mid-term exams 20 %, Final Exam 60 % .

Literature:

1. S. Skenderi, R,Maliqi, “Physic for thechnical faculty”, UP, Pristina, 2005.
2. J. Serway, Physics for scientists and engineerings, Thomson Books, 2004.
3. D. Haliday, R.Resnick, J.Walker, Fundametals of Physics, John Wiley &Sons, 2001.

Course title: Mathematics 2 (Mandatory, Sem. II, 7 ECTS)

The goal: The purpose of the course is to enable students to knowledge gained through this course can apply as an auxiliary device in the professional courses of study electrical engineering and computer.

Learning outcomes: On successful completion of the course, students will be able to: 1. Understand the notion of indefinite integral and definite integral and their application in the computation of various measures in geometry, electrical engineering, mechanics and other areas; 2. Understand basic techniques in calculus of several variables and apply on finding local and global extremes of differentiable functions of several variables; 3. Relate techniques of Mathematics and use them to solve basic types of ordinary differential equations and create a mathematical model, based on the differential equation, related to electrical engineering.

Course content. Indefinite and definite integral. Methods of integration (method of substitution and integration by parts). Applications of integral calculus. Function of several variables, Euclidean space R^n. The notion of the graph of the function in several variables. Limit and continuity of functions in several variables. Partial derivatives. Higher order derivatives. Derivatives of composite functions and chain rule. Local extreme of function of several variables. First-order differential equation. Orthogonal trajectories. Singular solutions of differential equations of the first order. Linear differential equation of the second order. Higher-order linear ordinary differential equations with constant coefficients. Linear systems of two or more ordinary differential equations

Methods of teaching: 45 hours of lectures + 45 hours of auditoria exercises. Approximately 120 hours of personal study and exercise.

Grading System: Homework 10%, Mid-term exams 30 %, Final Exam 60 %

Literature:

1. Hamiti E. - Matematika II, Prishtinë 1995.
2. Hamiti E. - Matematika III, Prishtinë 1997.
3. Loshaj Z. - Përmbledhje detyrash të zgjidhura nga Matematika II, Prishtinë 1996.
4. Hamiti E., Lohaj Sh. – Matematika III – Përmbledhje detyrash, Prishtinë 1998.

Course title: Algorithms and Data Structures (Mandatory, Sem. II, 5 ECTS)

The goal : The purpose of the course is to help studens in advancing their knowledge for different algorithms, data structures and use of classes and objects in programming.

Learning outcomes: On successful completion of the course, students will be able to compile advanced algorithms, to define structures and classes and to use them in writing advanced programs.

Course content: Definition and use of advanced functions, iline functions, macro functions, function overloading, templates. Searching and sorting algorithms: different methods for searching and sorting.

User defined types. Object oriented programming: classes and objects. Classes and member functions. Using public and private members. Declaring objects and operating with their components. Pointers and functions with pointers. References and functions with references. Stack. Queue. Linked lists, adding/deleting members. List searching and sorting. Binary tree. Graphs. Files: sequential and direct access files.

Methods of teaching: 30 hours of lectures + 30 hours of auditorial/lab exercises. Approximately 100 hours of personal study and exercise including home problems/tasks.

Grading System:

Attendance 10%, Mid-term problems 30 %, Collocui/Final Exam 60 %

Literature:

1. Agni Dika, Programimi i Orientuar në Objekte, me programe në C++, UEJL, Fakulteti i Shkencave Bashkëkohore, Tetovë, ISBN 9989-866-25-2, http://www.agnidika.net/programimiobjekte.pdf
2. D. S. Malik, C++ Programming: Program Design Including, Data Structures, Course Technology, Thomson Leraning, Boston, Massachusetts, ISBN 0-619-03569-2
3. H.M. Deitel, P. J. Deitel, How to Program C++, Prentice Hall, Upper Saddle River, New Jersey, ISBN 0-13-111881-1
4. Robert Lafore, Object-Oriented Programming in C++, Sams, Indianopolis, Indiana, ISBN-10:0-672-32308-7

5. D. S. Malik, Programming: From Problem Analysis To Program Design, Course Technology, Thomson Leraning, Boston, Massachusetts, ISBN 0-619-06213-4

Course title: Digital Circuits (Mandatory, Sem. II, 5 ECTS)
The goal: The purpose of the course is to present the way of digital logic design (analysis and design).
Learning outcomes: On successful completion of the course, students will be able to: 1. Explain and find the functions that performs a digital logic circuit. 2. To formulate differnet codes for information. 3. To express values in different system: Binary, Octal, Hexadecimal,etc. 4. Analyze logic circuits. 5. Designing the digital circuits.
Contents: Numerical systems. The binary number system, arithmetic operations in the binary system. Transformations between systems. Codes and encoding. Boolean algebra. Logical functions and their presentation. Combinatorial logic circuits. Analysis of logic circuits. Synthesis of logic circuits. Encoders, decoders, codes transducers, multiplexers, demultiplexers, arithmetic circuits, comparators, ROM memories. Digital sequential circuits. Flip-Flops: SR, JK, D, T. StateTables of the circuits. Diagram of states of the circuit. Analysis of synchronous sequential circuits. Analysis of asynchronous sequential circuits. Design of sequential circuits. Design of digital counters. Design of memory. Software for simulating logic circuits.
Methods of teaching: 30 hours of lectures + 15 hours of auditorial exercises and 15 hors of laboratory exercises. Approximately 70 hours of personal study and exercise including projects.
Grading System: Presence 10%, Projects 30 %, Final Exam 60 %
Literature:
1. Agni Dika "Qarqet digjitale kombinuese I", Universiteti i Prishtinës, 2008
2. S.M. Deokar, A. A. Phadke, "Digital Logic Design and VHDL", Wiles, 2009

Course title: Electrical Materials (Mandatory, Sem. III, 5 ECTS)
Objectives of the course (module): As students gain knowledge of the basic features of materials used in engineering and dependency features their effects of external field's forms.
Learning outcomes: After completing this course (course) the student will be able to: 1. To enrich knowledge Micro structure of materials. 2. To enrich knowledge of the basic features of conductive materials, dielectric and magnetic and 3. To be able to make quality selection of materials depending on the electro influences of various external fields.
Contents: Basic knowledge on materials microstructure. Conductive materials, materials with greater conductivity, semiconductor materials and super-basic features and their characteristics. Materials and their dielectric and magnetic materials, basic features and their use. Experimental Determination of the basic characteristics of materials, conductors, and magnetic insulation
Methodology of teaching:(30 hours of lectures, 30 hours of laboratory exercises. Approximately 100 hours of independent work including elaborations processing of experimental data.
Evaluation: Evaluation of the first 15%, second 15% rating, the third rating 15%, 5% Regular attendance, final exam 50%.

Literature:

1. A. Abazi, I. Krasniqi: "Materialet elektroteknike" Pristine, 1997
2. A. Robert: "Dielectric Materials and application", London, 1995,
3. D.G. Fink, H.W. Beaty, "Standard Handbook for Engineers ELECTRICAL" Mc. Graw Hill, N.Y, 1995

Course title: Mathematics III(E) (Mandatory, Sem. III, 5 ECTS)
The goal: Is to enable students that knowledge gain through this course can apply as an auxiliary device in the professional courses of electrical engineering and computer study.
Learning outcomes: On successful completion of the course, students will be able to: 1. Formulate and to solve various problems in the field of their profession, when dealing with double, triple, line and surface integrals, vector functions in the space, scalar and vector fields and Fourier series. 2. The student will know to describe and solve problems related to the mechanics and the theory of electrical circuits. With the acquired knowledge the student will be trained to make mathematical models related to specific professional problems.
Course content: Double and triple integrals, definition, calculation and their application in mechanics. Line integral of the first type and the second type, their definition, calculation, and Green's formula. Surface integral of the first type and the second type, their definition, calculation, Stocks and Gauss-Ostrogradsky formula. Vector functions in space. The gradient of the scalar field. The divergence and rotor of the vector field. Fourier series. Dirichlet conditions. Parseval identtity. Fourier series of the complex forme. Fourier transformations and Fourier Integral. Classical and axiomatic definition of probability. Events. Random variables and their distribution. Mathematical expectation, variance, standard deviation and other moments.
Methods of teaching: 30 hours of lectures + 30 hours of auditoria exercises. Personal study and exercise, discussions and group and individual consultations.
Grading System: Homework 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. Hamiti E. - Matematika III/1, Prishtinë 1995.
2. Hamiti E. - Matematika III/2, Prishtinë 1997.
3. HAMITI E, LOHAJ SH. - Përmbledhje detyrash të zgjidhura nga Matematika III, Prishtinë 2001.
4. HAMITI E, LOHAJ SH. - Përmbledhje detyrash të zgjidhura nga Matematika IV, Prishtinë 2002

Course title: Signals and Systems (Mandatory, Sem III. , 5 ECTS)
Course objectives: The objectives of the course are to introduce students to the basic concepts of signals, system modeling, and system classification; to develop students' understanding of time-domain and frequency domain approaches to the analysis of continuous and discrete systems; to provide students with necessary tools and techniques to analyze systems; and to develop students' ability to apply modern simulation software to system analysis.
Learning outcomes: Student will learn properties of signals and systems and the ways how to represent them in time and frequency domain. After finishing the course student will be

familiar with fundamental methods of signal and system analysis, in time and transform domain, through problem solving and performing corresponding simulations.
Course content: Introduction to basic theoretical concepts of signal and systems. Impulse response and convolution. Differential and difference equations. Fourier series and signal decomposition in harmonic components. Fourier transformation, spectrum of continuous signal and its properties. Amplitude modulation and sampling. System analysis in the frequency domain. Ideal filters. Demodulation and reconstruction of sampled signals. Fourier analysis of signals and systems in discrete time. Laplace transformation and its applications in the analysis of signals and systems. z-transform, properties, transfer function, stability and analysis in z domain.
Teaching methodology: 45 hours of lectures + 30 hours of exercises. Approximately 75 hours of personal study, including homework exercises.
Grading System: Homework 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. "*Schaum's Outline of Theory and Problems of Signals and Systems*", Hwei P. Hsu, 1995, McGraw-Hill.
2. "*Signals and Systems*", Alan V. Oppenheim, et al, 2nd ed., 1996, Prentice Hall.
3. "*Fundamentals of Signals and Systems-Using Matlab*", E. Kamen and B. Heck; 3rd ed., 2006, Prentice Hall.

Course title: Automation (Mandatory, Sem. III, 5 ECTS)
The goal : The purpose of the course is to introduce the students with the concepts and fundamental structures of automatic control systems.
Learning outcomes: On successful completion of the course, students will be able to: 1. To be thoroughly familiar with the concept and standard structures of automatic control systems. To appreciate the importance of feedback in system performance. **2.** Write dynamic equations of automatic systems, obtain a mathematical model of different control systems 3. Become familiar with the modeling of systems in the form of block diagrams and obtain transfer functions from such structures. 4.Perform system analysis in time domain and frequency domain 5. Conclude on important features of control systems based on the analysis of time and frequency responses.
Course content: Introduction to the fundamental of automatic control. The necessary mathematical apparatus for analysis of control systems. Mathematical modeling of electrical, mechanical and thermal systems. Time domain analysis of control systems. Step response of control systems and data inferring from recorded responses. Frequency domain analysis of control systems. Bode and Nyquist diagrams; deriving system features from these diagrams. Modeling and analysis of systems in state space. Controllability, observability and feedback controllers.
Methods of teaching: 30 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 100 hours of personal study and exercise including seminars.
Grading System: Seminar 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. F. Golnaraghi & B. C. Kuo, *Automatic Control Systems*, John Wiley & Sons
2. J. D'Azzo & C.Houpis, *Automatic Control Systems, Analysis and Design. Conventional and Modern*. McGraw Hill
3. A. Skeja, *Rregullimi Automatik,* Ligjwrata tw autorizuara

Course title: Electronics (Mandatory, Sem. III, 5 ECTS)
The goals: To provide an introduction to basic concepts in the field of electronics. This course is one of the fundamental courses for all departments of electrical engineering and will prepare students for more advanced courses in the field of electronics.
Learning outcomes: Upon completion of this course the student will be able to: Understand the basics of electronics within the field of electrical engineering, to analyze and design the diode circuits, bipolar and FET transistor and their models; analyze and design transistor circuits for small signals, analyze and utilize operational amplifiers, will be able to continue studies in advanced electronic courses and electrical circuits.
Course content: Basic concepts, current voltage, Kirchhoff's laws, Norton's theorem and Thevenin's theorem. Ac circuits, resonance, transfer function, four pole networks, filters and amplifiers. Diodes circuits, zener diodes, drivers, and diodes circuits for signal processing. Bipolar transistors, the basic configuration bipolar transistor circuits, models for small signals. Basic amplifier configurations: common Emitter, common based and common collector. Field effect transistor, operational principles, models for small signals. MOSFET transistors. Basic amplifier configurations: common sours, common gates and common drain. Operational amplifiers, real and ideal characteristics, basic circuits with operational amplifiers, AO applications. Feedback elements, differential amplifier. Data acquisition and control processes, comparators, oscillators, A/D transducers D/A transducers, time conversion. Computers and interconnection circuits.
Methods of teaching: 30 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 100 hours of personal study and exercise.
Grading System: Test 1: 15 % , Test 2: 15 % Final test: 20%, Final exam: 50%
Literature:

1. Donald Neamen, Electronic Circuit Analysis and Design, McGraw-Hill Education, 2000,
2. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press, 2007,
3. Myzafere Limani, Elektronika, Universiteti i Prishtinës, ligjërata të autorizuara, 2008.

Course name: Electrical Measurements (Mandatory, Sem. III, 5 ECTS)
Course objectives: To achieve the basic theoretical and practical knowledge's about Electrical Measurements.
Learning Outcomes: After completion of this course, student should be able to use instruments and measuring methods for measuring of electrical, nonelectrical and magnetic quantities. He should be able to do this in professional engineering and scientific manner estimating the measurement uncertainty of measured result. The covered span of measured quantities is that used utilities in industries and research without special measurements, i.e. student should have knowledge's about: sensors, instruments, amplifiers and converters of quantities.
Course Content: Measuring units and measuring errors. The use of resistor combinations to build measuring schemes for: voltage-potentiometers and current dividers, measuring potentiometers and measuring bridges. Discus and use the: thermocouples, resistive temperature detectors, thermistor's for temperature measurements, and strain gauge resistors

to measure mechanical tension. Discus and use of different sensors: capacitive, inductive, magnetic and electromagnetic and induction type, for different measurements of physical quantities. Knowledge and ability to use methods and instruments to measure electrical quantities as: voltage and current (both ac and dc), resistance, impedance and reactance; power and energy (both dc and ac in single and three phase system. Discus and use methods and instruments to measure magnetic quantities: flux, flux density, intensity of magnetic field and magnetic losses in ferromagnetic material.

Teaching methodology: 45 hours lectures with solution of problems, and 30 hours laboratory work. Approximately 75 hours with lecturer and teaching assistant.

Assessments: 3 tests each one 15 %, laboratory work test 15% and final exam 40 %.

Literature:

1. A. Gashi, Matjet elektrike, ligjëratat dhe prezantimet 2012.
2. M.J. KORSTEN, W.OTTHIUS, F. VAN DER HEIJDEN "Measurement Science for Engineers, Elsevier Science & Technology Books, 2004.
3. M. SEDLÁČEK, V. HAASZ, Electrical Measurements and Instrumentation, Prague 2000.

Course name: Measuring Instrumentation (Mandatory, Sem. IV, 5 ECTS)

Course objectives: To achieve the basic theoretical and practical knowledge's about: Dynamic characteristics and errors. AC measuring bridges, dividers, filters. Analog processing of measuring quantities. Digital processing of measuring quantities A/D and D/A conversion. Virtual instruments and measuring systems.

Learning Outcomes: After completion of this course, student should be able to determine instrument characteristics and dynamic error. To have a knowledge to use ac measuring bridges , dividers and filters. To have a knowledge to use operational amplifiers for analog processing of measuring quantities. About latches and flip-flops for digital processing of measuring quantities. About analog to digital converters and conversion, and vice versa. About high level virtual instruments and measuring systems.

Course Content: Instrument characteristics and dynamic errors. The use of impedances combinations to build measuring schemes for: capacitive and currentdividers, measuring bridges and filters. Discus and use operational amplifiers to build schemes for analog processing of measuringquantities, instrument amplifier. Discus and use of latches and flip flops to build counters and shift registers for digital processing of measuringquantities. State machine-processor and memory. Knowledge about analog to digital converters and digital to analog, main types of convertors. Virtual instruments. Introduction in Lab-View in a level to be able to use it for virtual measurement of main electrical quantities. High level computer systems such DCS (Distributed Control System) and SCADA.

Teaching methodology: 30 hours lectures with solution of problems, and 30 hours laboratory work. Approximately 60 hours with lecturer and teaching assistant.

Assessments: 3 tests each one 15 %, laboratory work test 15% and final exam 40 %.

Literature:

1. A. Gashi, Matjet elektrike, ligjëratat dhe prezantimet 2013.
2. " Circut Analysis Theory and Practice", London 2004.
3. "Electrical Measurement Signal Processing and Displays**",** New York, 2002.

Course title: Power Plants (Mandatory, Sem. IV, 6 ECTS)

Course objectives: Acquiring of knowledge related to various energy technologies and energy in modern world. Achieving level of knowledge for use in any other study and for further education in the field of electrical engineering Understanding of basic principles and characteristics of different power plant types. Knowledge of main components characteristics.

Learning Outcomes: On successful completion of the course, students will be able to: 1. Develop an intuitive understanding of energy processes in power systems with emphasis on physical explanations using (by means of) methods of thermodynamics, fluid mechanics and electrical engineering 2. Analyze and calculate the basic parameters of energy processes in thermal power plants, nuclear power plants, hydro power plants and wind power plants 3. Calculate entropy changes for reversible and irreversible energy processes: calculate the loss of exergy (maximum mechanical work) 4. Calculate exergy, ideal, reversible and real work of energy processes 5. Describe direct energy conversions to electrical energy (thermoelectric, thermionic and photoelectric transformation, fuel cells and magneto hydrodynamics generators) and electrical energy conversions to other (useful) energy forms 6. Develop energy balance and predict the growth of electricity consumption 7. Describe environmental impact of energy utilization, conversion and consumption (environmental pollution and climatic change) 8. Combine independent learning, analytical and problem solving skills that be applied in the diverse career paths 1. Describe main power plants 2. Explain operation of main equipment in hydro power plant 3. Explain operation of main equipment in thermal power plant 4. Identify specific operational requirements in case of nuclear power plants 6. Describe characteristics of wind power plant operation 7. Compute main parameters for different power plant types

Course Content: Importance of energy, energy supply, energy constraints. Energy forms and sources, classification of energy forms. Renewable and non-renewable energy sources. Transformations of primary energy forms into more usable forms and transformation of electrical energy into other forms of energy. Energy transportation and delivery. Electrical energy: generation, transmission, distribution and usage. Electrical energy consumption. Energy systems. Energy balance. Environmental impact during generation, transformation and consumption of energy (environmental pollution and climate change). Sustainable development and energy. Energy storage. Energy alternatives. Energy efficiency.

Basic characteristics of the power plants: types, power capabilities, energy production. Power plants (hydro, thermal, and nuclear). Main power plant systems and equipment. Water, steam and gas turbine types. Nuclear reactor as heat source. Heat balance diagrams and power generation cycles for different plants.

Teaching methodology: 45 hours of lectures, 25 hours numerical exercises. Approximately 100 hours of independent work including thesis seminar.

Grading System: Seminar 10%, intermediate estimates 30%, final exam 60%.

Literature

1. POŽAR, H. (1992). Osnove energetike, 1, 2. i 3. dio, Školska knjiga, Zagreb
2. AUBRECHT, G.J. (2006). Energy, PEARSON Prentice-Hall
3. MIKULIČIĆ, V.; ŠIMIĆ, Z. (2011). Energijske tehnologije (Tekst, http://www.fer.hr/predmet/eneteh)
4. D. F eretić, N. Čavlina, N. Debrecin (1995). Nuklearne elektrane, Školska knjiga
5. M.M. El-Wakil (1984),Powerplant Technology, McGraw Hill

Course title: Electromagnetic Fields and Waves (Mandatory, Sem. IV, 6 ECTS)
The goal: To provide students with the background necessary to understand the interplay between electricity and magnetism, the electromagnetic wave properties and its propagation in different media through various junctions.
Learning outcomes: On successful completion of the course, students will be able to: 1. Apply vector calculus to analyze the behavior of static electric fields and magnetic fields in standard configurations; 2. Describe the parameters of quasistatic and time varying fields, guided and free space wave propagation and the underpinning role of Maxwell's equations. 3. Explain examples of the interaction between waves and media and to be able to relate these to engineering design considerations and function; 4. Illustrate and analyze transmission lines; 5.Practice calculation of electromagnetic filed to solution of practical problems.
Course content: Vector Analysis: Gradient, Divergence and Curl, Laplacian operator.
Electrostatics: Maxwell's equations, Charge and current distributions, Gauss Law, Electrical scalar potential, Electrical properties of materials, Method of images, Electrostatic potential energy.
Magnetostatics: Magnetic forces and torques, Maxwell's magnetostatic equations, Vector magnetic potential, Boundary conditions, Inductance, Magnetic energy. Maxwell's equation for time varying fields: Faraday Law, Displacement current, Retarded potentials. Electromagnetic Waves: Derivation of the wave equation, solution of wave equation for TEM case, plane wave concepts, wavelength, attenuation and phase constants, propagation of waves in lossless and lossy media. Transmission Lines: Derivation of transmission line parameters, attenuation and phase coefficients, characteristic impedance, SWR definition, lossless and lossy lines and matching techniques.
.**Methods of teaching:** 45 hours of lectures + 15 hours of combined auditorial and laboratory exercises. Approximately 80-90 hours of personal study and exercise including assignments.
Grading System: Assignment 15%, Mid-term exam 35 %, Final Exam 50 %
Literature:

1. Fawwaz T. Ulaby, Eric Michielssen and Umberto Ravaioli, "Fundamentals of Applied Electromagnetics" Prentice Hall 6th Edition, 2010
2. Magdy F. IIskander "Electromagnetic Fields and Waves ", Waveland Press, 2012

Course title: Electrical Machines 1 (Mandatory, Sem. IV, 7 ECTS)
The goal: The aim of this course is to give a general understanding of the principles of electromechanical energy conversion, working principle and theory of transformers and direct current electric machines.
Learning outcomes: After completing this course the student will have knowledge of 1. Basic laws on which are based the working principle of transformers and electrical machines, as well as basic concepts of electromechanical energy conversion, 2. Construction and types of transformers, electromagnetic processes in real and ideal transformer, the transformer basic equations, the equivalent scheme, energy balance, parallel work, voltage drop and non-symmetrical regimes and transient processes. 3. Direct current machines, electromagnetic processes in the direct current machines, reaction of induct, and commutation, types of direct current machines; motors and generators; performance of motors and characteristics of direct current generators.
Course content: Basic laws, on which are based the principle of work that transformers and rotating electrical machines. Electromechanical energy conversion, basic concepts of electromechanical energy conversion. Construction and types of transformers, electromagnetic processes in real and ideal transformer, transformer load, basic equations of

the transformer, three phase transformers, construction of magnetic circuit, windings connection schemes. Equivalent scheme, Energy balance, parallel work, voltage drop, non-symmetrical regimes and transient processes. Direct current machines, processes in the continuing power cars, reaction of induct, and commutation, types of direct current machines; motors and generators; performance of motors and characteristics of direct current generators.
Methods of teaching: 45 hours of lectures + 30 hours of numerical exercises, 15 hours laboratory . Approximately 100 hours of personal study and exercise including homework and laboratory work.
Grading System: Seminar 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. Transformatorët, N. Avdiu, Prishtine 2009
2. Makinat e rrymës së vazhduar, N.Xhoxhi, Tiranë 1992
3. Transformatorët, Përmbledhje detyrash, Nysret Avdiu, 2001 Prishtinë
4. Makinat e rrymës së vazhduar. Përmbledhje detyrash, Nysret Avdiu, 1997 Prishtinë
5.. Transformatorët, N. Xhoxhi, J.Korro, Y.Luga, E. Toska. Tiranë 1977

Course Title : Project Management (Elective, Sem IV, 6 ECTS)
Course/Module aim: This module aims to introduce students to the basic concepts of project management and offer them the opportunity that through practice they apply these concepts.
Expected results : At the end of this course, students will be able to: Identify projects and distringuish them from other activities in the organization. Understand the importance of project planning and activities required for good planning. Understand the complex natyre of managing project activities. Use different techniques for project management (such as PERT). Identify required skills for a good project manager. Understand concepts of project costs, project budgets and activities required for their management. Identify and manage project risks. Understand the importance of project audit and monitoring.
Course contents: Introduction to project management. Project phases and life cycle. Project team management. Cost and time planning. Project planning and scheduling. Resource alocation. Risk Management. Project monitoring and control. Project auditing.
Teaching methodology: 30 hours of lectures and 30 hours of practice. Approximately 100 hours of independent work including term presentation.
Grading: Presentation 20%, Wikipedia project 10 %, Final exam 70 %
Literature :

1. Suzana Panariti: Menaxhimi i Projekteve, Shtëpia Botuese e Librit Universitar 2010, Tirane
2. Clifford F. Gray, Eric W. Larson: Project Management, The managerial Process, McGraw-Hill, 2006
3. Denis Lock: Project Management, Gower Publishing Limited, 2008

Course title: Transmission and Distribution of Electric Power (Mandatory, Sem.V, 6 ECTS)
Course objective: The objective purpose of the course is the introduction of the basic principles of transmission and distribution of electric energy in power systems from generating to consumer points

Expected results: Upon successful completion of the course, students are expected to be able:
1. to be acquainted and familiar with basic concepts of transmission and distribution of electric energy 2. to know and identify easily characteristics and basic features of transmission and distribution lines 3. to know equivalent schemes of electric power lines and the theory of transmission lines as well as the related calculation procedures for processes in transmission and distribution lines 4.to know main methods of numerical solutions to problems and issues of power line transmission and distribution
Course Content: General concepts of transmission and distribution of electric energy. Importance and main features of transmission of electrical energy and various transmission systems. Determination of transmission line parameters. Approximate equivalent schems of power lines. Theory of electric power transmission. Power transmission processes in ideal and real transmission lines. Equivalent schemes of generators and transforms in power systems. Numerical calculation in transmission and distribution systems. Per unit methods and methods of reduced admittances. Voltage control in power lines. Short circuit faults, types and calculation methods. Power and energy transmission losses. Steady stated and dynamic stability.
Course Methodology : 30 hours of lectures and 30 hours of numerical exercises. Two colloquiums. Individual and group consultations.
Evaluation: Intermediate evaluation through class activity, two semestral colloquiums and final examination.
Literature:

1. H. Saadat, Power System Analysis, 2nd ed., McGraw Hill, New York, NY, 2004
2. B. Stefanini, Bartja dhe Shperndarja e Energjise Elektrike, ETF Zagreb, 1978
3. G. Pula, Bartja dhe Shperndarja e Energjise Elektrike, ETMM, Prishtine, 1984

Course title: Electrical Machines 2 (Mandatory, Sem V, 6 ECTS)
The goal: The aim of this course is to give basic knowledge for alternative electrical machines, working principle and theory of electrical inductive and synchronous machines.
Learning outcomes: After completing this course the student will be able to: 1. Know the fundamental laws in which are based the work of alternative electrical machines and general features of rotating electrical machines. 2. Know the working principles and electromagnetic processes in alternative electric machines. 3. Know the basic design of asynchronous machines, and synchronous 4. Know about the types, features, of inductive and synchronous machines.
Course content: Basic Laws, which are based the work principle of rotating electrical machines. Electromechanical energy conversion. Asynchronous machines. General knowledge on asynchronous machines, constructive aspects, principle of work and work regimes.. Wound rotors and squirrel short circuit rotors. Theoretical basis of asynchronous machines, basic equations, equivalent scheme, and phasor diagram. Power losses. Torque of rotation, critical torque, and starting torque of asynchronous machines. Kloss equation, starting of asynchronous machines, rotors with deep bars, control of asynchronous machines, No load testing and short circuit test in asynchronous machines. Circle diagram, work performance, elementary knowledge for dynamics and nonsymmetrical regimes of asynchronous machines. Synchronous machines. General knowledge on synchronous machines, constructive aspects, the principle of work, the magnetic field of the rotor, cylindrical and non-cylindrical rotor. Turbogenetaors and hydrogenerators, Two axes theory, reaction of induct. Basic equations and phase diagrams. Power losses and the eficiency.

Excitation systems. Characteristics of synchronous generator. Voltage difference. Angle characteristics. Synchronous motors and synchronous compensators. Elementary knowledge for asymmetrical and dynamic regimes in synchronous machines. Parallel work of generators. Stability of synchronous machines

Methods of teaching: 45 hours of lectures + 30 hours of numerical exercises and 15 hours laboratory testng . Approximately 100 hours of personal study and exercise including four seminars.

Grading System:

Seminar 10%, Mid-term exams 30 %, Final Exam 60 %

Literature:

1. Makina Asinkrone, N.Xhoxhi, Y.Luga, E. Toska, Tiranë
2. Makinat Sinkrone, Y.Luga, N.Xhoxhi, Tiranë
3. Detyra të zgjidhuar nga Makinat Asinkrone dhe Sinkrone, N.Avdiu, N.Imeraj, Prishtinë
4. Shqyrtimet eksperimentale te makinave elektrike, N.Avdiu, dispence per laborator.

Course title: Low Voltage Power System (Mandatory, Sem. V, 6 ECTS)

The goals: The purpose of the course is to gain basic knowledge of electrical installation design.

Learning outcomes: On successful completion of the course, students will be able to: 1. To recognize the design of electrical components and compares the different components function in order of their selection for electrical installations. 2. Have knowledge of grounding in electrical installations, as well as the current flow on the ground and knowledge of proper measures for protective by direct and indirect touching. 3. To have basic knowledge of telecommunications installations. 4. To be able to make the design of electrical installation of a residential building.

Course content: Characteristic of loads. Reactive power compensation. General rules of electrical installation design. Basic components of electrical installations (conductors, fuses, circuit breaker, etc.) Connection to the LV utility distribution network. Grounding in electrical installations and current flow. Touch and step voltage. Effects of electrical current on the human body. Protection against electric shocks. TT, TN and IT systems. Protection against voltage surges in LV. Telecommunication installation in buildings.

Methods of teaching: 30 hours of lectures + 30 hours of auditoria exercises and 15 hours of laboratory exercise. Approximately 100 hours of personal study and home exercises.

Grading System: First exams 15%, Second exams 15 %, Home exercises (design) 15%, Regular continuation 5%. Final Exam 50 %

Literature:

1. Vjollca Komoni, Instalimet elektrike, ligjëratat, Prishtinë 2006,
2. M. Jorgoni, Teknika e sigurimit në impiantet elektrike, Tiranë 200,
3. G. Seipe, Electrical Instalations Handbook, Third Edition,Siemens, Wiley, 2000,
4. G. Seipe, Electrical Instalations Handbook, Part 1 Second Edition,Siemens, abi, 1999.

Course title: Power Electronics (Mandatory, Sem V., 6 ECTS)
The goals: to provide knowledge on theoretical and applied power electronic devices and power electronic switches, expansion of knowledge on the theory and applications of power convertors, understand the concepts of application of thyristors, analyze and design various power converter circuits (DC/AC, A /AC and DC/DC and AC/DC).
Learning outcomes: Upon completion of this course the student will be able to: understand the power electronic devices, power rectifiers, have sufficient knowledge for the analysis and implementation of different types of thyristors; be able to describe the operational principles of various circuits such as power converters, inverters, AC/AC and DC/DC transducers and, to be able to analyze the characteristics and to draw the voltage and currents wave forms for different working conditions, be able to analyze, discuss and design different types of power converters to meet the required specifications.
Course content: Power semiconductor diodes, rectifiers, Thyristors, converters three-phase converters, thyristor's commutation techniques, power transistors, inverters, inverters with supplementary switching, alternative converters (AC/AC), Cycle converters, DC / DC converter, UPS (uninterruptable power sources), Static switches.
Methods of teaching:
30 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 100 hours of personal study and exercise.
Grading System: • Test 1: 15 % • Test 2: 15 % • Final test: 20% • Final exam: 50%
Literature:

1. M. Rashid, Power electronics, Prentice Hall, 2007,
2. Hemann, K, Basic Principles of Power Electronics, New York, 1986,
3. Mazda, R, Power Electronics, Addison Wesley, Inc., 1998,
4. Myzafere Limani, Elektronika Energjetike, Universiteti i Prishtinës, 2001.

Course title: Energy and environment (Elective, sem. V, 6 ECTS)
The goal: The aim (goal) of this module is to provide the learner with the necessary knowledge, skill and competence in the broad area of energy and the environmental issues. It enables the student to evaluate the impact of energy in the environmental in technical, economic and political terms.
Learning outcomes: On completion of this module, the student will be able to: •Demonstrate a general knowledge of the environmental effects of energy production. • Evaluate the link between climate change and sustainability objectives •Be familiar with principle of operations of the main energy types • Asses the worth of a technological benefit against cost •Have the means to assess arguments critically
Course Content: Climate change, CO2 targets, the Rio and post Kyoto commitments. •Natural resources, fossil fuels, reserves, use and sustainable development • The role of conventional and renewable energy • Energy markets, (local, regional and global) •Essential information about related EU Directives • Case studies
Methodology of teaching:30 hours of lectures, 30 hours of numerical exercises
Grading System: Seminar works 40%, A final examination 60%
Literature:

1. www.iea.org
2. http://www.ipcc.ch/
3. http://mmph-rks.org/
4. http://www.ks.undp.org/repository/docs/KHDR_alb_opt.pdf
5. http://siteresources.worldbank.org/INTKOSOVO/Resources/KosovoCEA_Alb.pdf

Course title: Power System Facilities (Elective, Sem V, 6 ECTS)
Course Description: Introduction to electric power systems. Voltage and current stresses in switchgear and industrial systems. Symmetrical and unsymmetrical three-phase systems. Symmetrical components. Sequence impedances. Short circuit currents in three-phase AC systems. International Standards and specifications for calculation of short circuit currents. Short circuit current components (peak short circuit current, breaking current, thermal and dynamic short circuit strength). Substations and switchgear systems design. Selection criteria and planning guidelines for switchgear and distribution systems. Electric power transformers. Measuring (current and voltage) transformers. Main circuit assemblies. Electric facilities and distribution networks protection. Overvoltage protection. Reactive power compensation. Grounding systems. Protection against electric shock (direct and indirect contact).
Learning Outcomes: On successful completion of the course, students will be able to:
1. Define basic parts of electric facilities and their purposes
2. Identify basic parts of electric facilities on field
3. Describe current-voltage conditions in balanced and unbalanced systems
4. Solve short circuit problem on simple power system example
5. Employ software solutions for power system modeling and short circuit calculations
6. Distinguish between different arc interrupting techniques
7. Choose adequate electric products for specific location in the system
8. Argue about utilization of given electric product in specific location in the system

Methodology of teaching: 45 hours of lectures, 30 hours numerical exercises. Approximately 100 hours of independent work including thesis seminar.
Evaluation: Seminar 10%, intermediate estimates 30%, final exam 60%.
Literature

1. S. Krajcar; M. Delimar (2011). Transparencije s predavanja (www.fer.hr/zvne), F ER
2. H. Požar (1990).Visokonaponska rasklopna postrojenja, Tehnička knjiga, Zagreb
3. J.D. McDonald (2003). Electric Power Substations Engineering, CRC Press (http://ocw.mit.edu/index.html)
4. MIT OpenCourseWare (2005). Introduction to Electric Power Systems, MIT
5. J. Lewis Blackburn (1993). Symmetrical Components for Power Systems Engineering, Marcel Dekker

Course name: Protective relaying (Mandatory, Sem VI, 5 ECTS)
Course objectives: To achieve the basic theoretical and practical knowledge's about protective relaying and their use in protection of Electric Power System elements.
Learning Outcomes: After completion of this course, student should be able to determine fault and abnormal electrical quantities and use adequate protections for specific case. He should be able to calculate fault quantities and graduate them with adequate pick up values in main Electric Power System elements.
Course Content: Basic notions about protective relaying. Current and voltage instrument transformers in protection. Measuring principles of quantities feeding relays. Over current and ground fault current protection. Transformer protection. Electric generator protection. Protection of high voltage lines.
Teaching methodology: 30 hours lectures, and 30 hours problem solutions. Approximately 60 hours with lecturer and teaching assistant.

Assessments: 3 tests each one 20% and final exam 40 %.
Literature:
1.A. Gashi, Mbrojtja rele, ligjëratat dhe prezantimet 2013.
2..M. A. Anthony, Electric Power System Protection and Coordination, McGraw-Hill, Inc. 1994.
3.J.L. Blacburn, Protective relaying-Principles and applications, Taylor and Francis Group, 2003, London
4.ABB Protection Course 2007.

Course title: Electrical Drives (Mandatory, Sem VI, 5 ECTS).
The purpose: The purpose of the course is to prepare students to work independently on analyses of different applications of electrical drives and the prinipals of their functioning and selection.
Learning outcomes: On successful completion of the course, the student will be able to: (i) define clearly the electrical drive requirements; (ii) define the suitability of different type of electrical machines that can be used and applied depends on the requirements and conditions of electrical drives; (iii) calculate the electricity losses and the efficiency of the applied electrical drive system; (iv) define the most appropriate system and its control that can be applied depends on the electrical drive requirements.
Course content: Working quadrants. Movement equation. Stability. Stationary regimmes of electrical drive operations with different type of elektrical machines (DC, AC and sinchronous). Mechnical charachteristics of the working mechanisam. Breaking operation regimes (generatoric, electrodinamic and contra current). Basics of dynamics of electrical drives, energy losses and their duration. Reduction of mechanical measurement units. Stationary stability. Impact of the moment of intertia. Adoption of the electrical drives to the working mechanisam and to the electricity source (range of velocity control. Connection and the ways of DC & AC electrical drive control. Resistance and voltage source control. Electrical drives in booster connection. Pulse control of AC & AC drives). Multi motor electrical drives. Electrical axle. Cascade connection of AC motors. Sinchronous electrical drives and their control. Protection of electrical drives.
Methodology of teaching: Lectures, discussions and seminary labours (30 hours of lecturers, 15 hours of numeric and 15 hours of laboratoric exercises).
Appraisal system: Seminary labour 10%, presence on lectures and exercises 10% and the final exam 80%.
Basic literature:
1. Agron Orana, “Electrical Drives”, lectures and exams, Prishtina 1995
2. B. Jurkovic, “Electrical Drives”, Zagreb 1990
3. J. Teta, “Electrical Drives”, Tirana 1990
4. M. Rashid, “Power Electronics, circuits, devices and applications”, prentice-Hall International, Inc 1995.

Course title: Renewable energy resources (Elective, Sem. VI, 4 ECTS)
The goals: The purpose of the course is that students gain basic knowledge of renewable resources that have a special significance in the present day.
Learning outcomes: On successful completion of the course, students will be able to: 1. Have knowledge of renewable energy sources like wind, sun, water, geothermal, etc. 2. Have

knowledge of the possibility of using solar energy through photovoltaic systems and solar power plants. 3. Have knowledge of the possibility of using wind power with wind plants, water power plants, and geothermal energy.
Course content: Energy and sustainable development. Fundamentals of renewable energy supply. Solar radiation. Wind energy. Geothermal energy. Biomass. Tower and parabolic solar plants. Principles Photovoltaic power generation. Photovoltaic cell and module. Photovoltaic effect. Photovoltaic efficiency. Power from wind. Air flow and measuring wind speed. Turbine types and terms. Hydro power plants. Assessing the resource for small installations. Economic and environmental analysis of renewables.
Methods of teaching: 30 hours of lectures + 15 hours of laboratory exercise. Approximately 80 hours of personal study and home exercises.
Grading System:
First exams 20%, Second exams 20 %, Regular continuation 5%. Final Exam 55 %
Literature:

1. J. Twidel, Tony Weir, Renewable energy resources, Taylor & Francis, London New York, 2006;
2. M. Kaltschmitt, W. Streicher , A. WieseRenewable Energy: Technology, Economics and Environment (Hardcover), Springer, 2007 Berlin Heldinberg, New York
3. R. Messenger, J. Ventre, Photovoltaic Systems Engineering, Second Edition, CRC Press LLC, 2004;

Course title: Dynamics of power plants operations (Elective, Sem VI, 4 ECTS)
Course content: Selection of the power plants (HPP, TPP, GPP, CCPP, NPP) main equipment parameters compared to the electric power system demands (GRID CODE). Hydroelectric power plants transient operations. Power plants monitoring. Island operation of the power plants. Possibility and capacity electric power plants in (f-P) and (U-Q) control. TPP operation mode with power delivering to the plant inside consumption. Selection of the DC supplies system in the electric power plants based on DC system dynamics.
Methodology of teaching: 30 hours of lectures, 25 hours numerical exercises. Approximately 100 hours of independent work including thesis seminar.
Grading System: Seminar 10%, intermediate estimates 30%, final exam 60%.
Literature:

1. S. Tešnjak: Osnove regulacije u termoelektranama, FER-ZVNE, Zavodska skripta, Zagreb, 2004.
2. D. Lindsley: Power-Plant Control and Instrumentation - The Control of Boilers and HRSG Systems, The Institution of Electrical Engineers, London, 2000.
3. D. Flynn: Thermal Power Plant Simulation and Control, IEE Power & Energy Series 43, London, 2003.

Course title: Special electrical machines, (Elective, sem VI, 4 ECTS)
The goal: The aim of this course is to provide general knowledge on special small electrical machines applicable in industry and automatic control.
Learning outcomes: After completion of the course the student will have the knowledge for 1. Type of small electrical machines and special electrical machines, 2. Electromagnetic parameters and work performance of special electrical machines.

Course content: General knowledge oft special electrical machines and small electrical machines. Construction feature and theory. Electrical micro-machines without collector, theory. Step motors, parameters. Theory and construction of micro-motors with permanent magnet. Mathematic modeling of micro-machines.
Methods of teaching: 30 hours of lectures, 30 hours of numerical exercises. Approximately 70 hours of personal study, including seminars.
Grading System: Seminar 10%, Mid-term exams 30 %, Final Exam 60 %
Literature:

1. J. F. Gieras, R. J. Wang, M. J. Kamper, Axial Flux Permanent Magnet Brushless Machines, Kluwer Academic Publishers, Dordrecht, 2004.
2. S. A. Nasar, I. Boldea, L. E. Unnewehr, Permanent Magnet, Reluctance, and Self-Synchronous Motors, CRC Press, London, 1993.
3. T. J. E. Miller, Brushless Permanent-Magnet and Reluctance Motor Drives, Oxford Science Publications, Oxford, 1989.
3. Sergey E. Lyshevski, "Electromechanical Systems, Electric Machines, and Applied Mechatronics", CRC Press, Boca – Raton – London – New York – Washington D.C., 2000.
4. B.S. Guru, H. R. Hiziroğlu, "Electric Machinery and Transformers", 3rd Edition, Oxford University Press, New York – Oxford, 2001.

Course title: Software Applications in Power Systems (Elective, Sem. VI, 4 ECTS)
The goal : The purpose of the course is to introduce the use of Matlab/Simulink software for the study and analysis of processes occurred in Power Systems.
Learning outcomes: On successful completion of the course, students will be able to: 1.To know the nature of the functioning of the Matlab-Simulink, its structure and usage. To know how to structure and present graphically the simulation results so that he/she could analyze, and validate mathematical models of various equipment and electromagnetic processes 2.The parameterization of Simulink models and analyze electrical circuits, linear and non-linear inductivities, overhead lines and electrical cables, transformers, electric machines that containing , synchronous and asynchronous machines and power electronics. 3.To have basic knowledge of modeling and to be able to analyze various processes in Power Systems, such as the power flow analysis, reactive power compensation, symmetrical and non-symmetrical faults in Power Systems, dynamic processes in electrical machines etc..
Course content: Introduction to MATLAB-SIMULINK. Differential equations modeling in Simulink. Using the Simulink "Commonly Used Block" Library . Use of "Mathematical Library Operations". Introduction to SimPowerSystem. Analysis of the electrical circuit. Introduction to phases simulation method. Introduction to the power electronics. Analysis of three-phase systems and electric machines. Simulation of symmetric and non-symetric faults in Power Systems. Simulation of electric drivers. Simulation of AC motor drivers.
Methods of teaching: 28 hours of lectures + 28 hours of lab works . Approximately 100 hours of personal study and exercise including seminars.
Grading System: Seminar 10%, Active participation 5%, Firs and second exams 50 %, Final Exam 35 %
Literature:

1. Steven Carris, Circuit Analysis I with Matlab Simulink. Orchard Publication 2009
2. Carris, Circuit Analysis II with Matlab Simulink. Orchard Publication 2009.

3. Authorized Lecture and exercises " Aplikacione softuerike ne SEE" Gazmend Kabashi 2010.
4. Hadi Saadat, Power System Analysis Secon Edition, MC Graw Hill, 2002 Boston

Course title: Power market (Elective, Sem VI, 4 ECTS)
The goal: Understanding new electric power companies' structures. Knowledge about System operator role and importance in open market environment.Understanding connection between ancillary services market design and insurance of stabile and secure power system operation.
Learning Outcomes On successful completion of the course, students will be able to: 1. Define most important terms relevant to electricity market 2. Differentiate vertical and horizontal organization of electric power 3. Enumerate and describe market, regulated and possible market activities 4. Explain market different design and organization 5. Enumerate market subjects and describe their role in market environment 6. Describe functioning of ancillary systems market 7. Describe market power 8. Argue influence of congestion on electricity price
Course content: Power sector restructuring (organizational structures before and after). Implementation of classical economic theory on electric power (liberalization, deregulation, reregulation, privatization). Market different and organization (wholesale, spot, futures, forward, balancing, bilateral). Electric power market and ancillary systems market. Power (PX). Auction Types. System operators (minimal and maximal). Costs (marginal, opportunity, stranded, variable, total?). Influence of services market i.e. price of electricity. Systems for measurement and accountings in environment. Mandatory and commercial services. Market power. Congestion as results of market.
Methodology of teaching:45 hours of lectures, 25 hours numerical exercises. Approximately 100 hours of independent work including thesis seminar.
Grading System: Seminar 10%, intermediate estimates 30%, final exam 60%.
Literature

1. S. Tešnjak, E. Banovac, I. Kuzle (2009). Tržište električne energije, Graphis, Zagreb, Hrvatska
2. K. Shahidehpour, M. Alomoush (2001). Restructured Electrical Power Systems, Marcel Dekker, Inc., New York, USA
3. S. Stoft (2002). Power System Economics - Designing Markets for Electricity, IEEE Press/John Wiley&Sons, New York, USA
4. G. Rothwell, T. Gomez (2003). Electricity Economics: Regulation and Deregulation, IEEE
5. Press/John Wiley&Sons, New York, USA
6. B. Murray (1998). Electricity Markets ? Investment Performance and Analysis, John Wiley&Sons, New York, USASimilar Courses

Course title: Internship (Mandatory, Semester VI, 6 ECTS)
The goal: The students gain professional experience, depending on the field of study, in one of the local companies.
Learning outcomes: To be qualified for professional work, in the relevant field of study, and to be more prepared for the labor market.
Course Content: The content of this course depends on the company where the student shall finish 120 working hours. As a result, the content is drafted jointly from the coordinator of professional internships, appointed from the company, and the student who is going to work in such company. The coordinator of professional internships, who is appointed from the company, guides the student throughout the duration of his/her work in the company, and participates as a member of the commission in the presentation of the professional paper.
Teaching methodology: 120 working hours in the company, 30 working hours for the preparation of the presentation of professional internship.
Assesment: Presentation evaluation 40%, Presentation of the paper: 60%. Total:100%

Course title: Bachelor thesis (Mandatory, Sem VI, 6 ECTS)
The goals : The bachelor thesis is a comprehensive and independent task where the student has to demonstrate the ability to analyze the given problem from theoretical and practical aspects, devise a solution using the knowledge acquired in multiple courses and literature.
Learning outcomes: Upon completionofthis module studentswillbe able to:1. Togainconfidenceingained knowledge2.Have theability tofurther studiesofmandatory oradditional literature3.Consult withmentorwithquestionswellpreparedand structured; 4. Presenttheir workinwritten form, withastandard languageand guidelinesforthistypeof work, witha volume ofat least30sheetsofA4 format5.Topresentthe workin time of tenminutes with presentation prepared in PowerPoint
Course content: The thesis could be proposed by the supervisor or can be chosen by the student, and should be in the accordance with the qualification profile. The bachelor thesis is a comprehensive and independent task where the student has to demonstrate the ability to analyze the given problem from theoretical and practical aspects, devise a solution using the knowledge acquired in multiple courses and literature, and provides instructions for use and directions of future development.
Methods of teaching:
Compliant with the actual regulation at the faculty level on how to conduct a bachelor thesis.
Literature:

1. Depending on the bachelor thesis, will be offered different literature from mentor.