# INFORMATION AND COMMUNICATION TECHNOLOGIES

## BSc PROGRAM

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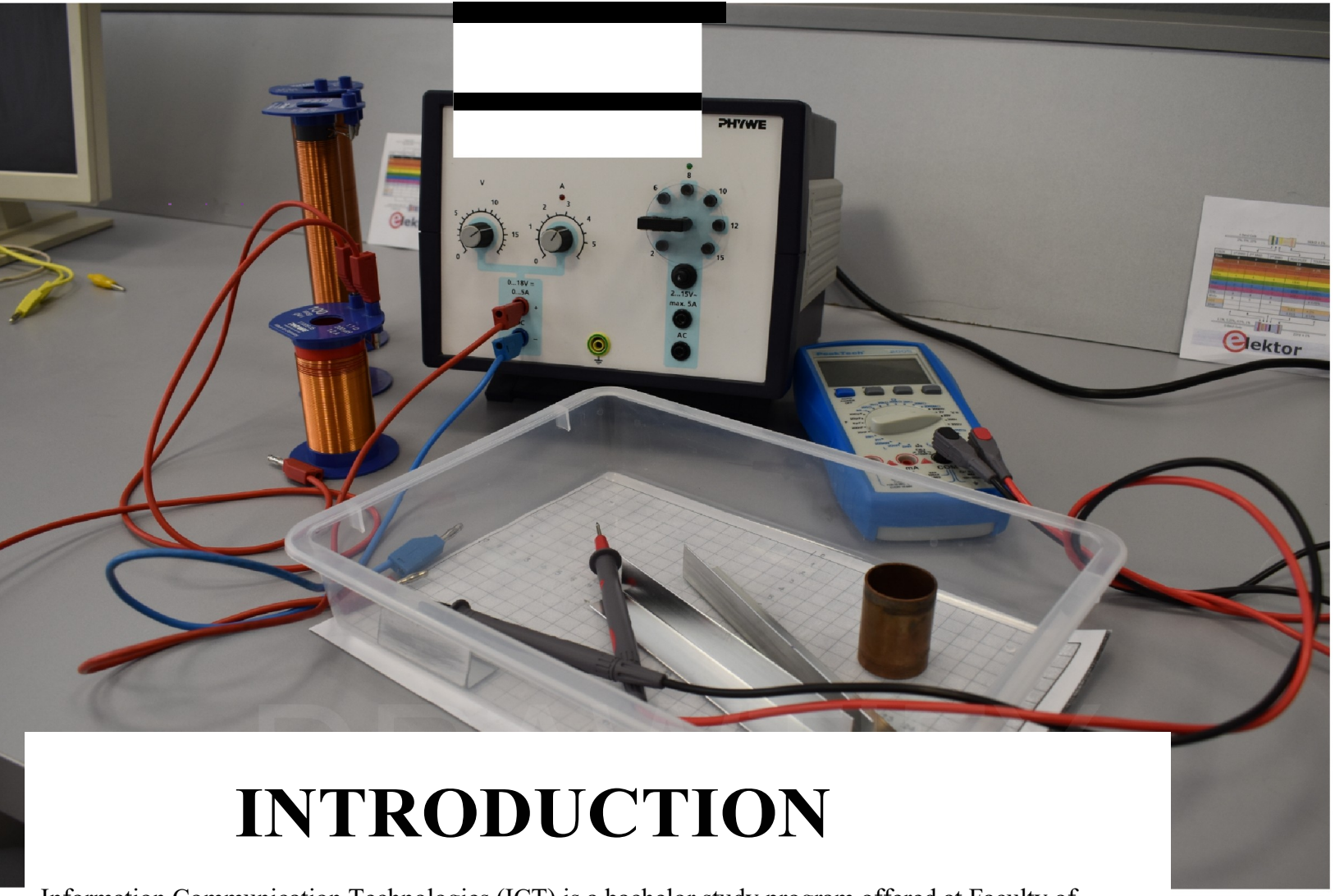


# INTRODUCTION

Information Communication Technologies (ICT) is a bachelor study program offered at Faculty of Electrical and Computer Engineering at University of Prishtina.

> *The mission of ICT study program is to prepare and deliver graduates who will be able to enhance productivity, innovation and market competitiveness both in country and worldwide.*

This program will enable students to acquire the necessary knowledge from:

- fundamental electrical engineering courses,
- programming languages,
- communication systems and networks,
- multimedia communications and
- the basics of radio engineering.

The proposed program integrates the theory developed with modern teaching methods as well as the practice carried out in the relevant ICT laboratories in FECE for different courses.

*Selected part of the program was developed based on the ERSAMUS+ DIMTV project.*

# ICT BSc PROGRAM

The exponential growth and widespread application of Information and Communication Technologies (ICT) in all fields of modern society has positioned this sector as one of the main supports/pillars of the country economy and beyond, thus creating the need for more ICT professionals with relevant university degrees.

University graduate professionals should not only be able to fulfill the current market needs but also have the ability to exploit opportunities that new technologies offer.

The graduates of this study program should be able to understand and respond to new information and communication technologies relevant to industry needs, they should be prepared to pursue master studies in the same or comparable field of study, and should have a good basis and incentive for further independent study within the framework of lifelong learning.

# Program objectives

The mission of the bachelor program in Information and Communication Technologies is in compliance with the mission of university and faculty, to provide qualitative academic education for a professional engineer profile that is trained in the broad ICT domain, and is equipped with both technical and market oriented skills and, therefore, that can contribute to the techno-economic society challenges.

- The ICT BSc study program will prepare and deliver graduates who will be able to enhance productivity, innovation and market competitiveness both in country and worldwide.

**The basic program objectives are:**

- To provide students with high-quality knowledge and skills in the field of ICT
- To encourage creativity, responsibility, team work, research and innovation interest
- To offer a good foundation for further academic degree education in similar disciplines and/or lifelong learning paths
- To deliver applicable knowledge and skills ensuring smooth students transition from university to labor market

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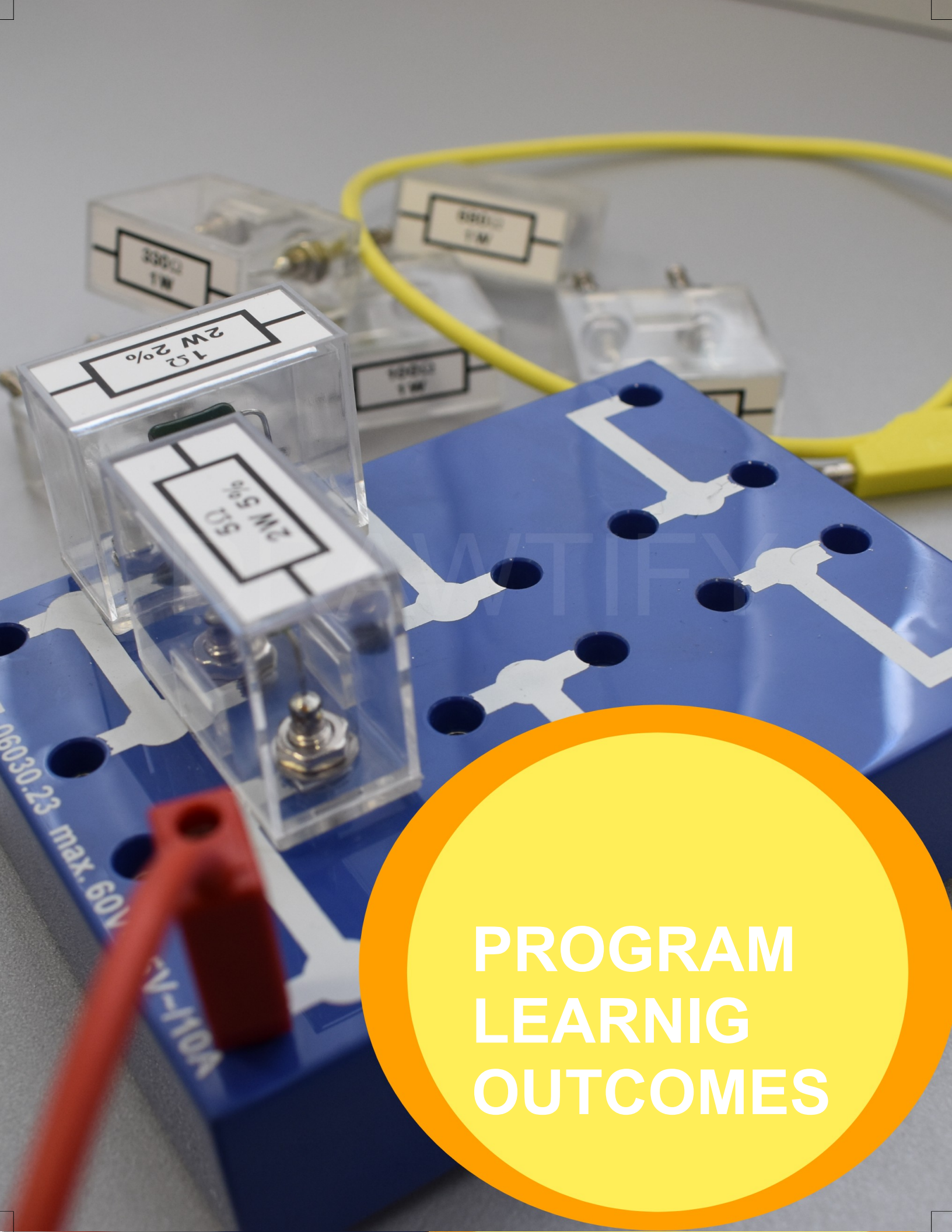
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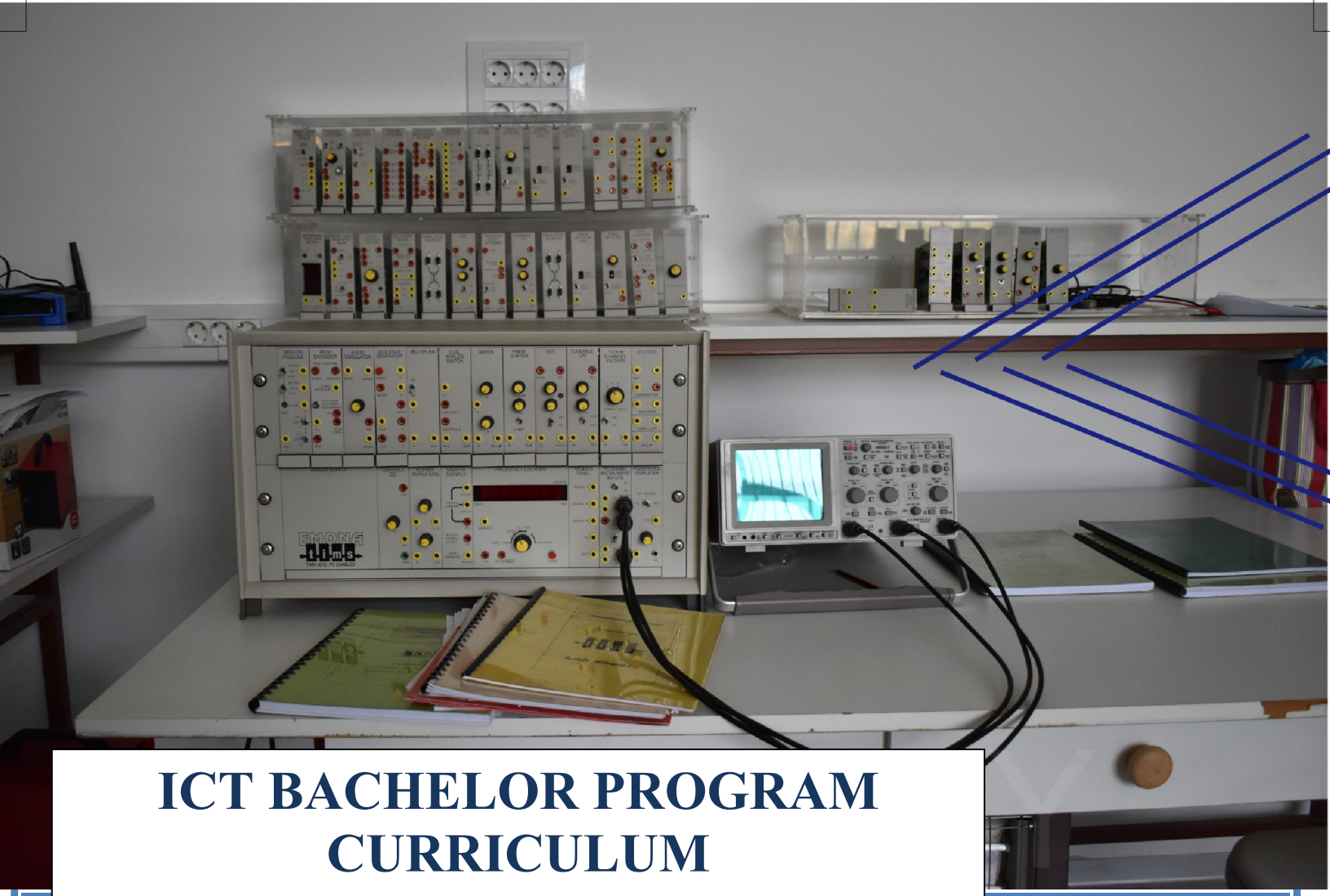
**The general competences obtained through the study program are:**

- The ability to apply the knowledge of mathematics, physics, science and engineering to identify and solve problems in the ICT field.
- The ability to achieve an appropriate level of knowledge of the application of programming languages and algorithms.
- To be able to gain and apply knowledge and skills on information systems and communication networks, wired and wireless networks as well as radio frequency engineering.
- Ability to develop professional skills in the use of information systems and networks for the collection, processing and transmission of data.
- To be able to demonstrate professional ethics and responsibility in engineering work, develop both oral and written communication abilities.
- To follow ICT sector progress and contribute by inclusion in the labor market.

## Upon the completion of this program the student will be able to:

- Identify, define, understand and analyze complex problems in the field of ICT
- Find solutions for challenges in ICT by using proper methodologies and tools
- Design or validate a system to meet requirements of the state of the art in ICT
- Communicate efficiently and persuasively, in oral and written form with the ICT community
- Work efficiently as an individual or in teams
- Develop projects in the field of ICT that bring solutions with benefits to society



# ICT BACHELOR PROGRAM CURRICULUM

This program will enable students to acquire the necessary knowledge from: fundamental electrical engineering courses, programming languages, communication systems and networks, multimedia communications and the basics of radio engineering. The program integrates the theory developed with modern teaching methods as well as the practice carried out in the relevant ICT laboratories for different courses.

- The first year gives the students fundamental knowledge in mathematics, physics, electrical engineering and computing and teaches the students to communicate effectively in the profession and to society as whole.
- In the second year, the students broaden the knowledge in mathematics, electronics, electromagnetic fields and waves, signals and information, communication technologies and Internet, with the emphasize in digital communications. Students are provided with Matlab and / or Labview experience as software tools to solve engineering problems. The courses on Data transmission, Computer architecture and Object oriented programming are followed with soft skills course on Project management in ICT.
- In the third year, the theoretical and practical knowledge in Communication Networks, Operating systems, Multimedia technologies, Mobile communication, Radio frequency engineering complemented with elective courses will be offered. The Internship is mandatory, ECTS credited, and Internship placement are guaranteed and ensured for all registered students. The study finishes after the final project is successfully completed and publicly defended.

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# Content of the educational process

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Linear Algebra and calculus 1 | 4+2+1 | 7 | **Mandatory** |
| **2** | Physics 1 | 3+1+1 | 6 | **Mandatory** |
| **3** | Fundamentals of electrical engineering 1 | 4+1+1 | 7 | **Mandatory** |
| **4** | Fundamentals of programming | 2+0+2 | 5 | **Mandatory** |
| **5** | English language<br>Communication skills<br>German language<br>Practicum in Mathematics | 2+1+0 | 5 | **Elective** |

**Sem 2**

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Calculus 2 | 4+2+0 | 7 | **Mandatory** |
| **2** | Physics 2 | 3+1+1 | 6 | **Mandatory** |
| **3** | Fundamentals of electrical engineering 2 | 4+1+1 | 7 | **Mandatory** |
| **4** | Algorithms and Data Structures | 2+0+2 | 5 | **Mandatory** |
| **5** | Digital logic circuits | 2+1+2 | 5 | **Mandatory** |

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**Sem 3**

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Calculus 3 and Probability | 3+1+0 | 6 | **Mandatory** |
| **2** | Signals and Information | 3+2+0 | 7 | **Mandatory** |
| **3** | Electronics | 3+1+1 | 7 | **Mandatory** |
| **4** | Internet Technologies | 3+0+1 | 6 | **Mandatory** |
| | **Elective Courses** | | 6 | |
| **5** | Matlab Practicum | 2+0+1 | 4 | **Elective** |
| **6** | Practicum in Labview | 2+0+1 | 1 | **Elective** |

**Sem 4**

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Digital Communications | 3+1+1 | **7** | **Mandatory** |
| **2** | Electromagnetic fields and waves | 3+1+1 | **7** | **Mandatory** |
| **3** | Operating Systems for ICT | 2+1+2 | **7** | **Mandatory** |
| **4** | ICT Project Management | 2+1+0 | **4** | **Elective** |
| **5** | Economics for Engineering | 2+1+0 | **4** | **Elective** |
| **6** | Computer and Mobile equipements Architecture | 2+0+2 | **5** | **Elective** |
| **7** | Application development in C++ | 1+0+3 | **5** | **Elective** |
| **8** | Web application development | **1+0+3** | 5 | **Elective** |

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**Sem 5**

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Communication networks I | 2+0+2 | **5** | **Mandatory** |
| **2** | Data Transmission | 2+0+2 | **5** | **Mandatory** |
| **3** | Object oriented programming | 2+0+2 | **5** | **Mandatory** |
| **4** | Multimedia technologies and systems | 2+0+2 | **5** | **Mandatory** |
| **5** | Python | 2+0+1 | **4** | **Elective** |
| **6** | Application development for Android an iOS | 2+0+1 | **4** | **Elective** |
| **7** | Computer games development | 2+0+1 | **4** | **Elective** |
| **8** | Matlab Practicum | 2+0+1 | **4** | **Elective** |
| **9** | Practicum in Labview | **2+0+1** | 4 | **Elective** |

**Sem 6**

| | Course | Hours | ECTS | Category |
|---|---|---|---|---|
| **1** | Microwave Engineering | 2+1+2 | **5** | **Mandatory** |
| **2** | Mobile Communications | 2+0+1 | **4** | **Mandatory** |
| **3** | Distributed programming | 2+0+1 | **4** | **Mandatory** |
| **4** | Communication networks II | 1+0+2 | **3** | **Mandatory** |
| **5** | Final project<br>(Internship and presentation)<br><br>Student spends 6x25 hours (6 ECTS) in ICT sector. He prepares seminar/presentation and presents his/her work in front of joint academy-industry evaluation panel (4 ECTS) | | **10** | **Mandatory** |
| **6** | Optical Communications | 2+0+1 | **4** | **Elective** |
| **7** | Bioelectromagnetics | 2+0+1 | **4** | **Elective** |
| **8** | Communication protocols | 2+0+1 | **4** | **Elective** |
| **9** | Animation and Virtual Reality | **2+0+1** | 4 | **Elective** |

| Course syllabus: **Linear Algebra and Calculus 1** |
|---|
| **Course status: Mandatory**<br>**7 ECTS** |
| Course description |
| **This course covers the following topics: The set of complex numbers, parts of Linear Algebra, Analytic Geometry and single-variable functions.**<br>**The student should be able to apply the knowledge gained through this course as an auxiliary apparatus in studying professional electrical and computer engineering courses.** |
| Expected learning outcomes: |
| **After the end of this course the student will be able to:**<br>• **solve and formulate various problems in the field of his profession when dealing with complex number operations;**<br>• **understand the concept of derivative as well as its application in the calculation of various measures in Geometry, Telecommunications, Informatics and other fields.** |
| Teaching Methodology: |
| **Lectures, numerical exercises, presentations, homework.** |
| Course subjects |
| **Week 1: The set of complex numbers and their geometric interpretation.**<br>**Week 2: Matrices, types of matrices, matrix operations. Determinants, basic properties, methods for their computation, minors and algebraic complements.**<br>**Week 3: Matrix rank, elementary transformations, equivalent matrices and conditions Week 4: Eigenvalues and Eigenvectors**<br>**Week 5: Systems of nonhomogeneous and homogeneous linear equations, Kramer's formulas, Gauss's method for solving systems of linear equations.**<br>**Week 6: Vectors, linear dependencies and geometric representation of vectors. Scalar product, vector product and mixed product in R**<br>**Week 7: Elements of analytical geometry in space. Planes and lines in space, their equations, their reciprocal positions in space**<br>**Week 8: Surfaces in space. Spherical, cylindrical, hyperboloid, paraboloid, conical and rotating surfaces. Cylindrical and spherical coordinate systems.**<br>**Week 9: Single-variable functions. Basic elementary functions and their graph, as well as classification of elementary functions.**<br>**Week 10: Numerical sequences, subsequences, accumulation points, limit points, theorems on convergence of a sequence. The binomial formula and the number e. Positive numerical series.**<br>**Week 11: Function limit, One-way limits, and limit theorems. Infinitely small and infinitely large values. Continuity of function, operations with continuous functions and their properties.**<br>**Week 12: Derivatives and differentials of single-variable functions. Derivative and continuity. Rules for the derivation of functions.**<br>**Week 13: Higher order derivatives and differentials. Generalization of the rules for derivatives and differentials of any order. High-order derivatives and differentials of composite functions.**<br>**Week 14: Basic theorems of differential calculus. Applying Koshi's theorem for computing indefinite forms. The formula of Taylor and Macloren.**<br>**Week 15: Implementation of differential calculus in function review. Monotony of function, extreme values, concavity, inflection points, asymptotes and graphical representation of functions.** |
| Literature |
| **1. Hamiti E. - Matematika I, Prishtina 2008.**<br>**2. Hamiti E. - Matematika II, Prishtina 2008.**<br>**3. Peci H, Doko M. - Përmbledhje detyrash të zgjidhura nga Matematika I, Prishtina 1997.**<br>**4. Loshaj Z. - Përmbledhje detyrash të zgjidhura nga Matematika II, Prishtina 1996.** |

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| Course syllabus: Physics 1 |
| --- |
| Course status**: Mandatory**<br>**6 ECTS** |
| Course description |
| **The course includes basic knowledge of physics necessary to gain general knowledge that is basic in engineering**<br>**Using the physical laws to solve the basic problems of engineering** |
| Expected learning outcomes: |
| On successful completion of the course, students will be able to:<br>• Analyze simple mechanical systems and solve equations of motion.<br>• Apply principles of conservation of energy and momentum to particle collisions.<br>• Explain the conditions of statics of rigid bodies and the equation of motion for rotation of the rigid body around fixed axis.<br>• Understand the first law of thermodynamics and analyze thermodynamic cycles. |
| Teaching Methodology: |
| **45 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 75 hours of personal study.** |
| Course subjects |
| **Week 1: The international system of Units. Physical methods, dimensions and units.**<br>**Week 2: Kinematics of particle, linear, rotational and curvilinear motion**<br>**Week 3: Newton s laws**<br>**Week 4: Particle system, center of mass, the law of conservation of movement quantities**<br>**Week 5: Work, energy, power**<br>**Week 6: Conservative non conservative forces**<br>**Week 7: Statics**<br>**Week 8: Mechanics of rigid body**<br>**Week 9: Gravitation**<br>**Week 10: Inertial and non inertial frames**<br>**Week 11: Statics of fluids, flow of ideal and real fluids**<br>**Week 12: Real and ideal fluids**<br>**Week 13: Heat and thermometry,**<br>**Week 14: Kinetic theory of heat.**<br>**Week 15: Thermodynamics, cyclic processes, entropy** |
| Literature |
| 1. S. Skenderi, R,Maliqi, “Physic for thechnical faculty”, UP, Pristina, 2005<br>2. J. Serway, Physics for scientists and engineering, Thomson Books, 2004.<br>3. D. Haliday, R.Resnick, J.Walker, Fundametals of Physics, John Wiley &Sons, 2001 |

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| Course syllabus: **Fundamentals of electrical Engineering 1** |
|---|
| Course status: **Mandatory**<br>**7 ECTS** |
| Course description |
| **The purpose of the course is to introduce the basic principles of electrical field and DC current circuits. Some of the main topics that will be included in this course are:**<br>**Basics of electricity. Fundamental lows of electricity. Electric potential. An electric dipole and flux lines. Electrostatic induction. Electric generator.**<br>**Polarization in dielectrics. Boundary conditions. Capacitance. Electrostatic networks. Energy and forces in electrostatic fields. Electrostatic field analysis using MATLAB. Concepts, elements and topology of electric circuits. Types of electrical circuits. Elementary DC circuits. Circuit Elements, Electrical resistance- Ohm's law. Construction of circuit model. 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.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Understand fundamental laws of electricity.**<br>• **Apply the fundamental laws of electricity for solving of electric field problems.**<br>• **Apply MATLAB software pavckage for soving basic problems in elctrical field.**<br>• **Understand and apply methods for DC circuit analysis such as: Kirchhof's lows, node voltage method, mesh current method, superposition method, Thevenin's and Norton's theorem.**<br>• **Understand transient response of first order circuits (series RC circuits).**<br>• **Apply PSPICE Software for DC circuit analysis.**<br>• **Apply gained knowledge in other electrical engineering fields.** |
| Teaching Methodology: |
| **Presentations, tutorials, discussions, and laboratory works meaning:**<br>**60 hours presentations + 15 hours of tutorials, and 15 hours laboratory works.** |
| Course subjects |
| **Week 1: Basics of electricity, fundamental laws of electrostatic field**<br>**Week 2: Electric field and potential**<br>**Week 3: Electrostatic induction, electric generator**<br>**Week 4: Polarization process in dielectrics**<br>**Week 5: Boundary conditions, capacitance**<br>**Week 6: Electrostatic networks**<br>**Week 7: Energy and forces in electrostatic field**<br>**Week 8: Electrostatic field analysis using software package MATLAB**<br>**Week 9: Concepts, elements and topology of electrical circuits**<br>**Week 10: Elementary DC circuits**<br>**Week 11: Circuits elements, Ohm's law**<br>**Week 12: Voltage and potential in electric circuit. Current sources.**<br>**Week 13: Kirhoff's laws**<br>**Week 14: Complex DC circuits**<br>**Week 15: DC circuit analysis using software package PSPICE** |
| Literature |
| **1. Nexhat Orana, Bazat e elektroteknikës 1, Prishtinë, 1994**<br>**2. M.N. Sadiku, Elements of electromagnetic, Oxford University Press, New York, 2001**<br>**3. Ch. Alexander, M.N. Sadiku, Electric Circuits, McGraw Hill, New York, 2000.** |

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| Course syllabus: **Fundamentals of programming** |
|---|
| Course status: **Mandatory**<br>**5 ECTS** |
| Course description |
| **This course teaches basic concepts of programming, including algorithm design using flow charts and writing the code using C ++ Programming Language.**<br>**Students will undergo their first steps in problem solving through algorithm design using flowcharts and writing code using C++ Programming Language.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Design algorithms for solving basic problems from mathematics and real life,**<br>• **Write code using C++,**<br>• **Debug programs,**<br>• **Test programs**<br>• **Organize code in manageable units (e.g. methods, structures, etc.)** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework** |
| Course subjects |
| **Week 1: Introduction to Programming and basic concepts**<br>**Week 2: Basic algorithms**<br>**Week 3: Initial programs, Conditional Operator, Brach with Switch ()**<br>**Week 4: Loops**<br>**Week 5: Arrays**<br>**Week 6: Working with array members**<br>**Week 7: Creation of arrays**<br>**Week 8: Functions**<br>**Week 9: Functions with arrays**<br>**Week 10: Mathematical functions, local and global variables, including files in the program**<br>**Week 11: Makro functions, Function overloading**<br>**Week 12: Enumerations**<br>**Week 13: Structures**<br>**Week 14: Structures and functions, Arrays of objects**<br>**Week 15: Conclusion – Summary** |
| Literature |
| **1. Agni Dika, "Algoritmet, me programe në C++", Universiteti i Prishtinës, Fakulteti Elektroteknik, Prishtinë,2004,**<br>**http://www.agnidika.net/algoritmetCpp.pdf**<br>**2. Agni Dika Bazat e Programimit në C++, Universiteti i Europës Juglindore, Tetovë, ISBN 9989-866-23-6, http://www.agnidika.net/programimiCpp.pdf**<br>**3. H.M. Deitel, P. J. Deitel, How to Program C++, Prentice Hall,Upper Saddle River, New Jersey, ISBN 0-13-111881-1**<br>**4. Robert Lafore, Object-Oriented Programming in C++, Sams, Indianopolis, Indiana, ISBN-10:0-672-32308-7** |

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| Course syllabus: **Technical English** |
|---|
| Course status: **Mandatory**<br>**5 ECTS** |
| Course description |
| **The focus of this course is to teach students to use English to clearly communicate and write engineering technical concepts.**<br>**Enabling student to actively use the English language to communicate, orally and in writing, at the necessary level for the professional field of electrical and computer engineering.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **actively use English in everyday life.**<br>• **communicate both orally and in writing the English language at a desired level,**<br>• **specifically as it pertains to their professional field.**<br>• **ask and answer questions in the field of electrical engineering in English.**<br>• **translate texts related to the field of electrical and computer engineering.** |
| Course subjects |
| **Week 1: Introduction to course material**<br>**Week 2: Technical functions and applications**<br>**Week 3: Describing technical materials and their properties**<br>**Week 4: Components and production**<br>**Week 5: Engineering design**<br>**Week 6: Technical problems**<br>**Week 7: Technical requirements**<br>**Week 8: Technological developments – Requirement description**<br>**Week 9: Taking the necessary precautions**<br>**Week 10: Technical procedures**<br>**Week 11: Automated systems**<br>**Week 12: Describing tests and experiments**<br>**Week 13: Comparing results against expectations**<br>**Week 14: Describing the performance and suitability of a product**<br>**Week 15: Review** |
| Literature |
| **Day, Jeremy, Cambridge English for Engineering, Cambridge, UK** |

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| Course syllabus: **Communication Skills** |
|---|
| Course status: **Elective**<br>**5 ECTS** |
| Course description |
| **This course offers basic communication skills in digital age.**<br>**The goal of this course is to develop written and verbal communication skills and group work** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **write different official and business letters;**<br>• **write formal and informal emails,**<br>• **write a five-paragraph essay;**<br>• **write different reports;**<br>• **write laboratory reports;**<br>• **use the Internet to find specific information;**<br>• **use the computer to write different reports;**<br>• **write minutes of meetings;**<br>• **write a paper on a particular problem or issue;**<br>• **write CVs and applications for work;**<br>• **hold oral presentations;**<br>• **respond to job interviews.** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework** |
| Course subjects |
| **Week 1: Introduction and course description**<br>**Week 2: Introduction to Technical Communication & Ethics**<br>**Week 3: Writing Technical Documents**<br>**Week 4: Analyzing Your Audience and Purpose**<br>**Week 5: Homework assignment #1**<br>**Week 6: Researching Your Subject**<br>**Week 7: Communicating Persuasively**<br>**Week 8: Writing Correct and Effective Sentences**<br>**Week 9: Corresponding in Print and Online**<br>**Week 10: Homework assignment #2**<br>**Week 11: Applying for a Job**<br>**Week 12: Writing Lab Reports**<br>**Week 13: Making Oral Presentations;**<br>**Week 14: Homework assignment #3**<br>**Week 15: Homework assignment #3** |
| Literature |
| **1. Mike Markel, Technical Communication, ISBN 978-1-39-08808-8, March 2017**<br>**2. John W. Davies, Communication Skills. A Guide for Engineering and Applied Science Students, Prentice Hall, 2011.**<br>**3. Miller et al, How the World Changed Social Media, UCL Press, 2016**<br>**4. Majlinda Nishku, Si të shkruajmë: procesi dhe shkrimet funksionale, CDE, Tiranë, 2004.** |

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| Course syllabus: **German language** |
|---|
| Course status**: Elective**<br>**5 ECTS** |
| Course description |
| **The focus of this course is to teach students to use German to clearly communicate and write engineering technical concepts.**<br>**Enabling student to actively use the German language to communicate, orally and in writing, at the necessary level for the professional field of electrical and computer engineering.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **actively use German in everyday life.**<br>• **communicate both orally and in writing the German language at a desired level, specifically as it pertains to their professional field.**<br>• **ask and answer questions in the field of electrical engineering in German.**<br>• **translate texts related to the field of electrical and computer engineering.** |
| Teaching Methodology: |
| **30 hours of lectures, 15 hours of exercises.**<br>**Approximately 80 hours of independent work, including a seminar.** |
| Course subjects |
| **Week 1: Introduction to course material**<br>**Week 2: Technical functions and applications**<br>**Week 3: Describing technical materials and their properties**<br>**Week 4: Components and production**<br>**Week 5: Engineering design**<br>**Week 6: Technical problems**<br>**Week 7: Technical requirements**<br>**Week 8: Technological developments – Requirement description**<br>**Week 9: Taking the necessary precautions**<br>**Week 10: Technical procedures**<br>**Week 11: Automated systems**<br>**Week 12: Describing tests and experiments**<br>**Week 13: Comparing results against expectations**<br>**Week 14: Describing the performance and suitability of a product**<br>**Week 15: Review** |
| Literature |
| **Leitner, Arnold, German Made Simple: Learn to speak and understand German quickly and easily, New York, USA** |

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| Course syllabus: Practical Mathematics |
|---|
| Course status: **Elective**<br>**5 ECTS** |
| Course description |
| **In this course will be studied algebraic expressions, equations with an unknown, inequations, systems of linear equations, arithmetic and geometrical strings, trigonometry and analytic geometry.**<br>**Students should be trained so that the knowledge gained through this course can be applied in acquiring knowledge from the following subjects.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **choose and design different problems in the field of equations with an unknown and their implementation;**<br>• **acquire knowledge of numerical strings;**<br>• **understand the basic concepts from analytical geometry and trigonometry.** |
| Teaching Methodology: |
| **Lectures, discussions, exercises, consultations, homework, seminar work, intermediate evaluations, final exam.** |
| Course subjects |
| **Week 1: Algebraic expressions: exponentiation and rooting, disintegrating polynomials into factors.**<br>**Week 2: Simplifying algebraic expressions.**<br>**Week 3: Equations with an unknown: Linear, quadratic, biquadratic equations.**<br>**Week 4: Equations with absolute value, irrational, exponential and logarithmic equations.**<br>**Week 5: Inequations.**<br>**Week 6: Systems of linear equations.**<br>**Week 7: Arithmetic and geometrical strings.**<br>**Week 8: Elementary geometry: Polygons, perimeter.**<br>**Week 9: The surface area.**<br>**Week 10: Surface area and volume of 3-D shapes.**<br>**Week 11: Trigonometry: Trigonometric Functions.**<br>**Week 12: Trigonometric Identities.**<br>**Week 13: Trigonometric equations.**<br>**Week 14: Analytical geometry: Line and circle.**<br>**Week 15: Ellipse, parabola and hyperbola.** |
| Literature |
| **1. Hamiti E , Peci H, Loshaj Z. Gjonbalaj, Lohaj Sh. - Përmbledhje detyrash nga matematika, Prishtinë 2001.**<br>**2. M. Berisha, D. Kamberi, R. Gjergji, R. Zejnullahu, Përmbledhje detyrash nga matematika, Prishtinë 1990.** |

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| Course syllabus: Calculus II |
|---|
| Course status: **Mandatory**<br>**7 ECTS** |
| Course description |
| **Some of the topics that will be covered in this course are: Integral computation and its implementation, functions with two or more variables and ordinary differential equations.**<br>**The knowledge gained through this course can be applied as an ancillary device in information and communication technology.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **understand the concept of indefinite and definite integral as well as their application in**<br>• **generalize concepts related to functions with one variable into multi variable functions and in particular into those with two variables;**<br>• **think logically about various differential equations, solve concrete examples step by step and model different practical problems through differential equations.** |
| Teaching Methodology: |
| **Lectures, discussions, exercises, consultations, homework, seminar work, intermediate evaluations, final exam.** |
| Course subjects |
| **Week 1: Indefinite integral. Methods of integration.**<br>**Week 2: Integration of rational, irrational and trigonometric functions.**<br>**Week 3: The definite integral and its properties. The fundamental theorem of calculus.**<br>**Week 4: Improper integrals. Application of definite integrals. Surface area.**<br>**Week 5: Volume. Arc Length and Surface Area**<br>**Week 6: Functions with two or more variables. Limit of multi-variable function. Continuity of multi-variable functions.**<br>**Week 7: Derivatives and partial differentials of multi-variable function.**<br>**Week 8: Extreme values of functions with two variables. Substituting variables.**<br>**Week 9: Ordinary differential equations. Some types of differential equations: separable differential equations, homogeneous differential equations.**<br>**Week 10: First-order linear differential equations, the Bernoulli equation, the Riccati equation.**<br>**Week 11: Total differential equations, integrating factors, second-order differential equations that can be transformed into first-order equations.**<br>**Week 12: Curve families. Orthogonal and isogonal trajectories. Singular solutions of the first-order differential equation.**<br>**Week 13: Homogeneous and nonhomogeneous second-order linear differential equations. Constant variation method.**<br>**Week 14: Homogeneous and nonhomogeneous second-order linear differential equations with constant coefficients. Euler's differential equation.**<br>**Week 15: Homogeneous and nonhomogeneous linear order differential equations of higher order with constant coefficients.** |
| Literature |
| 1. Hamiti E. - Matematika I, Prishtinë 2008.<br>2. Hamiti E. - Matematika II, Prishtinë 2008.<br>3. Hamiti E. - Matematika III, Prishtinë 2008.<br>4. Peci H, Doko M. - Përmbledhje detyrash të zgjidhura nga Matematika I, Prishtinë 1997.<br>5. Loshaj Z. - Përmbledhje detyrash të zgjidhura nga Matematika II, Prishtinë 1996. |

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| Course syllabus: **Physics 2** |
|---|
| Course status: **Mandatory**<br>**6 ECTS** |
| Course description |
| **The course includes basic knowledge of physics necessary to gain general knowledge that is basic in engineering**<br>**Using the physical laws of modern physics in modeling and solving specific engineering problem.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Apply the linearization technique to equations of motion of oscillatory.**<br>• **Explain the wave equation in non dispersive medium.**<br>• **Analyze optical systems using the methods of geometrical optics.**<br>• **Explain the phenomena of interference, diffraction and polarization of light.**<br>• **Explain Planck's law of black body radiation.**<br>• **Relate the atomic spectrum to quantization of energy levels.** |
| Teaching Methodology: |
| **45 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 75 hours of personal study.** |
| Course subjects |
| |
| **Week 1: Solid state materials elasticity**<br>**Week 2: Mechanical oscillation and mechanical waves**<br>**Week 3: Sound waves**<br>**Week 4: Doppler s effect**<br>**Week 5: Electromagnetic waves**<br>**Week 6: Maxwell s equation s.**<br>**Week 7: Wave equation, wave propagation.**<br>**Week 8: Geometrical optics, mirrors, lenses and prisms.**<br>**Week 9: Physical optics. Interference, diffraction and polarization.**<br>**Week 10: Photometry**<br>**Week 11: Quantum nature of light. Blackbody radiation.**<br>**Week 12: Photo effect and Compton s effect.**<br>**Week 13: Atom structure. Atomic specters. X-rays.**<br>**Week 14: Atomic nucleus. Radioactivity**<br>**Week 15: Relativistic mechanics.** |
| Literature |
| **1. S. Skenderi, R,Maliqi, "Physic for thechnical faculty", UP, Pristina, 2005**<br>**2. J. Serway, Physics for scientists and engineering , Thomson Books, 2004.-D. Haliday, R.Resnick, J.Walker, Fundametals of Physics, John Wiley &Sons, 2001** |

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| Course syllabus: **Fundamentals of electrical engineering 2** |
|---|
| Course status: **Mandatory**<br>**7 ECTS** |
| Course description |
| **The purpose of the course is to introduce the basic principles of magnetic field and AC current circuit analysis.**<br>**Some of the main topics that will be covered in this course are:**<br>**Basic of magnetism and magnetic flux density. Biot- Savart's law. Generalized Apere's law. Faraday's law. Inductors and inductances. Magnetostatic field analysis using MATLAB.**<br>**Current and voltage waveforms. Techniques of circuits analysis. Sinusoidal state analysis. AC circuit analysis. Balanced three phase circuits. AC circuit analysis using software package PSPICE.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Understand fundamental laws of magnetism.**<br>• **Apply the fundamental laws of magnetism for solving of magnetic field problems.**<br>• **Apply MATLAB software package for solving basic problems in magnetic field.**<br>• **Understand and apply methods for AC circuit analysis.**<br>• **Understand transient response for first order circuits.**<br>• **Apply PSPICE software package for AC circuit analysis.**<br>• **Apply gained knowledge in other electrical engineering fields.** |
| Teaching Methodology: |
| **Presentations, tutorials, discussions, and laboratory works, meaning: 60 hours presentations, 15 hours of tutorials, and 15 hours of laboratory works.** |
| Course subjects |
| **Week 1: Basics of magnetism, magnetic flux density**<br>**Week 2: Biot-Savart's law**<br>**Week 3: Magnetic force and torque. Ampere's law**<br>**Week 4: Magnetization process of materials. Generalized Ampere's law**<br>**Week 5: Magnetic boundary conditions, Faraday's law**<br>**Week 6: Inductors and inductance**<br>**Week 7: Magnetic energy and magnetic circuits**<br>**Week 8: Magnetostatic field analysis using MATLAB**<br>**Week 9: Current and voltage waveforms**<br>**Week 10: Sinusoidal steady-state analysis**<br>**Week 11: The passive circuit elements in the frequency domain**<br>**Week 12: Sinusoidal steady-state power calculations**<br>**Week 13: Magnetically coupled circuits. Response of first order circuits (RL).**<br>**Week 14: Balanced three phase circuits**<br>**Week 15: AC circuit analysis using software package PSPICE** |
| Literature |
| **1. Nexaht Orana, Bazat e elektroteknikës 2, Prishtinë, 1994**<br>**2. M.N. Sadiku, Elements of electromagnetics, Oxford University Press, New York, 2001**<br>**3. C. Alexander, Electric Circuits, McGraw Hill, New York, 2000** |

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| Course syllabus: Algorithms and data structures |
|---|
| Course status**: Mandatory**<br>**7 ECTS** |
| Course description |
| **The content of this course is about basics of algorithm design, as well as understanding the data structures for solving problems in effective way. This course deals with various algorithms such as searching and sorting, while it also covers the topics of problem representation through miscellaneous data structures, such as lists, trees and graphs.**<br>**Student acquires critical thinking skills for problem solving, problem solution modeling, algorithm design and choosing the right data structure.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **analyze problems and find solutions,**<br>• **design algorithms and select the appropriate data structure.** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework** |
| Course subjects |
| **Week 1: Classes**<br>**Week 2: Classes**<br>**Week 3: Pointers**<br>**Week 4: References**<br>**Week 5: Algorithms**<br>**Week 6: Data structures, Stack**<br>**Week 7: Queue**<br>**Week 8: Linked lists**<br>**Week 9: Linked lists**<br>**Week 10: Trees**<br>**Week 11: Trees**<br>**Week 12: Graphs**<br>**Week 13: Sorting algorithms**<br>**Week 14: Sorting and searching algorithms**<br>**Week 15: Summary** |
| Literature |
| **1. Avni Rexhepi, Algoritmet dhe strukturat e të dhënave, http://sites.google.com/site/avnirexhepi**<br>**2. 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**<br>**3. D. S. Malik, C++ Programming: Program Design Including, Data Structures, Course Technology, Thomson Leraning, Boston, Massachusetts, ISBN 0-619-03569-2**<br>**4. Robert Lafore, Object-Oriented Programming in C++, Sams, Indianopolis, Indiana, ISBN-10:0-672-32308-7**<br>**5. D. S. Malik, Programming: From Problem Analysis To Program Design, Course Technology, Thomson Leraning, Boston, Massachusetts, ISBN 0-619-06213-4** |

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| Course syllabus: Digital Circuits |
|---|
| Course status**: Mandatory**<br>**5 ECTS** |
| Course description |
| **The main goal of this course is to gain the basic theoretical understanding of functioning of digital structures and to acquire the knowledge and basic experience of practical design, implementation and testing of digital structures.**<br>**Some of the topics that will be included in this course are:**<br>**Number systems and codes, Boolean functions and logic gates, Computer-aided digital design, Sequential logic circuits, Three-state buffers and buses, Programmable logic circuits** |
| Expected learning outcomes: |
| **After successful completion of the course, students will be able to:**<br>• **describe the basic combinational and sequential structures of digital circuits;**<br>• **describe this functioning in one of the hardware description languages;**<br>• **detect flaws in such functioning;**<br>• **eliminate the basic among such flaws;**<br>• **choose the optimal design of a digital structure, taking into account the requirements of size, cost and reliability of functioning;**<br>• **design combinational and sequential circuits using the methods of abstract and structural synthesis;**<br>• **build a prototype of the designed structure in the form of a printed circuit board;**<br>• **test the functioning of such a prototype;** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework** |
| Course subjects |
| **Week 1: Basics of electricity, fundamental laws of electrostatic field**<br>**Week 2: Electric field and potential**<br>**Week 3: Electrostatic induction, electric generator**<br>**Week 4: Polarization process in dielectrics**<br>**Week 5: Boundary conditions, capacitance**<br>**Week 6: Electrostatic networks**<br>**Week 7: Energy and forces in electrostatic field**<br>**Week 8: Electrostatic field analysis using software package MATLAB**<br>**Week 9: Concepts, elements and topology of electrical circuits**<br>**Week 10: Elementary DC circuits**<br>**Week 11: Circuits elements, Ohm's law**<br>**Week 12: Voltage and potential in electric circuit. Current sources.**<br>**Week 13: Kirhoff's laws**<br>**Week 14: Complex DC circuits**<br>**Week 15: DC circuit analysis using software package PSPICE** |
| Literature |
| **1. Floyd Thomas L., Digital Fundamentals (10th Edition), Prentice Hall, 2008.**<br>**2. M. Morris Mano, M. D. Ciletti. Digital Design, 6th ed. Pearson/Prentice Hall, 2017.**<br>**3. Fundamentals of Digital Circuits, 3rd Edition, by A. ANAND KU**<br>**MAR, 2014, Delhi.** |

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| Course syllabus: Calculus 3 and Probability (ICT) |
|---|
| Course status**: Mandatory**<br>**6 ECTS** |
| Course description |
| **In this course will be studied parts from Mathematical Analysis like the basic concepts of polynomial series and functional series, Fourier series, Fourier integral and Fourier transformations. Double, triple, line and surface integrals. The special attention is paid to the part of the Probability Theory, where will be studied the basic concepts of probability, discrete and continuous random variables.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **solve and formulate various professional problems related to: double, triple, line and surface integrals;**<br>• **apply Fourier integral and Fourier transformation into concrete professional problems;**<br>• **know the basic distributions attributes as well as their application to professional problems;**<br>• **make mathematical models related to concrete professional problems** |
| Teaching Methodology: |
| **Lectures, discussions, exercises, consultations, homework, seminar work, intermediate evaluations, final exam.** |
| Course subjects |
| **Week 1: Functional sequence and series. Polynomial series.**<br>**Week 2: Fourier series. Dirihle condition. The expansion of periodic functions to Fourier series.**<br>**Week 3: Parseval's identity. The complex form of the Fourier series.**<br>**Week 4: Double integral. Calculation and geometric interpretation of the double integral.**<br>**Week 5: Application of the double integral**<br>**Week 6: Triple integral and its application. Triple integral in cylindrical and spherical coordinates.**<br>**Week 7: The line integrals. Properties and their solution.**<br>**Week 8: Green's formula. The line integrals that do not depend on the path of integration. The applications of the line integrals.**<br>**Week 9: Surface integrals. Ostrogradsky formula**<br>**Week 10: The relation between the surface integral and the line integral. Applications of the surface integral.**<br>**Week 11: Event space and events. The classic definition of probability. Probability axioms. Conditional Probability. The formula of full probability. Bayes formula.**<br>**Week 12: Random variables and their distribution. Discrete distributions of random variables. Continuous distributions of random variables.**<br>**Week 13: Moments of the random variable.**<br>**Week 14: Special probability distributions. Discrete distributions. Continuous random distributions. Links between different distributions.**<br>**Week 15: Introduction to statistics. The role of statistics in engineering, the basic elements of mathematical statistics, statistical tests.** |
| Literature |
| **1. Hamiti E. - Matematika III, Prishtinë 2008.**<br>**2. Hamiti E. - Matematika IV, Prishtinë 2008.**<br>**3. Hamiti E, Lohaj SH.- Përmbledhje detyrash të zgjidhura nga Matematika III, Prishtinë 2008.**<br>**4. Hamiti E, Lohaj SH.- Përmbledhje detyrash të zgjidhura nga Matematika IV, Prishtinë 2008.** |

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| Course syllabus: Signals and Information |
|---|
| Course status**: Mandatory**<br>**7 ECTS** |
| Course description |
| **Signals and information is a basic course that deals with the types and characteristics of signals used to transmit information across all electronic systems.**<br>**The goals of the course are to introduce students to the basic concepts of signals and information; to develop student`s understanding of time-domain and frequency domain approaches to the analysis of continuous and discrete signals; to understand to gain knowledge of the fundamental concepts of information theory; and to develop student`s ability to apply modern simulation software to signals and information analysis.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Understand fundamental laws of electricity.**<br>• **Apply the fundamental laws of electricity for solving of electric field problems.**<br>• **Apply MATLAB software pavckage for soving basic problems in elctrical field.**<br>• **Understand and apply methods for DC circuit analysis such as: Kirchhof's lows, node voltage method, mesh current method, superposition method, Thevenin's and Norton's theorem.**<br>• **Understand transient response of first order circuits (series RC circuits).**<br>• **Apply PSPICE Software for DC circuit analysis.**<br>• **Apply gained knowledge in other electrical engineering fields.** |
| Teaching Methodology: |
| **Student will learn properties of signals and information and the ways how to represent them in time and frequency domain. After finishing the course student will gain knowledge of fundamental methods of signals and information analysis, in time and transform domain, through the problem solving and performing corresponding simulations.** |
| Course subjects |
| **Week 1: Continuous signals: periodic, non-periodic and random signals.**<br>**Week 2: Signal power and correlation between periodic signals.**<br>**Week 3: Signal energy and correlation between aperiodic signals.**<br>**Week 4: Fourier analyses of periodic and aperiodic signals, signal spectrum.**<br>**Week 5: Signal power and correlation between random signals.**<br>**Week 6: Signal filtering and convolution.**<br>**Week 7: Clasic analog filters.**<br>**Week 8: Intermediate assesment-1**<br>**Week 9: Sampling and reconstruction of bandlimited signals.**<br>**Week 10: Pulse transmittion and intersymbol interference.**<br>**Week 11: Nyquist theorem.**<br>**Week 12: Foundamentals of information theory: events and information measure.**<br>**Week 13: Information sources, entropy and source coding.**<br>**Week 14: Communication channel model and channel capacity.**<br>**Week 15: Intermediate assesment-2** |
| Literature |
| **1. "Schaum's Outline of Theory and Problems of Signals and Systems", Hwei P. Hsu, 1995, McGraw-Hill.**<br>**2. "Signals and Systems", Alan V. Oppenheim, et al, 2nd ed., 1996, Prentice Hall.**<br>**3. "Fundamentals of Signals and Systems-Using Matlab", E. Kamen and B. Heck; 3rd ed., 2006, Prentice Hall** |

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| Course syllabus: **ELECTRONICS** |
|---|
| Course status: **Mandatory**<br>**5 ECTS** |
| Course description |
| **Some of the topics that will be included in this course are:**<br>**Semiconductors, semiconductor diodes, zener diodes, diode circuits, conductors, and various diode circuits for signal processing. Bipolar transistors, basic configurations of circuits with bipolar transistors, models for small signals. Basic amplifier configurations: common emitter, shared base, and common collector. Field effect transistor, working principles, small signal patterns. MOSFET transistors. Basic amplifier configurations: with common source, with common gate and with common drain. Operational amplifiers, ideal and realistic features, basic circuits with operational amplifiers, OA applications** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **understand the basics of electronics within the field of electrical engineering;**<br>• **understand the diode circuits and their models;**<br>• **understand circuits with bipolar and FET transistors and their models;**<br>• **analyze and design transistor circuits for small signals;**<br>• **analyze and utilize operational amplifiers;**<br>• **continue studies in advanced electronics and microelectronics courses.** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework** |
| Course subjects |
| **Week 1: Semiconductors**<br>**Week 2: Semiconductor diodes**<br>**Week 3: Rectifier circuits with and without filter.**<br>**Week 4: Diode circuits for signal processing**<br>**Week 5: Zener diodes**<br>**Week 6: Bipolar transistors, working principle, DC analysis.**<br>**Week 7: Models for small signals**<br>**Week 8: Basic amplifier configurations: common emitter**<br>**Week 9: Basic amplifier configurations: common base and common collector.**<br>**Week 10: Field effect transistor, working principles, DC analysis.**<br>**Week 11: Model for small signals.**<br>**Week 12: Basic amplifier configurations: with common source, with common gate and with common drain.**<br>**Week 13: Multistade amplifiers**<br>**Week 14: Operational amplifiers, ideal and realistic features,**<br>**Week 15: Basic circuits with operational amplifiers, OA applications** |
| Literature |
| **1. Donald Neamen, Electronic Circuit Analysis and Design, McGraw-Hill Education, Second Edition, 2009**<br>**2. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits, Oxford University Press, 2007**<br>**3. M. Limani, Q. Kabashi Elektronika, Universiteti i Prishtinës, ligjërata të autorizuara, 2014.** |

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| Course syllabus: **Internet Technologies** |
|---|
| Course status: **Mandatory**<br>**6 ECTS** |
| Course description |
| **The main objective of the course is to introduce fundamental knowledge about operation and application of Internet, Internet technologies and communication systems. The course combines theoretical background with practical applications and real-world examples. The topics build an integral whole, which is of interest and necessary for professional subjects in the continuation of the study.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **List the key technologies in Internet, including wired, wireless and mobile network technologies**<br>• **Sketch the architecture and explain the operation of Internet and other IP based communication systems**<br>• **Differentiate among purposes of communication protocols at various layers of TCP/IP**<br>• **Configure and test a simple network, information and or/communication system** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises and team-work for real-case scenarios and problem solving through project work. Case-studies and industry invited lecturers.** |
| Course subjects |
| **Week 1: Fundamentals of information and communication systems. Information society and digital transformation. Users and information communication service and content providers, services and their application.**<br>**Week 2: Internetworking. Communication systems, technologies, hardware, software and data transmission. Purpose of layered models and communication protocols, protocol data units. Signalization and intelligence in networks and systems.**<br>**Week 3: Purpose of layered models and communication protocols, protocol data units. Signalization and intelligence in networks and systems. OSI and TCP/IP reference models.**<br>**Week 4: Architectures of Internet and communication networks: access and core networks.**<br>**Week 5: Examples and operation of selected systems and technologies in communication services provisioning: Ethernet, xDSL, wireless and mobile networks, Internet systems with TCP/IP, satellite networks.**<br>**Week 6: Student's project work. Team work. Access and core networks case studies.**<br>**Week 7: Industry invited lecturers.**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: Broadband concept. Broadband vs. narrowband communications.**<br>**Week 10: Fundamentals of Web and Web technologies. Client-server operation. Traditional Internet services and applications.**<br>**Week 11: Internet of things – concept and application examples.**<br>**Week 12: Student's project work. Internet of things case studies**<br>**Week 13: Convergent interactive Internet applications. Fundamentals of convergent Internet multimedia components and services, and broadcasting systems.**<br>**Week 14: Internet standards world.**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. Comer, D. E. (2013). Internetworking with TCP/IP. Addison-Wesley Professional.**<br>**2. William Stallings (2013). Data and Computer Communications, (10th ed.). Pearson.** |

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| Course syllabus: **Matlab Practicum** |
|---|
| Course status: **Elective**<br>**3 ECTS** |
| Course description |
| **This course describes the basics of programming in Matlab. At the beginning student learn vectors, matrix and graphical representation of functions. The next part focuses on saving the data in files, function definition, use of Simulink and toolboxes.**<br>**The purpose of this course is that the student during lectures and laboratory exercises expand and deepen their knowledge to apply Matlab programming language ICT problem solving and analysis** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **distinguish the use of vectors and matrix in Matlab**<br>• **formulate function and loops**<br>• **demonstrate appropriate knowledge for data visualization by graphical representation**<br>• **implement examples from communication systems using simulink and Toolbox-es**<br>• **solve ICT problems using Matlab software** |
| Teaching Methodology: |
| **Lectures, Discussion, Practical work** |
| Course subjects |
| **Week 1: Introduction to MATLAB**<br>**Week 2: Program design and algorithm development**<br>**Week 3: Vectors and Matrixes in MATLAB**<br>**Week 4: Matlab functions and data import-export**<br>**Week 5: Logical vectors in MATLAB**<br>**Week 6: Function m-files**<br>**Week 7: Loops**<br>**Week 8: 2D graphics in Matlab**<br>**Week 9: 3D graphics in MATLAB**<br>**Week 10: Simulink in MATLAB**<br>**Week 11: Apply Matlab Toolboxes**<br>**Week 12: Simulation of communication systems in MATLAB**<br>**Week 13: Simulation of communication systems using Simulink**<br>**Week 14: Data visualization in MATLAB**<br>**Week 15: Symbolic Toolbox application in engineering** |
| Literature |
| **1. B. Hahn, D. Valentine (2019): Essential MATLAB for Engineers and Scientists, 7th Edition, Publishing House "Elsevier", USA.**<br>**2. O. Ibe (2017): Applied Numerical Methods with MATLAB for Engineers and Scientists, 4th Edition, Publishing House Mc Graw Hill, USA** |

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| Course syllabus: **Practicum in LabVIEW** |
|---|
| Course status: **Elective**<br>**4 ECTS** |
| Course description |
| **This course is designed to provide the students with fundamental knowledge for labview software. The course also provide others activities and examples in order to demonstrate the students the techniques for identifying other information resources about labview**<br>**The aim of this course is to teach the students the main concepts of labview software. The goal of this course is also to provide the students with knowledge of techniques of conecting measurement devices with PC, data analysis etc. SCADA systems programming and programmable logic controller communication are also the focus of this course.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should bevable to:**<br>• **Write LabVIEW scripts called Vis;**<br>• **Use different techniques for problem solving;**<br>• **Formulate and store Vis in order to be used as subclasses;**<br>• **Store the data in a file and display them in a graph;**<br>• **Develop applications that use GPIB (General Purpose Interface Bus) or plug-in DAQ boards;**<br>• **Optimize the speed and performance of LabVIEW programms;**<br>• **Use advanced techniques in LabVIEW;**<br>• **Control the created programms and publish them in internet using LabVIEW commands** |
| Teaching Methodology: |
| **Lectures, discussions, practical work, seminars** |
| Course subjects |
| **Week 1: Introduction to LabVIEW**<br>**Week 2: Virtual instrumentation: Using LabVIEW in the real world, the evolution of the LabVIEW,**<br>**Week 3: The LabVIEW environment: key terms, block diagrams, toolbar, pop-up menus,**<br>**Week 4: LabVIEW Foundations: key terms, creating VIs, running VIs, loading and saving VIs, debugging techniques**<br>**Week 5: Controlling Program Execution with Structures: loops, shift registers, dialogs**<br>**Week 6: LabVIEW's Exciting Visual Displays: Charts and Graphs: Waveform Charts, Graphs, XY Graphs, Chart and Graph Components, Intensity Charts and GraphsColor as a Third Dimension, Exporting Images of Charts and Graphs**<br>**Week 7: Exploring Strings and File I/O: Using String Functions, String Construction**<br>**Week 8: Project work: Presentation 1**<br>**Week 9: Signal Measurement and Generation: Data Acquisition Data Acquisition in LabVIEW**<br>**Week 10: Instrument Control in LabVIEW Connecting Your Computer to Instruments**<br>**Week 11: Advanced LabVIEW Structures and Functions**<br>**Week 12: Advanced LabVIEW Data Concepts**<br>**Week 13: Advanced LabVIEW Features**<br>**Week 14: Independent lab work.**<br>**Week 15: Final exam** |
| Literature |
| **1. Labview for everyone. J. Travis, J. Kring, 2007. Pentince Hall**<br>**2. Labview Programming, Data Acquisition and Analysis. J. Beyon, 2001. Prentice Hall**<br>**3. Labview Graphical Programming. G. Johnson, R. Jennings, 2006. McGraw Hill** |

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diMTV

| Course syllabus: **Digital Communications** |
|---|
| Course status: **Mandatory**<br>**7 ECTS** |
| Course description |
| **The course deals with the basic concepts of digital communications, in the baseband transmission and passband transmission.**<br>**The main goal of the course is to introduce the basic principles of digital communications.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Explain the basic concepts in telecommunications including signals & spectra, sampling, analog modulation processes, noise and its effects, basic A / D conversion techniques and basic multiplex /multiple access techniques**<br>• **Identify and recognize main characteristic of analog and digital modulation methods;**<br>• **Explain basic concepts in digital telecommunications including digital telecommunication systems performance criteria**<br>• **Know baseband and passband digital transmission techniques**<br>• **Draft a paper on a particular issue or issues in the field of telecommunications.** |
| Teaching Methodology: |
| **45 hours of lectures + 15 hours of auditorial exercises + 15 hours of laboratory exercises. Approximately 100 hours of personal study and exercise including seminars.** |
| Course subjects |
| **Week 1: Communication systems model. Information and its measure.**<br>**Week 2: Spectral analysis of signals. Random noise.**<br>**Week 3: Linear and nonlinear systems.**<br>**Week 4: Analog modulations.**<br>**Week 5: FDM/FDMA. Sampling process.**<br>**Week 6: Pulse modulations. A/D conversion.**<br>**Week 7: Pulse code modulation (PCM), differential PCM, delta modulation.**<br>**Week 8: Intermediate assesment-1**<br>**Week 9: TDM/TDMA. Overview of basic analog communication systems. Model of digital telecommunication system.**<br>**Week 10: Source encoding. Performance criteria and limits of communication systems.**<br>**Week 11: Baseband digital transmission. Line codes.**<br>**Week 12: Intersymbol interference. Nyquist criteria.**<br>**Week 13: Channel equalization techniques.**<br>**Week 14: Digital modulation techniques. Overview of modern digital communication systems.**<br>**Week 15: Intermediate assesment-2** |
| Literature |
| **1. R. E. Ziemer and W. H. Tranter, “Principles of communications”, 5th Ed., John Wiley & Sons Inc., 2002**<br>**2. Roger Freeman, “Fundamentals of Telecommunications”, A John Wiley & Sons, inc. publication, 2004**<br>**3. HWEI HSU, PH.D. “Analog and Digital Communications”, second edition, Shaum~s outlines series, 2003** |

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diMTV

| Course syllabus: |
| --- |
| Course status:<br>**ECTS** |
| Course description |
| **The course starts with brief explanations of waves and phasors, the nature of electromagnetism, travelling waves and presentation of electromagnetic spectrum. The general concepts of transmission lines are explored, including: the role of wavelength and propagation modes, transmission line equations, concepts of wave propagation on transmission lines, ending with special cases of transmission lines such as: short-circuited line, open-circuited line, quarter-wave transformer and impedance matching. The basic concept of Vector calculus, gradient, divergence, curl and Laplace operator are covered. Maxwell's equations for Electrostatics, Magnetostatics and Time-Varying fields are analyzed and compared, followed with practical application in engineering.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Apply vector calculus to analyse the behavior of static electric fields and magnetic fields in standard configurations;**<br>• **Describe the parameters of time varying fields, guided and free space wave propagation and the underpinning role of Maxwell's equations.**<br>• **Explain examples of the interaction between waves and media and to be able to relate these to engineering design considerations and function;**<br>• **Illustrate and analyse transmission lines and wave propagation for different practical scenarios;**<br>• **Analyse the application of radio frequency propagation models and path loss for different environments** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises, numerical exercises and tutorials for practical part and engineering problem solving.** |
| Course subjects |
| **Week 1: Electromagnetism, travelling waves and presentation of electromagnetic spectrum.**<br>**Week 2: The general concepts of transmission lines**<br>**Week 3: The basic concept of Vector calculus, gradient, divergence, curl and Laplace operator**<br>**Week 4: Maxwell's equations for Electrostatics, Magnetostatics and Time- Varying fields**<br>**Week 5: Wave Equation**<br>**Week 6: Complex permittivity, plane wave propagation in losslessbmediums**<br>**Week 7: Different types of wave polarizations and their applications**<br>**Week 8: Midterm evaluation, 40 %**<br>**Week 9: The comparative analysis between: Plane wave propagation in low loss dielectric and good conductor**<br>**Week 10: Electromagnetic power density for plane wave propagation in lossless and loss mediums**<br>**Week 11: Wave reflection and transmission at normal incidence, at oblique incidence, Snell' law and Brewster angle**<br>**Week 12: The transmission and reflection coefficient**<br>**Week 13: Radio frequency propagation models and path loss**<br>**Week 14: Case studies of radio wave propagation**<br>**Week 15: Final evaluation, 40 %** |
| Literature |
| **1. Ulaby, F. T., Michielssen, E., & Ravaioli, U. (2010). Fundamentals of applied electromagnetics 6e. Boston, Massachussetts: Prentice Hall.**<br>**2. Magdy F. IIskander (2012) "Electromagnetic Fields and Waves ", Illinois Waveland: Press,** |

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diMTV

| Course syllabus: **Operating Systems for ICT** |
|---|
| Course status: **Mandatory**<br>**6 ECTS** |
| Course description |
| **This course describes the basics of operating systems for ICT such us memory, processes, files and network management. Moreover, the focus of the course is on operating systems that are in use by mobile and network equipment's.**<br>**The purpose of this course is that the student during lectures and laboratory exercises expand and deepen their knowledge for operating systems functionality in general while learning the basic concepts as well as to know in practice the use of UNIX, Windows, Linux and Android. Also, the student will become familiar with operating systems that are in use in communication network equipment's: switch, router, exchange point, access point and end user devices.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **understand memory, process, file and end user equipment management**<br>• **describe basic concepts the basic concepts of network organization and functionality**<br>• **apply in practice the most used operating systems in ICT such as Unix, Windows, Linux and Android**<br>• **apply in practice base station, network equipment's such as switch, router, access point operating systems**<br>• **analyze and monitor the performance of operating systems for practical problem solution** |
| Teaching Methodology: |
| **Lectures, Discussion, Practical work** |
| Course subjects |
| **Week 1: Operating System Concepts**<br>**Week 2: Memory Management Systems**<br>**Week 3: Device Management**<br>**Week 4: File Management**<br>**Week 5: System managent**<br>**Week 6: Operating Systems in Practice**<br>**Week 7: Windows operating system**<br>**Week 8: UNIX, Linux, Android and IOS**<br>**Week 9: Network organization**<br>**Week 10: Network management**<br>**Week 11: Network Exchange Operating systems**<br>**Week 12: Switch operating systems**<br>**Week 13: Router and access point operating systems**<br>**Week 14: End user devices operating systems**<br>**Week 15: End user devices management** |
| Literature |
| **1. A. McHoes, I. Flynn (2018): Understanding Operating Systems, 8th Edition, Publishing House "Cengage", USA.**<br>**2. Silberschatz, P. Galvin, G. Gagne (2018): Operating System Concepts, 10th Edition, Publishing House Wiley, USA**<br>**3. K. Dooley, I. Brown (2009): Cisco IOS Cookbook, Publishing House O'Reilly, USA** |

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| Course syllabus: ICT Project Management |
|---|
| Course status**: Elective**<br>**5 ECTS** |
| Course description |
| **This course will introduce and enable students to apply project management rules to IT. In addition, this course enables students to successfully apply and apply IT project management concepts.**<br>**In this course, students will learn the fundamentals of financial management, cost accounting and budgeting. There by they are able to calculate competitive prices for products and services budget the projects and manage the finances of an enterprise.** |
| Expected learning outcomes: |
| **Upon successful completion of this module, student will be able to:**<br>• **Understand and explain project management processes;**<br>• **Have deep understanding of the Scrum project management method. Correctly use project management terminology.**<br>• **Choose appropriate project management methods depending on the project;**<br>• **Plan project activities regarding time and budget;**<br>• **Apply the SCRUM methodology in practice and use Planio.io tool;**<br>• **Use MS Project package for classical project management processes;**<br>• **Smoothly and suggestively express project and its idea;**<br>• **Prepare project documentation;**<br>• **Work in a team, assume responsibility for the quality of assigned task;**<br>• **Manage project team, responsibly assess the team leader, the members;** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in-group of 3-4 students (independent work), individual homework. 30 hours of lectures, 30 lab exercises, approximately 90 hours of freelance work including homework** |
| Course subjects |
| **Week 1: Introduction to project management**<br>**Week 2: Project integration and scope management**<br>**Week 3: Project time management**<br>**Week 4: Project cost management**<br>**Week 5: Phase 1 of project presentation**<br>**Week 6: Project quality management**<br>**Week 7: Project human resources and communication management**<br>**Week 8: Project risk management**<br>**Week 9: Agile project management**<br>**Week 10: Phase 2 of project presentation**<br>**Week 11: Different project management methodologies**<br>**Week 12: Scrum Components**<br>**Week 13: Process and Reporting**<br>**Week 14: Comparison of different agile methodologies**<br>**Week 15: Phase 3 of project presentation** |
| Literature |
| **1. Schwalbe, K. (2015). Information Technology Project Management. 8th edition. Cengage Learning**<br>**2. Robert, K. Wysocki (2013). Effective Project Management: Traditional, Agile, Extreme. 7th Edition. Wiley.** |

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diMTV

| Course syllabus: Economics for engineering |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **During this course the students will acquire knowledge about fundamentals of economics and legal and engineering environment of a project. The main topics of this course are: engineering profession, engineering ethics, intellectual property, problem solving engineering approach, teamwork, organization and leadership.**<br>**The main goal of this course is to teach the students the main concepts in economics and provide them with knowledge for understanding the tools that economists use for addressing different economics issues and using these tools for solving engineering problems.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Identify the complex environment of engineering;**<br>• **Explain ethical issues of engineering;**<br>• **Understand the basis of intelectual property;**<br>• **Apply basic principles in teamwork;**<br>• **Explain the importance of leadership;** |
| Teaching Methodology: |
| **Lecturs, seminars, discussions.** |
| Course subjects |
| **Week 1: Introduction to economics**<br>**Week 2: Organizing and human element**<br>**Week 3: Tools for making effective engineering and technology management**<br>**Week 4: Project Selection and Management**<br>**Week 5: Management of Engineering Design and Product Costing**<br>**Week 6: Student's project work. Team work.**<br>**Week 7: Management of Proposals and Contract**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: Creativity and Innovation**<br>**Week 10: Concurrent Engineering**<br>**Week 11: Value Engineering**<br>**Week 12: Student's project work.**<br>**Week 13: Reverse Engineering**<br>**Week 14: Project Presentation**<br>**Week 15: Summary** |
| Literature |
| **1. B.S. Dhillon, Engineering and Technology Management Tools and Applications, Artech House, 2002.**<br>**2. S.P. Robbins, M. Coulter, Management – ninth edition, Prentice Hall, 2007** |

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| Course syllabus: Computer and Mobile Equipments Architecture |
|---|
| Course status**: Elective**<br>**5 ECTS** |
| Course description |
| **This course describes the basics of computers, processor and memory architecture, input/output systems. The second part of the course is focused on architecture of smartphones, base station, communication systems and network equipment's (switch, router, access point), including hardware, communication, processor and memory parts.**<br>**The purpose of this course is that the student during lectures and laboratory exercises expand and deepen their knowledge for computer architecture. Moreover, the student become familiar with mobile and networks equipment architecture.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **understand data representation in computer systems**<br>• **describe architecture of a simple computer system and mobile equipments**<br>• **quantify processors, memories and their functionality**<br>• **classify input/output units in computer system**<br>• **interpret communication parts of mobile equipment** |
| Teaching Methodology: |
| **Lectures, Discussion, Practical work** |
| Course subjects |
| **Week 1: Computer systems**<br>**Week 2: Data representation in computer systems**<br>**Week 3: An Introduction to simple computer architecture**<br>**Week 4: Mobile equipment simple architecture**<br>**Week 5: Memory for computer systems**<br>**Week 6: Memory for mobile equipment**<br>**Week 7: Processor for computer architecture**<br>**Week 8: Processor for mobile equipment architeture**<br>**Week 9: Input/output systems in a computer architecture**<br>**Week 10: input/output for mobile equipment architecture**<br>**Week 11: Network equipment architecture**<br>**Week 12: Recent mobile architectures**<br>**Week 13: Power optimization of mobile architectures**<br>**Week 14: CPU performance optimization**<br>**Week 15: GPU performance optimization** |
| Literature |
| **1. L. Nul, J. Lobur (2019): The Essentials of Computer Organization Architecture, 5th Edition, Publishing House "Jones & Barlet Learning", USA.**<br>**2. D. Patterson, J. Hennessy (2017): Computer Organization and Design, The Hardware/software Interface ARM Edition, Publishing House Elsevier, USA**<br>**3. J. Aweya (2018): Switch/Router Architectures: Shared-Bus and Shared-Memory Based Systems, Publishing House IEEE Wiley, USA** |

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| Course syllabus: **Application development with C++** |
|---|
| Course status: **Elective**<br>**5 ECTS** |
| Course description |
| **During this course the students will acquire knowledge for developing applications in C++ language. Some of the topics that will be covered in this course are: The basics of C++ as a procedural language. Integer and floating-point data types; identifiers; logical operators, object-oriented features, Polymorphism.**<br>**The main goal of this course is to teach the students the main features of C++ language and make them capable of application development with C++** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Write scripts in C++;**<br>• **Use different functions;**<br>• **Debug the applications;** |
| Teaching Methodology: |
| **Lecturs, seminars, discussions.** |
| Course subjects |
| **Week 1: Introduction to computer systems and program development**<br>**Week 2: The basics of C++ as a procedural language. Integer and floating-point data types; identifiers.**<br>**Week 3: Logical operators.**<br>**Week 4: if-else statement; while, do while, and for loops; files; the assignment, increment, and decrement operators; the break, continue, and switch statements; promotions and casts; and basic formatting**<br>**Week 5: Students' first application to develop**<br>**Week 6: Student's project work. Team work.**<br>**Week 7: object-oriented features: classes, inheritance, and polymorphism.**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: classes and objects, data members and methods, constructors and the destructor, defining classes and using them in programs, and using existing class libraries.**<br>**Week 10: inheritance, including protected members, and constructors and the destructor under inheritance**<br>**Week 11: Polymorphism, difference between run-time binding and features that resemble it**<br>**Week 12: operator overloading for classes, including overloading operators as either methods or top-level functions**<br>**Week 13: Compile-time and run-time storage**<br>**Week 14: generic functions through templates, STL (Standard Template Library)**<br>**Week 15: Project Presentation** |
| Literature |
| **1. Richard Johnsonbaugh, Martin Kalin, Applications Programming in C++, 1 st Edition.**<br>**2. H.M. Deitel, P. J. Deitel, How to Program C++, Prentice Hall, Upper Saddle River, New Jersey, ISBN 0-13-111881-1**<br>**3. Robert Lafore, Object-Oriented Programming in C++, Sams, Indianopolis, Indiana, ISBN-10:0-672-32308-7** |

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| Course syllabus: Web Application Development |
|---|
| Course status**: Elective**<br>**5 ECTS** |
| Course description |
| **The course provides the knowledge and skills necessary to create dynamic web applications, and prepares students for relevant advanced courses in computer technologies.**<br>**Some of the topics that will be included in this course are:**<br>**Internet and Web Protocols, Client-Server Architecture, Web Software, Development Technologies, HTML, Active Server Pages, VBscript, Databases, Interfacing with Databases, Web Application Components, Authentication, User Registration, uploading content, Emailing, Design Principles, Web Application Design, Performance and Reliability, Purpose of Web Application Infrastructure. Server-side technologies of Active Server Pages (ASP) and ASP.NET. Application of connectivity issues with databases. Web server management. Hypertext Preprocessor (PHP) essentials.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Comprehend and propose Web Application infrastructure.**<br>• **Apply client/server communication techniques such as server, application, session variables, cookies and server behaviors.**<br>• **Determine the needs for web database and connectivity.**<br>• **Apply code reuse with templates, libraries, and snippets.**<br>• **Evaluate several alternatives in the design of a web application.**<br>• **Develop a functional web application.** |
| Teaching Methodology: |
| **Lectures, class discussions, and review of real-world cases based on specific theoretical concepts.**<br>**Laboratory sessions, involving training and practice in developing web applications.** |
| Course subjects |
| **Week 1: Introduction to web development**<br>**Week 2: Internet and Web Protocols**<br>**Week 3: Client-Server Architecture**<br>**Week 4: Web Software**<br>**Week 5: HTML**<br>**Week 6: Java Servlets and JavaScript and AJAX**<br>**Week 7: Web Application Design**<br>**Week 8: Security and Encryption**<br>**Week 9: Midterm evaluation, 15 %**<br>**Week 10: Performance and Reliability**<br>**Week 11: Web Application Infrastructure**<br>**Week 12: Web Demo 20%**<br>**Week 13: Advanced Architectural Styles**<br>**Week 14: Final evaluation 15 % & Homework**<br>**Week 15: Web Application Demonstration 40%** |
| Literature |
| **1. Ralph F. Grove PhD, Web Based Application Development, ISBN-13: 9780763759407, 2010**<br>**2. Joseph W. Lowery, Adobe Dreamweaver CS5 Bible, ISBN: 978-0-470-58586-3, May 2010**<br>**3. Learning PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites (Animal Guide) by Robin Nixon and Nixon Robin (Paperback - Jul 22, 2009)** |

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diMTV


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| Course syllabus: Communication Networks I |
|---|
| Course status**: Mandatory**<br>**5 ECTS** |
| Course description |
| **The main goal of this course is to understand the principles and concepts on computer networks and gain familiarity with communication protocols, description and operation of services at the application, transport, network, and physical layers** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Demonstrate concept of packet-switching, and identify and analyze the different types of packet delay in packet-switched networks**<br>• **Use IP addressing and apply routing algorithms to find shortest paths for network-layer packet delivery**<br>• **Describe and compare data link layer services and multiple access techniques**<br>• **Use networking tools to observe and analyze behaviors of networking protocols** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises and teamwork for real-case scenarios.**<br>**Software packages for lab: Packet tracer and GNS 3.** |
| Course subjects |
| **Week 1: Computer networks fundamentals: Services, protocols, delays, loss, packet switching, circuit switching, services and reference models.**<br>**Week 2: Application layer: Principles of network applications, network application architectures. Web and HTTP, cookies, web cashing, File transfer applications. DNS and electronic mail. Peer to peer applications and socket programing.**<br>**Week 3: Transport layer services. Multiplexing and demultiplexing. Principles of reliable data transfer (ARQ).**<br>**Week 4: Connection oriented transport (TCP). Connectionless transport (UDP).**<br>**Week 5: Principles of congestion control.**<br>**Week 6: Presentation of student's homework. Case studies Application and Transport layer.**<br>**Week 7: Midterm evaluation, 30 %**<br>**Week 8: Forwarding and routing. Virtual circuits and datagram networks. Network Layer.**<br>**Week 9: Router and routing. The IP (Internet protocol). IPv4 and IPv6.**<br>**Week 10: Routing algorithms (Link state and Distance vector).**<br>**Week 11: Inter and intra autonomous system routing. Broadcast and multicast routing.**<br>**Week 12: The link layer: links, access networks and LANs.**<br>**Week 13: Presentation of student's homework. Case studies Network and Data link layer.**<br>**Week 14: The services provided by link layer. Error detection and correction techniques. Multiple access links and protocols. Ethernet, Token Ring, FDDI, WLAN.**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. Kurose, J. F., & Ross, K. W. (7th Edition) (2016). Computer networking: a top-down approach.**<br>**2. Tanenbaum, A.S., Wetherall, D.J. (2011). Computer Networks, 5th, 2011. Pearson Education, Inc.** |

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diMTV

| Course syllabus: **Data Transmission** |
|---|
| Course status: **Mandatory**<br>**6 ECTS** |
| Course description |
| **This course describes the basics of data transmission, beginning with analog and digital communication, continuing with efficiency of transmission media as result of multiplexing and switching. In the second part the students learn the communication network with wirer (optical and hybrid optical) and without wires (2G, 3G, 4G and 5G), as well as multiple access techniques that are used for data transmission. At the end of the course the multimedia services and their quality for data transmission is covered.**<br>**The purpose of this course is that the student during lectures and laboratory exercises expand and deepen their knowledge for data transmission, networks used for data transmission and needed quality of service for data transmission.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **understand analog and digital data transmission**<br>• **demonstrate necessary knowledge for wired networks (optical and hybrid optical) and wireless**<br>• **networks (2G, 3G, 4G and 5G) for data transmission**<br>• **interpret quality of service parameters for multimedia services transmission** |
| Teaching Methodology: |
| **Lectures, Discussion, Practical work** |
| Course subjects |
| **Week 1: Introduction to physical layer**<br>**Week 2: Digital transmission**<br>**Week 3: Analog transmission**<br>**Week 4: Transmission media**<br>**Week 5: Multiplexing and spread spectrum**<br>**Week 6: Switching**<br>**Week 7: Data link control**<br>**Week 8: Medium access control**<br>**Week 9: Wired networks (optical and hybrid optical)**<br>**Week 10: wireless networks (2G, 3G, 4G and 5G)**<br>**Week 11: wireless LANs**<br>**Week 12: WLAN coverage planning**<br>**Week 13: Low power wide area networks**<br>**Week 14: Quality of Service**<br>**Week 15: Multimedia services transmission** |
| Literature |
| **1. B. Forouzan (2013): Data Communication and Networking, 5th Edition, Publishing House"Mc Graw Hill", USA.**<br>**2. O. Ibe (2018): Fundamentals of Data Communication Networks, Publishing House Wiley, USA**<br>**3. M. Sauter (2017): From GSM to LTE-Advanced and 5G, An introduction to mobile networking and mobile broadband, 3rd Edition, Publishing House Wiley, USA** |

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diMTV

| Course syllabus: Object Oriented Programming |
|---|
| Course status**: Mandatory**<br>**6 ECTS** |
| Course description |
| **This course will introduce and enable students to apply object-oriented programming techniques to software projects. This course also enables students to successfully learn and apply object programming concepts and techniques.**<br>**This course enables students to prepared and successfully apply the concepts and techniques of programming with objects, enabling students to apply object-oriented techniques in software projects. The purpose of the course is to prepare students with modern knowledge in "thinking in object programming".** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Understand main concepts of object oriented programming;**<br>• **Write code with classes and use objects;**<br>• **Use inheritance and polymorphism;**<br>• **Predict exceptions and error handling;**<br>• **Create abstract classes and interfaces;**<br>• **Realize e project relating a particular issue using object-oriented programming.** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in-group of 3-4 students (independent work), individual homework. 30 hours of lectures, 30 lab exercises, approximately 90 hours of freelance work including homework** |
| Course subjects |
| **Week 1: Introduction to Object Oriented Programming and Java**<br>**Week 2: Classes and Objects**<br>**Week 3: Packages in Java**<br>**Week 4: Constructors and destructors**<br>**Week 5: Reference types, value types and models**<br>**Week 6: Data access, attributes, methods, and operations**<br>**Week 7: Data encapsulation**<br>**Week 8: Inheritance and polymorphism of classes**<br>**Week 9: Abstract classes, interfaces and paternity**<br>**Week 10: Error handling and exceptions**<br>**Week 11: Incoming and outgoing classes**<br>**Week 12: Generic types and methods**<br>**Week 13: Collection of classes**<br>**Week 14: Object Oriented Software Testing**<br>**Week 15: Documenting Object Oriented ProgramsWeek 1: Introduction to Object Oriented Programming and Java** |
| Literature |
| **1. C. Thomas Wu , "An Introduction to Object-Oriented Programming with Java", 2009, Publisher: McGraw-Hill Education; 5th edition**<br>**2. Daniel Liang, "Introduction to Java Programming", 2014, 10th Edition, Armstrong Atlantic State University**<br>**3. Danny Poo, "Object-Oriented Programming and Java", 2007, Second Edition 2nd Edition**<br>**4. Richard Naoufal, "Java: Object-Oriented Programming Concepts", 2018.** |

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diMTV

| Course syllabus: Multimedia technologies and systems |
|---|
| Course status**: Mandatory**<br>**5 ECTS** |
| Course description |
| **The main goals of this course are:**<br>**1. To provide basic knowledge for the development and use of multimedia - combining text, graphics, sound, animation, video images,**<br>**2. To enhance the knowledge of students about the nature of various media, capture and creation, digitization and modification of any type of media, architecture and technology of multimedia systems, the principles behind effective multimedia presentations,**<br>**3. To enable students to analyze, design and develop multimedia presentations through software packages; treat the fundamental concepts of contemporary technologies and develop new technologies** |
| Expected learning outcomes: |
| **After completing this course, the student will be able to:**<br>• **Essentially know the nature of the text, image, sound, video and animation;**<br>• **Create, edit and storage the various media;**<br>• **Implement digitization and compression in multimedia;**<br>• **Use the tools for creating multimedia products, have knowledge of web-based multimedia systems;**<br>• **Use and develop various software packages for the design of multimedia presentations that complement and expand those requirements.** |
| Teaching Methodology: |
| **Problem-based learning and Project-oriented approach.** |
| Course subjects |
| **Week 1: Introduction to basis of multimedia**<br>**Week 2: Multimedia systems. History of multimedia systems**<br>**Week 3: Software tools in multimedia**<br>**Week 4: Presentation 1**<br>**Week 5: Video editing**<br>**Week 6: Technical design. Data display in multimedia.**<br>**Week 7: Voice digitalization**<br>**Week 8: Presentation 2**<br>**Week 9: MIDI. Fundamentals of digital video.**<br>**Week 10: Information theory elements**<br>**Week 11: Computer networks.**<br>**Week 12: Presentation 2**<br>**Week 13: Independent lab work.**<br>**Week 14: Final exam**<br>**Week 15: Evaluation** |
| Literature |
| **1. Myzafere Limani: Kompjuterika Multimediale – Prishtinë, 2006.**<br>**2. Ze-Nian Li, Mark S. Drew, Fundamentals of Multimedia, Pearson Prentice Hall, 2004.**<br>**3. International journal and conference papers** |

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| Course syllabus: Python |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **Python is a general-purpose interpreted programming language in many fields, including web programming, writing, scientific processing, artificial intelligence, machine learning, and complex data analysis. It is a language with simple syntax and powerful libraries.**<br>**The purpose of this course is for students to expand their knowledge of Python programming language during lectures and laboratory exercises. This course will describe the principles of programming in Python - including data types, data structure, application development, algorithm development, program design, and functions. The course also includes object-oriented programming as well as data processing and information processing techniques.**<br>**This course will be of great interest to all students who would understanding of the basic components of computer programming using the Python language, as well as a very good start to applying this knowledge in other fields.** |
| Expected learning outcomes: |
| **After completing this course, the student will be able to:**<br>• **Understand the basic concepts of working with Python and the support system for this language**<br>• **Understand data types, processing and working with them**<br>• **Develop functions and call them**<br>• **Know and use the programing language libraries**<br>• **Develop object-oriented programming**<br>• **Understand the programming elements with Python**<br>• **Develop applications for data analysis and data processing in various fields** |
| Teaching Methodology: |
| **Lectures, exercises during class using laptops and supported applications, individual and group homework.** |
| Course subjects |
| **Week 1: The Context of Software Development**<br>**Week 2: Values, Variables, expressions, and statements**<br>**Week 3: Conditional Execution**<br>**Week 4: Functions**<br>**Week 5: Iteration**<br>**Week 6: Strings**<br>**Week 7: Files**<br>**Week 8: Midterm exam**<br>**Week 9: Lists**<br>**Week 10: Dictionaries**<br>**Week 11: Tuples**<br>**Week 12: Regular expressions**<br>**Week 13: Object Oriented Programing**<br>**Week 14: Visualizing data**<br>**Week 15: Final exam** |
| Literature |
| **1. Kenneth A. Lambert, Fundamentals of Python: First Programs 1st Edition, Publisher: Course Technology, Cengage Learning, ISBN-13: 978-1-111-82270-5**<br>**2. Charles Severance, Python for Everybody: Exploring Data Using Python 3, 2016**<br>**3. Allen Downey, Think Python, O'Reilly, 2015** |

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| Course syllabus: Application Development for Android and IOS |
|---|
| Course status**: Mandatory**<br>**4 ECTS** |
| Course description |
| **This course focuses on the creation of mobile applications for various modern platforms, including major mobile operating systems. The main goal of this course is to understand the mobile device architecture, different programming languages used for application development, user interface design, and application distribution.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Demonstrate knowledge of the technology and business trends impacting mobile applications**<br>• **Demonstrate programming skills with Java & Swift**<br>• **Be competent with the characterization and architecture of mobile applications.**<br>• **Be competent with designing and developing mobile applications using one application development framework.** |
| Teaching Methodology: |
| **Classroom lectures, Laboratory exercises where the students will be involved actively and team-based projects.** |
| Course subjects |
| **Week 1: Understanding the Android Application Architecture**<br>**Week 2: Designing a Successful Application**<br>**Week 3: Application Testing.**<br>**Week 4: Inter-/Intra-Process Communication.**<br>**Week 5: Graphical User Interface.**<br>**Week 6: Android Mini App 11%**<br>**Week 7: Midterm 20%, Project Proposal 3%**<br>**Week 8: Sift with playgrounds**<br>**Week 9: Introduction to Auto Layout**<br>**Week 10: Designing UI Using Stack Views**<br>**Week 11: Creating a Simple Table-based App**<br>**Week 12: IOS mini App 11%**<br>**Week 13: Exploring CloudKit**<br>**Week 14: Final Evaluation 20%**<br>**Week 15: Final Project Evaluation 25%** |
| Literature |
| **1. Simon Ng, Beginning iOS 10 Programming with Swift. AppCoda**<br>**2. Android Cookbook Problems and Solutions for Android Developers 2nd Edition** |

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| Course syllabus: Computer Games Development |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **This course aims to introduce the fundamentals of programming 3D games in existing game engines. The main goal of this course is to gain familiarity with the API library of a chosen game, and appreciation of the technology and the algorithms that form these games.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Illustrate an understanding of the concepts behind game programming techniques.**<br>• **Implement game programming techniques to solve game development tasks.**<br>• **Build familiarity and appreciation of the programmatic components of an industry standard game development engine.**<br>• **Understand mathematical analysis, physical analysis, graphics, multimedia and how they incorporate in game development.** |
| Teaching Methodology: |
| **Lectures for theoretical aspects as well as practical coding examples, In the labs, review learning from the previous weeks by discussing solutions and reasoning with classmates.** |
| Course subjects |
| **Week 1: Introduction to Game Development**<br>**Week 2: Overview and Design of Video Games**<br>**Week 3: Game Production and Teams**<br>**Week 4: Language and Architecture**<br>**Week 5: Mathematics, Collision Detection and Physics used in Video Games**<br>**Week 6: Midterm 15%**<br>**Week 7: Graphics, 3D Models, Textures**<br>**Week 8: Animation Programming and Creation**<br>**Week 9: Game Demo 20%**<br>**Week 10: Artificial Intelligence**<br>**Week 11: Audio and Networking**<br>**Week 12: Create a 2D game with a game engine**<br>**Week 13: Final exam 15%**<br>**Week 14: Business and Legal Issues in the game industry**<br>**Week 15: Game final demonstration 40%,** |
| Literature |
| **1. Rabin, S. (2010). Introduction to Game Development, 2nd ed. Boston, MA: Charles River Media.**<br>**2. Unity in Action, Second Edition :Multiplatform game development in C#**<br>**3. C# Cookbook, 2nd Edition (O'Reilly)** |

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| Course syllabus: Microwave and RF Engineering |
|---|
| Course status**: Mandatory**<br>**5 ECTS** |
| Course description |
| **The course deals with the basic concepts of Microwave and RF Engineering, which are the foundation of the design and implementation of wireless communications systems.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to:**<br>• **Be familiar with the basic topics in high frequency, microwave engineering and antennas**<br>• **Use HF analysis and design tools for matching purposes, such as Smith chart**<br>• **Understand the operation of microwave circuits using S-parameters**<br>• **Understand the general parameters and operation of antennas**<br>• **Draft a paper on a particular issue or issues in the field of microwave and antennas.** |
| Teaching Methodology: |
| **30 hours of lectures + 30 hours of auditorial exercises. Approximately 80 hours of personal study and exercise, including seminars** |
| Course subjects |
| **Week 1: Basic features of radio communication systems.**<br>**Week 2: Transmission lines.**<br>**Week 3: Smith charts**<br>**Week 4: Scattering parameters.**<br>**Week 5: CAD tools - Microwave Office**<br>**Week 6: Ansoft design**<br>**Week 7: Programing with Python-1**<br>**Week 8: Programing with Python-2**<br>**Week 9: Microwave elements and circuits using microstrip lines-1**<br>**Week 10: Microwave elements and circuits using microstrip lines-2**<br>**Week 11: Waveguides**<br>**Week 12: Microwave circuits using waveguides**<br>**Week 13: Basic characteristics and parameters of antennas: far- field, radiation intensity, radiation patterns, directivity, gain, polarization, etc.**<br>**Week 14: Microwave antennas.**<br>**Week 15: Antenna array.** |
| Literature |
| **1. David M. Pozar "Microwave Engineering ", Copyright, 2012, John Wiley & Sons Inc.**<br>**2. D. M. Pozar, Microwave and RF Design of Wireless Systems, John Wiley & Sons, 2001**<br>**3. Kai Chang, Radio Frequency Circuit Design, John Wiley & Sons, 2001**<br>**4. E. Hamiti, Qarqet komunikuese analoge, ligjërata të autorizuara, Prishtinë 2009** |

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| Course syllabus: Mobile Communication |
|---|
| Course status**: Mandatory**<br>**4 ECTS** |
| Course description |
| **The purpose of the course is to introduce students to basic concepts, principles and systems of mobile communications.**<br>**Some of the topics that will be included in this course are:**<br>**Introduction to mobile communications. Wireless communication system components. Wireless transmission: wireless issues, mobility issues, frequency issues, signal propagation, modulation and antennas. Basic concepts of mobile cellular communications. Modulation techniques. Multiple access techniques. Wireless Communication Systems and satellite communication networks.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will:**<br>• **have a good knowledge of basic principles of mobile communications and of a wide range of mobile communication technologies.**<br>• **have a good understanding of wireless transmission.**<br>• **have a good understanding of multiplexing and of multiple access techniques used in mobile communication systems.**<br>• **have a good understanding of architecture of mobile communication systems: GSM, GPRS, UMTS, LTE, WiMAX, WLAN and satellite systems.**<br>• **have a good understanding of mobility management in mobile communication networks.** |
| Teaching Methodology: |
| **Lecturer, research-based learning and presentations** |
| Course subjects |
| **Week 1: Introduction to mobile communications**<br>**Week 2: Wireless communication system components**<br>**Week 3: Wireless transmission: wireless issues, mobility issues, frequency issues, signal propagation, modulation and antennas**<br>**Week 4: Basic concepts of mobile cellular communications: cells, base stations, frequency reuse, mobility management**<br>**Week 5: Modulation techniques: PSK, QPSK, QAM, DSSS, OFDM**<br>**Week 6: Student's project work. Team work.**<br>**Week 7: Multiple access techniques: Slotted Aloha, CSMA/CA, FDMA, TDMA, CDMA, OFDMA**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: Wireless Communication Systems: terrestrial mobile cellular communication networks (GSM, GPRS, UMTS, LTE)**<br>**Week 10: WiMAX technology**<br>**Week 11: Wireless LANs and satellite communication networks.**<br>**Week 12: Student's project work.**<br>**Week 13: 5G Networks**<br>**Week 14: Summary**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. A. F. Molisch, "Wireless Communications", Second Edition, John Wiley & Sons Ltd., 2011.**<br>**2. J. Schiller, Mobile Communications, Addison-Wesley, 2000.** |

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| Course syllabus: Distributed Programming |
|---|
| Course status**: Mandatory**<br>**5 ECTS** |
| Course description |
| **This course will introduce and enable students to apply distributed systems to client machines, servers and networks. This course also enables students to successfully train and apply the concepts of distributed systems.**<br>**The aim of this the course is to enable and prepared students to understand and apply distributed system techniques.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will be able to**<br>• **To understand main concepts and system model of distributed systems;**<br>• **To compare distributed system;**<br>• **To creates distributed systems;**<br>• **Manage distributed objects;**<br>• **To realize e project relating a particular issue with distributed systems.** |
| Teaching Methodology: |
| **Lectures, exercises during class using different materials, one project work in-group of 3-4 students (independent work), individual homework. 30 hours of lectures, 30 lab exercises, approximately 90 hours of freelance work including homework** |
| Course subjects |
| **Week 1: Characteristics of distributed systems**<br>**Week 2: Distributed systems models**<br>**Week 3: Intercrosses communication**<br>**Week 4: Indirect Communication**<br>**Week 5: Distributed operating systems**<br>**Week 6: Distributed components and objects**<br>**Week 7: Web Services**<br>**Week 8: Peer-to-peer systems**<br>**Week 9: Distributed File Systems**<br>**Week 10: Names Services**<br>**Week 11: Time and global state**<br>**Week 12: Transactions and concurrent control**<br>**Week 13: Distributed transactions**<br>**Week 14: Distributed replication**<br>**Week 15: Web-based distributed systems** |
| Literature |
| **1. George Coulouris, Jean Dollimore, Tim Kindberg, Peter Baer Galvin dhe Greg Gagne, "Distributed Systems – Concepts and Design", 5th Edition, 2012.**<br>**2. Andrew S. Tanenbaum, "Distributed Systems – Concepts and Paradigms", 2rd Edition, 2007.**<br>**3. Manish Varshnev and Shanoo Agarwal, "Concepts of distributed system", 2016** |

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| Course syllabus: Communication Networks II |
|---|
| Course status**: Mandatory**<br>**3 ECTS** |
| Course description |
| **The main goal of this course is to provide knowledge for computer networking issues through hands-on experiments and simulations with network equipment and services. The course starts with lectures/labs at the physical layer and continues up the protocol stack to the application layer.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Demonstrate concept of packet-switching, and identify and analyze the different types of packet delay in packet-switched networks**<br>• **Use IP addressing and apply routing algorithms to find shortest paths for network-layer packet delivery**<br>• **Describe and compare data link layer services and multiple access techniques**<br>• **Use networking tools to observe and analyze behaviors of networking protocols** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises through hands-on experiments and simulations with network equipment and services. This is lab oriented hands-on course.** |
| Course subjects |
| **Week 1: Networking Types, Routing and Switching, Comparative analysis OSI and TCP/IP protocols**<br>**Week 2: Ethernet Technologies and Cabling, MAC layers of Ethernet and 802.11 wireless networks, Management of Ethernet LANs, WLAN networks, Address Resolution Protocol (ARP)**<br>**Week 3: Virtual LANs, Collision Domains, Broadcast networks, Trunk Ports, Encapsulation dot1Q, Link-Layer Addressing,**<br>**Week 4: The Internet Protocol, IP Addressing and Subnets, Private and Public IP addresses,**<br>**Week 5: Subneting Variable Length Subnet Masks (VLSM), Static, Default and Dynamic Routing**<br>**Week 6: Forwarding and Addressing in the Internet,**<br>**Week 7: Midterm evaluation, 20 %**<br>**Week 8: Intra-Domain Routing, Distance Vector and Link State, Open Shortest Path Protocol (OSPF) and Routing Information Protocol (RIP), Routing Table algorithms,**<br>**Week 9: Multi-Area OSPF, RIPv2, Inter-Domain Routing,**<br>**Week 10: Autonomous Systems, Hierarchical routing architecture used in the internet,**<br>**Week 11: Border Gateway Protocol (BGP), Label Distribution Protocol (LDP),.**<br>**Week 12: Virtual Private Network (VPN)**<br>**Week 13: Multi-Protocol Label Switching (MPLS)**<br>**Week 14: Network and link virtualization**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. Computer Networking: A Top-Down Approach by James Kurose and Keith Ross**<br>**2. CCNA Routing and Switching.**<br>**3. Lab manual.**<br>**4. Computer networks tutorials and case-studies** |

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| Course syllabus: Final project (Internship + presentation), |
|---|
| Course status**: Mandatory**<br>**10 ECTS** |
| Course description |
| **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. The final project 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.**<br>**The students gain professional experience, depending on the field of study, in one of the local companies, also 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.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **Be qualified for professional work, in the relevant field of study, and to be more prepared for the labor market.**<br>• **Gain confidence in gained knowledge**<br>• **Have the ability to further studies of mandatory or additional literature**<br>• **Consult with mentor with questions well prepared and structured;**<br>• **Present their work in written form, with a standard language and guidelines for this type of work, with a volume of at least 30 sheets of A4 format**<br>• **Present the work in time of ten minutes with presentation prepared in PowerPoint** |
| Teaching Methodology: |
| **120 working hours in the company, 150 hours for preparation of the final project and 30 working hours for preparation of the final presentation.** |
| Literature |
| **It is depended from the final project, will be provided from the mentor.Education, Inc.** |

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| Course syllabus: Optical Communications |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **This course describes the basics of optical spectrum and light characteristics as electromagnetic wave. The focus of the course is in the optical communication network for different configurations, for local optical networks and wide networks. Also, in this course student practice optical measurements for definition of wavelength and losses in optical fibers (multi-mode, single-mode, polarization and chromatic dispersion).**<br>**The course is designed to offer basic knowledge for optical network and its components. The purpose of this course is that the student during lectures and laboratory exercises expand and deepen their knowledge for optical signal transmission over optical fibers. Moreover, student distinguish sources of light, receivers and other basic elements for an optical communication link.** |
| Expected learning outcomes: |
| **Upon completion of this course the student will be able to:**<br>• **understand basic principles of optical communication systems as transmission characteristics, modulation, multiplexing and switching**<br>• **sketch optical communication links for diverse capacities as GPON, EPON, HFC and FTTH**<br>• **organize measurement campaigns in existing optical networks and identify faults in the network**<br>• **demonstrate necessary knowledge for optical communication systems as a precondition for being incorporated in optical network industry** |
| Teaching Methodology: |
| **Lectures, Discussion, Practical work** |
| Course subjects |
| **Week 1: Introduction to optical communication**<br>**Week 2: Transmission characteristics of optical communication**<br>**Week 3: Optical fibers and cables**<br>**Week 4: Optical fiber connectors**<br>**Week 5: Optical sources 1: the laser**<br>**Week 6: Optical sources 1: the led diode**<br>**Week 7: Modulation in optical communication**<br>**Week 8: Multiplexing in optical communication**<br>**Week 9: Switching**<br>**Week 10: Optical communcation links (GPON, EPON, HFC and FTTH)**<br>**Week 11: Optical detectors**<br>**Week 12: Optical communication network equipments**<br>**Week 13: Optical network planning**<br>**Week 14: Measurements in optical networks**<br>**Week 15: Fault detection and identification in optical link** |
| Literature |
| **1. John M. Senior. (2009): Optical Fiber Communications: Principles and Practice. Third Edition, Publishing House: Prentice Hall, London.**<br>**2. R.Ramaswami, K.Sivarajan, G. Sasaki: (2010) Optical Networks: Apractical Perspective 3rd Edition, Publishing House: Elsevier, USA**<br>**3. Keigo Iizuka. (2002): Elements of Photonics, Publishing House:Wiley, USA** |

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| Course syllabus: Communication Networks II |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **This course aims to provide students with basic information on interaction between electromagnetic fields and humans.**<br>**Some of the topics that will be included in this course are: Basic concepts of electromagnetic fields and waves. Electromagnetic properties of human body. Specific Absorption Rate. Interaction between human and low frequency electromagnetic fields, exposure bio-effects. Interaction between human and high frequency electromagnetic fields, exposure bio-effects. Safety standards and exposure limits.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Explain background, definition and fundamentals of Bioelectromagnetics;**<br>• **Describe mechanisms and parameters that quantify interaction between humans and electromagnetic fields;**<br>• **Compare different human exposure scenarios through case –studies;**<br>• **Assess compliance of human exposure with general safety standards and guidelines;**<br>• **Demonstrate knowledge of measurement of field strength techniques and protocols** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises and project teamwork for case-studies** |
| Course subjects |
| **Week 1: Biolectromagnetics: Definition and fundamentals.**<br>**Week 2: Project work discussions and assignments**<br>**Week 3: Basic concepts of electromagnetic fields and waves: Maxwell's equations, spectrum, wave equation and properties.**<br>**Week 4: Coupling mechanisms between electromagnetic fields and humans.**<br>**Week 5: Electromagnetic properties of human body: permittivity, permeability and conductivity of biological tissues of human body**<br>**Week 6: Specific Absorption Rate: energy transfer from field to human body**<br>**Week 7: Midterm evaluation, 30 %**<br>**Week 8: Interaction between human and low frequency electromagnetic fields, exposure bio-effects.**<br>**Week 9: Interaction between human and high frequency electromagnetic fields, exposure bio-effects.**<br>**Week 10: Fundamentals of Web and Web technologies. Client-server operation. Traditional Internet services and applications.**<br>**Week 11: Safety standards and exposure limits: ICNIRP, IEEE and CELNEC.**<br>**Week 12: Thermal and non-thermal effects. Case studies such as: Power line and public health, Mobile phone and human health etc.**<br>**Week 13: Project work presentations**<br>**Week 14: Project work presentations**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. Furse, C., Christensen, D. A., & Durney, C. H. (2009). Basic introduction to bioelectromagnetics. CRC press.**<br>**2. Habash, R. W. (2001). Electromagnetic fields and radiation: human bioeffects and safety. CRC Press.**<br>**3. Luan Ahma, Mimoza Ibrani "Hyrje në bioelektromagnetikë", dispencë, UP, 2010** |

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| Course syllabus: Communication Protocols |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **The purpose of the course is to introduce the protocol architecture, OSI and TCP/IP models and the most widely used protocols in communication networks.**<br>**Some of the topics that will be included in this course are: Communication networks. The OSI model. TCP/IP model. Software packages etc.** |
| Expected learning outcomes: |
| **On successful completion of the course, students will:**<br>• **Be able to explain the basic principles of the hierarchical layer structure of protocols.**<br>• **Have a good understanding of the theoretical OSI model.**<br>• **Have a good understanding of the TCP/IP protocol stack and for the most widely used protocols of each layer, in particular for the IPv4 and IPv6 protocols.**<br>• **Have a good understanding of the routing protocols.**<br>• **Be able to set up network models for different topologies and configure these networks using Packet Tracer software package.**<br>• **Be able to analyze protocols on real TCP/IP networks using Wireshark protocol analyzer.** |
| Teaching Methodology: |
| **Lecturer, research-based learning and presentations** |
| Course subjects |
| **Week 1: Introduction to communication protocols**<br>**Week 2: Communication networks. Basic concepts and terminology. Components of the communication networks**<br>**Week 3: Types of the communication networks**<br>**Week 4: Protocol architecture. Basic principles of protocol hierarchical structure**<br>**Week 5: The OSI reference model. Seven layers of the OSI model.**<br>**Week 6: Student's project work. Team work.**<br>**Week 7: TCP/IP protocol stacks.**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: Physical layer. Examples of the physical layer protocols: Ethernet and WLAN underlying networks.**<br>**Week 10: Data Link Layer. Example of a Data link layer protocol: HDLC protocol. Network layer. IPv4, IPv6, and Routing protocols.**<br>**Week 11: Network layer. IPv4, IPv6, and Routing protocols.**<br>**Week 12: Student's project work.**<br>**Week 13: Transport Layer. Connection oriented TCP and connectionless UDP protocol**<br>**Week 14: Application Layer. Examples of the application layer protocols: DHCP**<br>**Week 15: Software packages: Packet Tracer and Wireshark.** |
| Literature |
| **1. A. S. Tanenbaum and D. J. Wetheral, "Computer networks", 5th Ed., Pearson., 2011.**<br>**2. J. Kurose and K. Ross, "Computer networking", 5th Ed, Addison –Wesley, 2010.**<br>**3. W. Stalling, "Data and Computerl Communications", 7th Ed., Pearson., 2016.** |

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| Course syllabus: Animation and VR |
|---|
| Course status**: Elective**<br>**4 ECTS** |
| Course description |
| **This course focuses on Maxon's Cinema 4D, an intuitive 3D package that is becoming the standard for 3D Motion Graphics work. The class will include demonstrations on the fundamentals of Cinema 4D Lite and CINEWARE, a powerful bridge between After Effects and C4D. Tutorial topics will include: User Interface, Navigation, Modeling, Materials, Textures, Lighting, Camera Tracking, Rendering and Compositing.**<br>**The aim of the course is to teach students the principles and multidisciplinary features of virtual reality; to teach students technology for interactivity and multimodal perception of users in VR, in particular visual and audio interface and behavior; to teach VR technology for VR large-scale real-time environmental management; to provide students with an introduction to VR system and development tools.** |
| Expected learning outcomes: |
| **After successful completion of the course, students should be able to:**<br>• **Understand the animation process as: User Interface, Navigation, Modeling, Materials, Lighting, Visualization and Composition**<br>• **Understand real time VR technology**<br>• **Manage VR system development tools**<br>• **Create Motion Graphics animations, and illustrative 3D imagery inside of Cinema 4D Lite and After Effects** |
| Teaching Methodology: |
| **Lectures for theoretical aspects, laboratory exercises and team-work for real-case scenarios and problem solving through project work. Study visits and industry invited lecturers.** |
| Course subjects |
| **Week 1: Introduction to animation and virtual reality**<br>**Week 2: 3D animation and element 3D**<br>**Week 3: Introduction to different software for animation**<br>**Week 4: Primitive modeling**<br>**Week 5: Modeling and animation**<br>**Week 6: Student's project work. Team work.**<br>**Week 7: Industry invited lecturers.**<br>**Week 8: Midterm evaluation, 30 %**<br>**Week 9: Modeling of different objects using Blender Software**<br>**Week 10: Painting the object (Texture)**<br>**Week 11: Animating the geometry**<br>**Week 12: Student's project work. Modeling an object**<br>**Week 13: Creating and animating hair and clothing**<br>**Week 14: Final animation**<br>**Week 15: Final evaluation, 30 %** |
| Literature |
| **1. Lightning Fast Animation in Element 3D: Master the intricacies of Element 3D, the fast-rendering Adobe After Effects plugin. Ty Audronis, Packt Publishing, 2014. ISBN: 978-1-78355-938-**<br>**2. Cinema 4D Apprentice: Real-World Skills for the Aspiring Motion Graphics Artist. K. McQuilkin, Routledge 2015, ISBN-10: 9781138018624. ISBN-13: 978-1138018624.**<br>**3. Stop Motion: Craft Skills for Model Animation. S. Shaw, Routledge 2017, ISBN-10: 1138779318. ISBN-13: 978- 1138779310.** |

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