Computer Science Engineer BSc

Calculus I.
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
Sets of numbers (natural, whole, rational and real numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; projections; definition of functions; presentation of functions; polinoms; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonity, limitedness, convergence and divergence); limit value and continuity of functions; types of discontinuity; definition of tangents; differential calculus of functions in one variable, differential quotients, derivative, relation between differentiability and continuity; rules of derivation, derivatives of algebraic functions; integral calculus: definition of the primitive function and indefinite integral, properties of indefinite integrals, basic integrals, integral processes, definition of the Riemann integral, its geometric and physical meaning, integral function, Newton-Leibniz theory.

Calculus II.
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 2.
Prerequisites: Calculus I.
Brief Syllabus
Definition of definite and indefinite integrals, calculus of definite integrals using the Newton-Leibniz theory, application of definite integrals to engineering (architectural) problems, calculation of volume and centres of gravity, analysis of multivariable functions, interpretation and application of partial derivatives, definition, calculus and application of double integrals in authentic practical problems.Students will also learn about transcendental functions: notable limit values and their derivation, application of differential calculus, Rolle's theorem, Lagrange's mean value theorem,rule of L'Hospital, testing functions, differentials of differentiable functions and their application for fault calculation, tangency of curves, osculating circles, curvature of the plane curve at P0, Taylor-polinoms, integration with replacements, partial integration, special integrals, geometric and engineering applications of definite integrals, improprius integrals, numeric integration, examples with common differential functions, definition of differential equations, their classification and solutions, solution of differential equations of the first and second order, definition of multivariable functions, partial derivatives, gradients, extreme values of the multivariable function, definition of the double integral and its calculus in the standard range.

Linear Algebra
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 2.
Prerequisites: Calculus I.
Brief Syllabus
Matrices and vectors. Systems of linear equations. Matrix inversion and determinants. Ranks, range and linear equations. Vector spaces. Linear independence, bases and dimension. Linear transformations and change of basis. Diagonalisation. Inner products and orthogonality. Solution techniques of linear system of equations. Eigenvalues and eigenvectors. Application of linear algebra.

Probability theory and statistics
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.
Prerequisites: Calculus II.
Brief Syllabus

The aim of the course to help students to understand the models of phenomena with randomness, the laws of probability theory and the rules of statistical calculations.Foundatoins, experiments and events, probability, conditional probability. Probabilistic variables and their application. Discrete and continuous distributions. Expectation and standard deviation. Variance and higher moments. Covariance and correlation. Normal, Poisson, gamma, chi-square, Student's t and F distribution. Foundations of mathematical statistics. Population, samples. Hypothesis testing, tests. Correlation and linear regression.

Introduction to number theory
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
This course intended to introduce students to some of the classical and important number theoretic problems and to different areas of number theory. Primes, Divisibility and the Fundamental Theorem of Arithmetic. Greatest Common Divisor (GCD), Euclidean Algorithm. Congruences, Chinese Remainder Theorem, Hensel's Lemma, Primitive Roots. Quadratic Residues and Reciprocity. Arithmetic Functions, Diophantine Equations, Continued Fractions.

Algorithm design
Number of Credits: 3
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
The course provides an introduction to basic algorithms, their design and basic analysis. The course also aims to provide an overview of several different data structures, their advantages and disadvantages, and their uses.Introduction to algorithm design. Algorithm analysis. The Big Oh Notation. Data structures: queues, stacks, lists, binary trees, hash tables, dictionaries, associative tables. Basic algorithms. Sorting and searching. Graphs and graph algorithms.

Foundations of electrical signals of hardware
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
The goal of the course for the IT students to evolve the basic knowledge of electrical engineering and electrical circuit design approach, the basic relationships and methods of calculation awareness. Electrostatics. The electrical field. Circuits Basics. The stationary magnetic field. The time-varying electromagnetic field. Electromagnetic waves. Poynting vector. Sinusoidal alternating quantities. DC and sinusoidal varying voltage networks, and the presentation and application of calculation methods of two-gates.

Modelling of transport processes
Number of Credits: 4
Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 2.
Prerequisites: -
Brief Syllabus
The aim of this basic scientific course to give the subject some expert knowledge of specific subjects and give a general assistance to the technical issues to better understand the approach of the phenomenon from another point of view. During the lecture modern physics chapters will be processed , including the mechanical, optical and thermodynamic phenomena general context, foundations of quantum mechanics, nuclear physics, basic concepts and the dynamics of elementary particles, electrical conductivity of metals, superconductivity, basics of nano-electronics. The topics of the excercises are related to the lectures and the tasks from the topics of

mechanics, thermodynamics, the topic of optical waves. Selected tasks in the topic of modern physics (piezo.electricity, electro-and magneto-striction).

Signals ans systems
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 4.
Prerequisites: Calculus II.
Brief Syllabus
The aim of the course is the analysis of the fundamental properties of continuous- and discrete-time deterministic signals, and examination of linear, time-invariant systems and networks.The concept of system and network. Operations on continuous- and discrete-time signals. The impulse response and its application. State-variables, state-space representation of systems. Determination of the transfer characteristic based on the state-space representation. Fourier-series of periodic signals. Spectral representation of general signals, the Fourier-transform. Band-limited and time-limited signals. Signal representation in the complex frequency domain. The Laplace- and the Z-transform. Transfer function of the system. Network analysis in the complex frequency domain. Interpretation, spectral representation, and Laplace-transform of sampled signals. Discrete-time simulation of continuous-time systems.

Economics
Number of Credits: 3
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
The main aim of this course is to introduce the basic concepts and processes of economics. This knowledge will help the students to understand other topics of economics, and to synthesize the knowledge of economic. The course discusses several concepts of economics, some historically specific aspects and its connection to other scientific disciplines. The course highlights the motivations and decision situations of the micro players of the economy, the households and mainly enterprises. During this process the students will learn the most important concepts (management, poverty, needs, assets, production, consumption, distribution, etc.). The course presents the social position and role, the main types of operational framework, goals of internal and external stakeholders, and the characteristics of the basic operations. During the semester the students learn the types of the most important economic spaces and markets, their processes and connections, the specialities of the market decisions. The course also describes the concept of economic systems, their types, the reasons and areas of the economic role of the state, the possibilities and difficulties of the economic measurement and finally the most important specialities of an economic system (e.g. unemployment, inflation).

Construction management 2.
Number of Credits: 3
Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 5.
Prerequisites: -
Brief Syllabus
The lectures and practicals of this subject introduce students to those aspects of management which can assist in a production and covers the following topics: definition and application of production management; elements of the construction process, their representations and relations; methods of production and construction management, their comparisons and potential applications; essentials of linear and progress chart scheduling, elements and contents of time schedules; methods and conditions for the sequencing of processes, calculating the demand for labour; the influence of money as a resource on construction scheduling; computer aided methods for construction management; types of management methods using flowcharts; essentials of the critical path method (CPM), its principles and preparation process; analysis of flowcharts from logical and chronological points of view.

Construction management 3.
Number of Credits: 5

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: -
Brief Syllabus
This course intends to provide students with the engineering and economic knowledge necessary for responsible participation in a development and investment process and covers the following topics: improvement of networks, essentials and elements of MPM (Metra Potential Method) diagrams; computer aided processes of networks; essentials and application of the continuous production management method and sequence programming; essentials, roles and elements of spatial organization; systems, types and content of organization plans; controlling the construction site, rights and duties of the site manager; technical administration on the construction site; technical supervision and the role of the design foreman in construction.

Enterprise management
Number of Credits: 2
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 7.
Prerequisites: -
Brief Syllabus
The objective of this course is to introduce the general aspects of enterprise management including legal, economic and administrative aspects. In particular the following topics are covered: theoretical concepts related to enterprise, reproduction and enterprise; definition of enterprise and management and the connections between them; economic environment of enterprise; markets and competition; definition of enterprise strategy and tactics; types of enterprises; special enterprise issues in the market of construction investments, phases of the construction implementation cycle; tendering according to FIDIC offers, tendering in EU countries, methods of tendering, types of contracts, elements of contract strategy.

Engineering practice in the EU 1.
Number of Credits: 2
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 4.
Prerequisites: -
Brief Syllabus
The aim of the course is to introduce students to the system of professional engineering licences, the role and operation of the chambers of commerce and professional associations, the forms and possibilities of training and further education through examples from different countries.A brief history of the EU, the institutional system of education in the EU, training policies. Opportunities for engineering education and further education inside and outside EU countries.The dual training system in higher education.The recognition of academic qualifications and degrees.Regulation and licensure in engineering.The role and operation of the chambers of commerce, the system of traineeship, chamber membership.

Engineering management
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.
Prerequisites: -
Brief Syllabus
System approach. Organizations as systems. Reasons for establishing organizations. Elements of organizations. Objectives of organizations. Individual and organizational objectives. Necessities. Representation of organizations, descriptive models of organizations. Organizational units. Business organizations (companies, associations, state-owned companies, privately owned companies). Business environment, PEST and SWOT analyses. Planning and uncertainty. Functions in organizations. Projects. Tools of representation technique. Leadership activity. Means of the leader. Leadership functions. Forms of leadership behaviour. Leadership skills. Leadership styles. Problem solving and decision making. Problem solving methods. Creative way of thinking. Decision making models, decision making rationalism. Group decisions. Decision and risk.

Introduction to informatics
Number of Credits: 3
Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
The aim of the course is to cover all the fields of informations witch will be needed for the students to start their Computer science study. The course starts with computer hardware and software basics with CPU's, RAM and ROM memories, drives, peripheries, etc. The software side is more relevant which starts with the common operating system features but focuses on the command interpreters. The next big theme is word processing where Office Word programs, Word and Powerpoint and LaTex will be introduced. In the end speadsheeting is trained and functions.

Information visualisation
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 2.
Prerequisites: -
Brief Syllabus
The course provides an intrduction to data and information visualization. The course aims to show different techniques and methods how to create graphical representation of information. A part of the course concentrates on the design of web pages and their usability.Basic elements of engineering drawings. Standards for engineering drawings. Human perception and its models. Consequences of the human perception. Rules and techniques for visualization. The work of Edward Tufte. From graphics to visualization. Data representation. Scalar Visualization. Vector visualisation. Image visualization. Volume visualization.Interface design. Web site structure. Page structure and design. Typography. Graphics, multimedia on the web. Usability of a web page.

Programming I.
Number of Credits: 2
Weekly Hours: 1 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
This course provides an introduction to all of the fundamental aspects of the C programming language, including elementary data types; arithmetic, logical and bitwise operators; control-flow statements; functions; structures; pointers; program scope rules; good program design practices; and C debugging techniques. Emphasis is on the ANSI-standard C.

Programming II.
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 2.
Prerequisites: Programming I.
Brief Syllabus
The purpose of this course is to introduce the students to the fundamental concepts of object-oriented programming and appreciate the complexity of application development. Students will learn the basic concepts of program design, problem solving, and fundamental design techniques for object-oriented and event-driven programs. Program development will incorporate the implementing a solution in a programming language C# .NET, and testing the completed application.

Programming III.
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 3 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.

Prerequisites: Programming II.
Brief Syllabus
The primary goal of this course is to introduce advanced object-oriented programming and the Java Programming Language.The course emphasizes an in-depth study of object-oriented programming paradigm including advanced topics in: inheritance: abstract classes, interfaces, multiple inheritance, inheritance hierarchies, polymorphism; application programming interface: GUI programming, event dispatch/handling; exception handling: throwing and catching exceptions; the base of network programming and JDBC.The course is divided into two interacting sections: a lecture-based theory section and a laboratory-based programming section. Each laboratory session tackles different programming problems that are typical of this style of program design. The lecture-based sections prepare the laboratory tasks, but it deals with some concepts in larger context as well.

Software technology
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 5.
Prerequisites: Databasis I.
Brief Syllabus
This course discusses the processes, methods, techniques and tools that organizations use to determine how they should conduct their business, with a particular focus on how computer-based technologies can most effectively contribute to the way business is organized. The course covers a systematic methodology for analyzing a business problem or opportunity, determining what role, if any, computer-based technologies can play in addressing the business need, articulating business requirements for the technology solution, specifying alternative approaches to acquiring the technology capabilities needed to address the business requirements, and specifying the requirements for the information systems solution.

Visual and web programming I.
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 2.
Prerequisites: Programming I.
Brief Syllabus
The goal of the course for the IT students to evolve the basic knowledge of visual programming in Labview, see its basic concepts and methods. Introducing the LabVIEW application development system, major parts and concepts, elementary properties; programming basics in LabVIEW, structured directives, data types and operations, array and record type elements, graphic displays, elements of file management, error control, program tracking options, Data Connectivity, Even based programming, exception handling; using ActiveX controls and programming, code using external interfaces (C - LabView connection); Multithreaded programming processes.

Visual and web programming II.
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 4.
Prerequisites: Databases I.
Brief Syllabus
The aim of the course is to teach students the basic technologies and programming languages that can be used in the creation of web application. The course also aims to provide versatile information and knowledge on modern web techniques. Static web pages. The HTML language and its tags. CSS technology, styles and classes. DHTML. Client-side scripts. The Javascript language. Server side scripts. The PHP programming language. PHP functions. Forms. PHP and MySQL connections. MySQL data types. Handling of date and time. Creation of a complex dynamic web application.

Digital logic design
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam

Place of Subject in Curriculum: 1.
Prerequisites: -
Brief Syllabus
The majority of the instruments in information technology are digital systems. The course helps the students to understand the mathematical and electronic basics of these systems, and gives instructions for the planning and creation of them. Starting from the simplest building elements, the level of digital computers is reached systematically.

Electronics
Number of Credits: 3
Weekly Hours: 2 lectures, 0 practical lessons, 1 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 2.
Prerequisites: Foundations of electrical signals of hardware
Brief Syllabus
Making the students acquainted with the basic electronic parts, analog and digital circuits, and the basics of wired and optical signal transmission. Passive and active electric parts.Physical fundamentals of semiconductors, the operation of p-n junction.Diode, bipolar transistor.Operation, characteristics, working modes, models of JFET and MOSFET. Active parts of optical signal transmission. Low-signal amplifier base circuits.Setting of the operating point, characteristics of amplifying.Concept of signal and power adaptation.Principles of feedback.The architecture and typical use of operational amplifiers.Types of signal sources and drains, their circuit models, rules of connecting them together. Disturbance signals.

Measurement and data acquisition
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.
Prerequisites: Foundations of electrical signals of hardware
Brief Syllabus
The students learn the basic concepts of the measurement theory, structure and practice of the programmable data acquisition systems and virtual instrumentation. The basic concepts of measurement. The relationship between the measurement and modeling. Characteristics of measurement procedures, the basic structure types. Basic methods for processing measurement data. Measuring instrument design. Smart sensors and actuators. Development of data acquisition system with programmed measurement units. Virtual instrumentation. Applying graphical programming language in the instrumentation.

Technical System Engineering
Number of Credits: 4
Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 4.
Prerequisites: Measurement and data acquisition
Brief Syllabus
The students learn the concepts of linear systems, testing, modeling and computer simulated environment of the operating point of linear systems. Basic concepts of System Engineering, The methods of information acquiring. Measurement and modeling (functional, physical , mathematical models). Deductive modeling. Mathematical models of elementary processes. Conservation laws (clay, energy, impulse).Current density, the concept of driving force. Convective, conductive, throughput rate (current density), sources, interpretation of local alteration, enter the balance equations for extensive derived by different amounts. Characterization of linear systems using methods described system. Material and energy flow networks, mathematical modeling of static and dynamic testing system. Dynamics and simulation systems. Case Studies.

Control engineering
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 5.
Prerequisites: Measurement and data acquisition
Brief Syllabus

The course provides the students with the fundamental concepts of control engineering including the operating principles of control systems, their analysis and synthesis. The student successfully completing the course will be able to analyze continuous and discrete control systems in various engineering applications, to understand and solve the most common control problems in real-time embedded environment. The course provides sufficient background for later specialized studies.

Computer architecture I.
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.
Prerequisites: Digital logic design
Brief Syllabus
The aim of the course is to introduce the lower abstract layers of computer architectures. After presenting the main periferals and computer components, these abstract layers will be examined. Going from the pure hardware, from transistors, we head through digital logic, microarchitecture and further layers toward the higher level abstract layers. Introduction (data, information, algorithm), computer architecture types, Neumann-Harvard architecture, Basic computer architecture – CPU, bus, RAM, peripheries.Microcontroller, microprocessor, micro computer, CISC, RISC. Development of computers. Memory types, buses. Microarchitecture, IJVM, Mic-2, Mic-3, Instruction sets.

Computer architecture II.
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 1 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 4.
Prerequisites: Computer architecture I.
Brief Syllabus
The aim of the course is to examine the higher abstract layers of computer architectures. The course discusses the layers from the Instruction Set Architecture and goes through the OS and Assembly layers. This and the preciding course shows how the hardware and software of a computer works.ISA level, tasks of OSM, virtual memory, paging, segmentation, support of I/O, parallelisation, processes, Assembly level, Parallel architectures, SUN Ultrasparc, IBM Power, SGI, Architectures for high performance computing, supercomputers.

Operating systems
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 4.
Prerequisites: Computer architecture I.
Brief Syllabus
The aim of this course is to teach students the basics and design of operating systems. The course will cover several concepts of operating systems. Operating systems concepts. System calls. Processes and threads. Interprocess communication, race conditions, busy waiting, mutual exclusion, sleep and wakeup, semaphores, mutexes. Message passing. Scheduling. Batch systems. Interactive systems. Real-time systems. Input/output, device controllers, DMA, Deadlock, detection and recovery, prevention, avoidance. Disks. Memory management. Allocation strategies. Virtual memory. Paging and segmentation. File systems.

Computer networks I.
Number of Credits: 3
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 4.
Prerequisites: Computer architecture I.
Brief Syllabus
The course discusses the aims and function of computer networks. Physical and theorethical limitations and expectations shaped the evolution of telecommunication. During the lectures, we classify networks and compare them. The lecture discusses the lower layers of computer networks. History of computer networks, types of

computer networks. Standards for computer networks. ISO-OSI reference modell. Physical and data link layer, multiplexing, modulation methods. Local and city networks.

Computer networks II.
Number of Credits: 5
Weekly Hours: 2 lectures, 3 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 5.
Prerequisites: Computer networks I.
Brief Syllabus
This course is intended to help students understand the mechanisms of upper OSI layers.We will focus on an overview of network, transport and application layers. Students who successfully complete this course will have a concept and knowledge building, operating and managing computer networks. Students will also have hands on experience in building computer networks, configuring active network devices, switches, routers through lab sessions.

Databases I.
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 3.
Prerequisites: Programming II.
Brief Syllabus
This course provides the students with an introduction to the core concepts in databases. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system.

Databases II.
Number of Credits: 4
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 4.
Prerequisites: Databases I.
Brief Syllabus
The course is designed to develop programming proficiency in a selected DBMS. Emphasis is on data definition, data manipulation, and data control statements as well as on report generation. The course helps the students understand the concept of database transaction and apply it appropriately to an application context. Upon completion, students should be able to write scripts of SQL commands, stored procedures, triggers, functions. After finishing the course students should be able to write programs that create, update and produce reports which are representative of industry requirements.

Intelligent systems I.
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 5.
Prerequisites: Signals and systems
Brief Syllabus
This course is a comprehensive introduction to the theory and practice of artificial intelligent systems. Definitions of intelligence. Measure of machine intelligence. Agent technology: theory and solutions. Sensing, learning, information processing, knowledge representation.Approximations of problem solutions.Theory of biology-driven information processing.Artificial neural networks.Fuzzy systems, genetic algorithms. Expert and decision support systems. Speech processing, speech recognition, text and translation control systems.

Intelligent systems II.
Number of Credits: 5
Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 6.
Prerequisites: Intelligent systems I.
Brief Syllabus
This course continues the course Intelligent systems I. In this course soft computing technics: the theory and practice of neural networks, fuzzy systems and genetic algorithms will be detailed. Some advanced topics on fuzzy controllers and adaptive fuzzy inference systems and its applications for quasi-optimization of system models are also covered.Upon completion of this course the students will be able to: Utilize the state of the art topics of soft computing in their research activities.

Foundations of information security
Number of Credits: 3
Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: Computer networks II.
Brief Syllabus
This course is intended to help students gain fundamental and comprehensive understanding of information security. We will focus on an overview of major information security issues, technologies, and approaches. Students who successfully complete this course will have a concept and knowledge of security properties, concerns, policies, models, cryptography, PKI, firewalls, security evaluation, and real life security cases. Students will also have hands on experience in selected information security technologies through lab sessions.

Integrated systems
Number of Credits: 3
Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 7.
Prerequisites: Technical System Engineering
Brief Syllabus
The nature of the course is synthetic. In the information technology base material (technical system engineering, control engineering, intelligent systems) body of knowledge can utilize to negotiate a short description specified topics example of a large, hierarchical engineering systems and networks (case study, simulation and animation application software to take into account).

Programmable logic control
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 5.
Prerequisites: Digital logical design
Brief Syllabus
The course provides the students with the fundamental concepts of programmable logic control including the operating principles of PLC. The course explains the basic programing concepts and skills required to write an appropriate real-time open-loop control program. Upon completion of this course, students will demonstrate the ability to: Explain operating principles and major components of a Programmable Logical Controllers. Develop control strategy in several IEC 61131 conform languages. Convert state chart and function block diagrams into PLC programs. Edit, monitor and analyze PLC programs.

Robot technology I.
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 1 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 5.
Prerequisites: Digital logical design
Brief Syllabus
Making the students acquainted with the fundamentals of robot technology by means of the introduction of industrial robots and their serving equipments.Fundamentals of computer integrated manufacturing (CIM).

Introducing of industrial robots; grippers and sensors; other equipments and machines in the robot cell; devices that ensure the material flow between the cells, and other major tools in connection with CIM, separately and through their relationship, in the complex system of industrial production. Anatomy and types of robots.Operation of handling, manufacturing, assembling etc. robots and almost every tools working in the automated production.Fundamentals and tools of sensor technology.

Robot technology II.
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: Robot technology I.
Brief Syllabus
Introduction of the theoretical and mathematical fundamentals that is needed for controlling and programming robots.Practicing robot programming in workshops.Programming modes of robots.Determination of position and orientation.Homogenous, relative transformations.Geometry of robot manipulators.Direct and reverse kinematics of robots.Path control.Dynamic system of robots.Machine vision.Cameras, geometric camera models.Image processing techniques. Linear filters, convolution, correlation. Edge detection, image segmentation.

Product design
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 6.
Prerequisites: Information visualisation
Brief Syllabus
The aim of the course is to introduce students to the use of the Catia engineering software package. Starting with part design basics, sketching in 2D with simple and combined profiles, sketch modification, constraints and constraints animation. It follows Solid modelling with features and parametrization. Various technics of building solid parts, useful tips, and complete tutorials. Making drafts and standard outpts. Connection between solid and surface modelling, and surface modelling basics.

Image and sound processing
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: Signals and systems
Brief Syllabus
The aim of the course is to provide the basic theoretical and practical background required for the understanding and implementation of fundamental sound- and image processing algorithms.Discrete time signals and systems analysis review. Properties and representation of linear, time invariant systems. Discrete Fourier-transform and Fast Fourier transform with applications. Signal analysis in the frequency domain. Digital filter design, properties of FIR and IIR systems.Filtering in time domain and frequency domain.Representation and manipulation of images.Image filtering.Image correction, histogram-based techniques.Image segmentation and morphology.

Digital control
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 7.
Prerequisites: Control engineering
Brief Syllabus
This course is a comprehensive introduction to control system synthesis in which the digital computer plays a major role, reinforced with hands-on laboratory experience. The course covers elements of real-time computer architecture; input-output interfaces and data converters; analysis and synthesis of sampled-data control systems using classical and modern methods.The student should get an understanding for discrete time control systems, how to analyze, design and implement digital controllers.

Linux system administration
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 5.
Prerequisites: Computer networks I.
Brief Syllabus
The aim of the course is to provide a hand on experience and knowledge for students how to install, configure and manage a Linux server. This knowledge can be directly utilised as a system administrator when a students joins a company.Installation of a Debian system. Partitioning of hard disks. Package management. The booting process and controlling the shutdown of a system. Management of users. Network settings. Configuration of telnet, ftp, ssh servers. MySQL configuration. Apache configuration. ACL for MySQL and Apache. Firewalls under Linux. Logging.

Assembly programming
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 5.
Prerequisites: Computer architecture I.
Brief Syllabus
The main aim of the course is to connect the knowledge about the low level architecture and their high level programming, by showing to the students what the assembly language is and how the compilers and linkers create executable programs.History and variations of the assembly language. CPU, registers, memory. Binary arithmetic. COM programs. Different variations of memory access. Assembly instructions. Writing assembly programs. The use of the stack structure. Assmebly functions. Arguments and return values of assembly functions. Recursive functions. EXE programs. Combination of assembly and C programs. String and array handling special instructions. Optimization under assembly. Floting-point mathematics with co-processor in assembly. Assembly viruses.

Network and system management
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: Linux system administration
Brief Syllabus
The aim of this course is to show to students what is the difference between installing, configuring, managing one server and multiple servers. The course also aims to provide an insight into the „informatics service industry".Introduction to server hadware. Rack and blade servers. Introduction to data centers. Cooling, HVAC of a data center. Redundancy and availability of data centers. ITIL. Life cycle of informatic services. Service strategy, service design, service transition, service operation, continual service improvement. PXE protocol for mass installation. Storage solutions, DAS, SAN, NAS. Backup strategies.

Computer networks III.
Number of Credits: 4
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Term mark
Place of Subject in Curriculum: 6.
Prerequisites: Computer networks II.
Brief Syllabus
This course is intended to help students understand the basics of telecommunication networks.We will focus on an overview from early telephone networks, through CaTV networks to nowdays new generation telecommunication networks. Students who successfully complete this course will have a concept and knowledge about telecom protocols and systems. Students will also have hands on experience in building VoIP networks, analyzing network protocols, building integrated networks through lab sessions.

Logic programming
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.

Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 6.
Prerequisites: Programming III.
Brief Syllabus
We discuss the syntax and the semantics of Prolog, the working of a Prolog interpreter and various applications of Prolog. A principal aim is to develop students' programming expertise through experience in typical applications. The course is divided into two interacting sections: a lecture-based theory section and a laboratory-based programming section. Each laboratory session tackles different programming problems that are typical of this style of program design. The lecture-based sections prepare the laboratory tasks. The programming assignments can be coded in SWI Prolog.

Internet technology
Number of Credits: 5
Weekly Hours: 2 lectures, 0 practical lessons, 2 lab.
Language of Instructions: English
Grading: Exam
Place of Subject in Curriculum: 7.
Prerequisites: Computer networks II.
Brief Syllabus
This includes the concept of IOT (Internet Of Things), various models from business to business to machine to machine, general features of the mobile industry including hardware features, operating systems, service oriented architecture, VSAT model etc. Technical details are also considered, such as Carrier Sense Multiple Access/ Collision Avoidance (CSMA/CA), calculation of bandwidth and throughput, scaleability etc. To effectively support application developments, roles, workflows, user stories, task lists are discussed; and on the other side the scrum methodology is compared with the waterfall model of the development. Besides, introduction to basic cloud definitions before and after the NIST standardization, characteristics and features of the various available technologies. Cloud applications are highlighted.