Information Technology

Autumn 2021

Component code	Component Title	ECTS

IM00AD53	**Algebra**	3

After the course a student knows how to solve expressions, equations and equation groups and apply the methods in other studies.
The content of the course is: Expressions, elementary functions, determinants, complex numbers, equations, equation systems and applications in the field of technology.

IM00AD54	**Geometry**	3

After the course a student knows how to apply geometric, trigonometric and vector calculations and solve related problems.
The main topics are plane and space figures, plane and space vectors, trigonometric functions and equations and applications in the field of technology.

IM00AD60	**Mechanics**	4

After the course a student knows the basics of Mechanics and he can apply the knowledge in his professional field.

TL1035	**Laboratory Practices in Physics**	3

After the course a student should know basic experimental physical measurements. Laboratory works on mechanics, thermophysics, electricity, magnetic induction and radiation lead the student to routine methods of measurements while working in small lab-groups. Students learn the fundamental measuring equipment, methods and routines, and is able to estimate the uncertainties of the results. Compilation of written reports is also a part of these laboratory exercises.

IT00AE93	**Scripting and functional programming**	3

In this course a student learns what is difference between scripting and functional programming. It is also explained how to make simple scripts and how to write simple functional programs. Students can evaluate when to use scripting and when to create functional program.

ITK1021	**Computing**	2

After the course a student should understand the basic concept of computer and computing; understand the role of information technology in the society; understand how to use computers in professional environment; understand the concept of information security; know how to use the MS Office package on intermedia level.
Content of the course: Basic computer concepts; Identification of safe computing practices; File management; Hands-on exercises on MS Office Package (Word, Excel, PowerPoint).

ITK1022	**Basics in Programming**	6

After the course a student should know how real-world problems can be modelled in software and can design and implement small object-oriented programs.
Content of the course: Information systems and software engineering. The role of programming in systems development. Introduction to object-oriented programming: classes and objects, methods, System as a composition of class collaborations.

ITK1024	**Project Management**	3

The outcome of the course is a student knows the process of project management and its different phases based on demanding problem fields of multidisciplinary projects.
The content of the course is choosing and organizing a project, project planning and division, maintenance of schedules, concluding the project, using a computer in project management, examples and independent computer exercises.

ITK1031	**Digital Techniques**	6

The outcome of the course is a student knows the typical components used in digital technology and is able to analyse and design logic, sequential and other basic circuits used in digital technology. The content of the course is number systems, Boolean algebra, gate circuits, combination logic, commercial microcircuits and circuit families, sequential circuits, accumulators and shift registers, memory circuits, graphic symbols and design examples.

ITK1035	**Operating Systems**	4

The outcome of the course is a student understands the basic concept of the architecture of computer system including processor, memory and input/output elements; is aware of important characteristics of modern operating systems e.g. Windows, Linux etc.; understands the objectives and functions of an operating system; understands concepts of instruction cycle, instruction execution, procedure calls and interrupts; understands the role of processes in an operating and their description in the operating systems; knows how to create and control processes of an operating system programmatically; understands the thread-based architecture of processes; knows how to create, control and terminate threads; understands principles and methods of sharing resources as well as processes and threads concurrency.
The content of the course is computer system overview; operating system overview; processes description and control; thread description and control; exclusion and synchronization.

ITK1037	**Digital Media**	3

After the course a student knows the theoretical and technical basics of digital image and voice processing and transfer. Student is able to select appropriate media formats for given tasks.
The content of the course is: Digital presentation formats of voice and image; Multimedia in information systems.

ITK1038	**WWW-Programming**	3

After the course a student knows common web programming methods and web technologies and can implement small web-based applications in the selected platform.
The content of the course is: HTML, Style Sheets, JavaScript, PHP & MySQL, Introduction of other technologies (j2ee, dotnet).

ITK1040	**C Programming Language**	4

The outcome of the course is a student understands role and importance of programming languages in software development process; is able to use for own purposes Visual Studio 2015 for programming in C language; understands the structure of the source code of a program; is able to apply pre-processing directives in programs which are being developed; knows how to perform input / output operations; understands how to allocate memory; understands the role of data types as well as how to apply in programs primitive, compound and structured data types; understands C language operators and expressions; understands the flow control of a program; knows how to design and use in a program functions.
The content of the course is Introduction; Program building blocks; Flow control; Pointers and functions; Compound data types; Input output.

ITK1045	**Algorithms and Data Structures**	3

The objective is to provide students with an understanding data structures, their applications and also develop algorithmic thinking.
The content of the course is Producing of algorithms and their performance; Lists, stacks, queues, trees, binary trees, graphs, applications; Search and sort methods.

ITK1049	**C++ Programming Language**	4

After the course student should be able to design, implement and code a computer program using C++ programming language on the intermediate level.
The content of the course is: 1. Types and declarations; 2. Pointers, arrays and structures; 3. Expressions and statements; 4. Functions; 5. Namespaces and exceptions; 6. Source files and programs; 7. Abstraction mechanism; 8. Standard template library; 9. Standard structures and algorithms; 10. Development, design, programming.

TL1029	**Differential Calculus**	3

After the course students should know how to apply differential calculus methods in professional studies.
The main topics are limit values, continuity, derivatives of the elementary functions, the inverse functions and implicit functions, extreme values, course of the curve, mean value theorem, differential calculus, estimation of error and application of dynamics and kinematics.

TL1030	**Integral Calculus**	3

After the course a student should know how to apply integral calculus methods in professional studies and how to solve demanding e.g. dimensioning tasks.
The main topics are basic integration formulas, with substitution integration, rational function integration, applications of integral, partial derivatives, total differential, and the implicit derivative of a function with multiple variables and extremes, gradient. The basics of differential equations are also studied.

TL1033	**Electrophysics**	3

After the course a student should know the fundamental laws of electromagnetic theory and with the significance of these laws the student can solve technical applications of electromagnetism. The content f the course is: Introduction to the laws of Coulomb, Gauss, Schuster, Ohm and Kirchhoff, Joule, Lorentz, Biot-Savart, Ampere-Laplace, Ampere, Faraday and Lenz. These laws govern electrostatics, direct current electric circuits, magnetic fields, electromagnetic induction with its important practical applications, and alternating current electric circuits.

TL1041	**Industrial Economics**	5

After the course a student should know the fundaments of industrial operations, central concepts, methods and modes of working within a company.
The main topics are business economics, the characteristics of company analysis, expense concepts, contribution margin calculation, product-specific expense calculus, budgeting and investment calculations.

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AVA1040	**Fundamentals of Web Development**	5

On the course a student learns to write simple static and dynamical Web pages and gets to know common Web development technologies.
The content of the course is: Introduction; HTML; CSS; JavaScript; PHP & MySQL; Special Topics

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IM00AD55	**Functions**	3

After the course a student knows how to solve expressions, equations and equation groups and apply the methods in other studies.
The content of the course is: Expressions, elementary functions, determinants, complex numbers, equations, equation systems and applications in the field of technology.

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IM00AD59	**Statistics**	3

After the course a student knows how to describe data by using statistics and how to calculate statistical parameters and key figures. The main topics are describing data by calculating numerical measures and drawing graphs, basic knowledge of probability, inferential statistics, analysing relationships and quality control.

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IM00AD61	**Thermophysics**	2

After the course students should know the basics of thermophysics and be able to apply the knowledge in his professional field.

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IT00AC87	**Software development tools**	5

After the course students should know most popular tools used for various task in software development, and basic working routines. Tools include using version control, drawing tools, task management tools and other tools.

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IT00AC89	**UI/UX Development**	5

After completing the course a student knows different prototypes (paper, digital, low-fidelity, high-fidelity), is able to design user interfaces on paper and in digital tools, is able to apply best practices for UI/UX, knows basics elements of UI (buttons, fonts, pictures) and is able to design usable user experience.
The content of the course is: User interfaces and their building blocks; Colors, Images, fonts, icons; Different UI layout types (mobile, web, etc.); Key elements of user experience, different user interactions; Prototyping with paper and digital tools.

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IT00AC90	**RESTful Web Services**	5

During this course, the students will get familiar with modern web development and REST application interfaces. The course concentrates on the application and all its parts, including both

the back end and front end, as well as databases and combination of all these parts. With these tools the student can create a proper full stack RESTful web service.

IT00AE46	**Python Programming**	3

The prerequisite to take the course is a student should already know basics of some programming language. After completing this course, a student can use Python to create smaller applications and knows how to use basic Python libraries.
The content of the course is: Basics of Programming with Python (introduction, python tool, data types, variables, operators, decision making and loops, arrays, functions); OOP Classes and objects; GUI Applications with Python; Creating GUIs with Python (Libraries Tkinter), Usage, Examples, Exercises; Special features Testing & Debugging, Python Main Modules: introduction, Exceptions: introduction File IO: introduction Pygame: introduction.

ITK1007	**Mathematics for Computing**	2

After the course student should understand mathematical basis of computing, be able to count in various numeral systems, be able to analyse numeric contents of computer memory, understand bitwise operations, know mathematical basis of counting, algorithms and data structure like – for example – logic operations and reasoning, relations and trees, understand the relation between mathematics and programming structures and patterns.
Content of the course: Logic; Sets, alphabets and languages; Ordered structures; Functions; Division algorithm; Counting in various numeral systems; Binary operations; Representation of numbers in computer.

ITK1032	**Embedded Systems**	6

The main topics are basic integration formulas, with substitution integration, rational function integration, applications of integral, partial derivatives, total differential, and the implicit derivative of a function with multiple variables and extremes, gradient. The basics of differential equations are also studied.

ITK1033	**Information Systems**	3

After the course student should know the general theory of systems; The concept of data, information and knowledge; The generic structure, taxonomy, principles and functionality of information systems; The history of information system development; The impact of information systems and technologies on the post-industrial society.
The content of the course: System, computers and computing; History of information systems; Information infrastructure; Data management; Information society.

ITK1039	**Object-Oriented Programming**	5

Integral set of two courses together with Object-Oriented Modelling. It is impossible to take these courses separately.
The content of the course is the essential concepts in object-oriented programming; Class design and implementation based on requirements; Design of application as a composition of class collaborations; Class libraries; Unit testing.

ITK1041	**IP-Networks**	4

After completing the course, a student knows the basic structure and operation of IP-networks and can design and implement a small LAN.
The content of the course: The structure of IP-networks; TCP/IP-protocols; IP/LAN; Domain Name System; Information Security.

ITK1046	**Modelling Techniques**	3

After completing the course, a student can use UML diagrams to model software.
The content of the course: UML, decision tree, data dictionary, ER.

ITK1047	**Software Engineering**	3

The outcome of the course is a student understands the software process; knows the role of software in the contemporary society and economy; understands the importance of the quality of software; understands ethical issues of software engineering; knows principles, concepts, methods, and techniques of the software engineering methodology; recognises and understand own role in software process; understands problems of software projects management; knows how to design reliable software of high quality as well as easy to maintain.
The content of the course is Software processes, Agile software development, Requirements engineering, System modelling, Architectural design, Design and implementation, Software testing, Software evolution.

ITK1050	**Object-Oriented Modelling**	3

Integral set of two courses together with Object-Oriented Programming. It is impossible to take these courses separately.
The outcome of the set of courses is a student is able to create the UML model of a real-world problem and based i but develop software using object-oriented programming paradigm. Should also know how to deal with the complexity of a problem and select appropriate types of model and design patterns in order to make the application more robust.

ITK1052	**Software Project**	4

After the course a student should understand the importance of planning and managing IT projects, various roles of members of a software development team, social issues of team-work, practical aspects of software development process and the importance of collaboration between members of a group to develop software.

ITK1054	**Mobile Software Development I**	4

The outcome of the course is a student understands the basic concepts of Android platform for mobile application and the general concept of mobile systems development. A student should also be able to develop application for Android OS on intermediate level.
The content of the course is Mobile phones market; Android; Fundamentals of application for Android OS; Activity – the basic building block of an application; Fundamental of user interface design; Development of application in graphical mode; Development of application in programmatic mode; Input Controls; Multi-activity applications.

TIK1092	**CCNA R&S: Introduction to Networks**	5

The outcome of the course is a student acquires basic knowledge and skills regarding concept, operation and construction of local area networks.
The content of the course is architecture and construction of the Internet and computer networks, IP addressing and Ethernet basics, Building and configuration of a small network.

TIK1099	**Linux Essentials**	5

The outcome of the course is a student gets practical Linux skills and ability to take benefits of the possibilities of open source operating systems. The objective is the understanding the criteria that should be considered when selecting operating systems for different applications.
Linux is used in many different platforms like servers, phones, cars and embedded systems. Also, many cloud services are backed by Linux. The technical quality and the fact that Linux is free of charge are the main reasons behind its success and popularity in many platforms. Linux based operating systems and free open source applications are also available to personal computing devices.

TL1042	**Leadership**	3

After the course students should know the factors that affect people's work behaviour when one works as a manager or an employee, as an individual or as part of a group.
The contents of the course are the basics of work psychology and reviewing management methods.