Study plan

Name of study plan: Bachelor Specialization Software Engineering, part-time, in Czech, 2021

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch: Program of study: Informatika Type of study: Bachelor combined

Required credits: 153

Elective courses credits: 27 Sum of credits in the plan: 180

Note on the plan: Tato verze studijního plánu je ur ena pro ro níky, které byly p ijaty ke studiu od

akademického roku 2021/2022 do kombinované formy studia bakalá ského programu. . Garant: Ing. Michal

Valenta, Ph.D.&email: michal.valenta@fit.cvut.cz

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 106

The role of the block: PP

Code of the group: BIK-PP.21

Name of the group: Compulsory Courses of Bachelor Study Program Informatics, part-time study, version

2021

Requirement credits in the group: In this group you have to gain 106 credits

Requirement courses in the group: In this group you have to complete 20 courses

Credits in the group: 106

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BIK-AG1.21	Algorithms and Graphs 1 Radek Hušek, Dušan Knop Dušan Knop Dušan Knop (Gar.)	Z,ZK	5	14KP+4KC	Z	PP
BIK-AAG.21	Automata and Grammars Št pán Plachý, Jan Holub Jan Holub (Gar.)	Z,ZK	5	14KP+4KC	Z	PP
BI-BAP.21	Bachelor Thesis Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BIK-BPR.21	Bachelor project Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	1		Z,L	PP
BIK-DBS.21	Database Systems Monika Borkovcová, Michal Valenta, Andrii Plyskach Monika Borkovcová Monika Borkovcová (Gar.)	Z,ZK	5	14KP+6KC	L	PP
BIK-DML.21	Discrete Mathematics and Logic Eva Pernecká Eva Pernecká Eva Pernecká (Gar.)	Z,ZK	5	14KP+4KC	Z	PP
BIK-KAB.21	Cryptography and Security Filip Kodýtek, Jaroslav K íž, Róbert Lórencz, Ji í Bu ek, Ji í Dostál, Ivana Trummová, František Ková, David Pokorný Róbert Lórencz Róbert Lórencz (Gar.)	Z,ZK	5	14KP+4KC	L	PP
BIK-LA1.21	Linear Algebra 1 Karel Klouda Karel Klouda (Gar.)	Z,ZK	5	14KP+4KC	Z	PP
BIK-MA1.21	Mathematical Analysis 1 Petr Olšák Ivo Petr Ivo Petr (Gar.)	Z,ZK	5	14KP+4KC	L	PP
BIK-MA2.21	Mathematical Analysis 2 Petr Olšák Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	6	21KP+4KC	Z	PP
BIK-OSY.21	Operating Systems Michal Šoch, Jan Trdli ka, Pavel Tvrdík Michal Šoch Michal Šoch (Gar.)	Z,ZK	5	14KP+4KC	L	PP
BIK-PSI.21	Computer Networks Vladimír Smotlacha, Yelena Trofimova, Josef Zápotocký Vladimír Smotlacha Vladimír Smotlacha (Gar.)	Z,ZK	5	14KP+4KC	L	PP
BIK-PST.21	Probability and Statistics Daniel Vašata Pavel Hrabák Pavel Hrabák (Gar.)	Z,ZK	5	14KP+4KC	Z	PP

BIK-PA1.21	Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	14KP+8KC	Z	PP
BIK-PA2.21	Programming and Algorithmics 2 Radek Hušek, Ond ej Štorc, Jan Trávní ek, Ladislav Vagner, Josef Vogel, Barbora Kolomazníková Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	14KP+6KC	L	PP
BIK-SAP.21	Computer Structure and Architecture Martin Da hel Martin Da hel (Gar.)	Z,ZK	5	14KP+6KC	L	PP
BIK-TZP.21	Technological Fundamentals of Computers Martin Da hel, Kate ina Hyniová Martin Da hel Martin Da hel (Gar.)	Z,ZK	5	14KP+4KC	Z	PP
BIK-GIT.21	SW Development Technologies Petr Pulc Petr Pulc (Gar.)	Z	3	14KP	Z	PP
BIK-TDP.21	Documentation and Presentation Tomáš Nová ek, Dana Vynikarová Tomáš Nová ek Dana Vynikarová (Gar.)	KZ	3	14KP+4KC	Z,L	PP
BIK-UOS.21	Unix-like Operating Systems Jakub Žitný, Petr Zemánek Petr Zemánek Petr Zemánek (Gar.)	KZ	5	14KP+4KC	Z	PP

Characteristics of the courses of this group of Study Plan: Code=BIK-PP.21 Name=Compulsory Courses of Bachelor Study Program Informatics, part-time study, version 2021

Algorithms and Graphs 1 Z,ZK **BIK-AG1 21** 5

The course is presented in Czech. The course covers the basics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing curriculum. Students learn techniques of proofs of correctness of algorithms and techniques of asymptotic mathematics for estimation of their complexity in the best, worse, or average case (the course includes basics from probability theory needed for understanding randomized algorithms). Within exercises students learn applications of studied algorithms for solving practical problems.

BIK-AAG.21 **Automata and Grammars**

Z,ZKStudents are introduced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite automata, regular expressions, and regular grammars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages. Knowledge acquired through the module is applicable to creation of algorithms for pattern matching, data compression, translation, simple parsing, and creation of digital circuits.

BI-BAP.21 **Bachelor Thesis** 14 BIK-BPR.21 Bachelor project

1. At the beginning of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the partial tasks that he / she will perform during the semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at the end of the semester. 2. The external supervisor enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvut.cz/student/studijni/formulare). The completed and signed form must be delivered in person or by email to the SZZ coordinator, who will arrange for the credit to be granted. 3. If the topic of the work that the student has reserved is formulated more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the assignment so that the assignment can be supplemented and approved at the end of the semester.

Database Systems BIK-DBS.21

Z.ZK Students get acquainted with the architecture of the database engine and typical user roles. They learn to design the structure of a smaller data store (including integrity constraints) using a conceptual model and then implement them in a relational database engine. They get acquainted with the SQL language and also with its theoretical basis - relational database model. They will get acquainted with the principles of relational database schema normalization. They understand the basic concepts of transaction processing and control of parallel

user access to a single data source. At the end of the course, students will be introduced to alternative nonrelational database models.

BIK-DML.21 Discrete Mathematics and Logic Z,ZK 5

Students will get acquainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts from set theory will be explained. Special attention is paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The course also lays down the basics of combinatorics and number theory, with emphasis on modular arithmetics.

BIK-KAB.21 Cryptography and Security

Z,ZK

Students will understand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to use cryptographic keys and certificates in systems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in applications. Within labs, students will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedures of cryptanalysis.

BIK-LA1.21 Linear Algebra 1 Z.ZK

We will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field of real and complex numbers and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination method (GEM) and show the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenvalues and eigenvectors of a matrix. We will also demonstrate some applications of these concepts in computer science.

BIK-MA1.21 Mathematical Analysis 1 Z,ZK

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We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers. Then we study real sequences and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functions. This theoretical foundation is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and solution of simple optimization problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical description of complexity of algorithms.

BIK-MA2.21 Mathematical Analysis 2 Z,ZK

The course completes the theme of analysis of real functions of a real variable initiated in BIK-MA1 by introducing the Riemann integral. Students will learn how to integrate by parts and use the substitution method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylors theorem to the computation of elementary functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, and its analysis using the Master theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and Hessian matrix, we study the analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integration of multivariate functions. This course can be enrolled only after successful completion of the course BIK-MA1, which can be replaced by the course BIK-ZMA in the case of repetitive students.

BIK-OSY.21 Operating Systems Z.ZK

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In this course that is a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread implementations, race conditions, critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS monitoring. They are able to design and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.

BIK-PSI.21 Computer Networks Z,ZK

The course introduces students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local networks and in the Internet as well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced network technologies. Students practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS.

BIK-PST.21 Probability and Statistics

Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. They will be able to apply basic models of random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction they will be able to perform estimations of unknown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical hypotheses and determining the statistical dependence of two or more random variables.

Programming and Algorithmics 1

Z,ZK

Students gain the ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, structured, pointers), expressions, statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searching, sorting, and manipulating with linked lists

BIK-PA2.21 Programming and Algorithmics 2 Z,ZK

Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, queue, enlargeable array, list, set, table). They learn these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e.g., template programming, copying/moving of objects, operator overloading, inheritance, polymorphism).

Computer Structure and Architecture

Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arithmetic-logic unit, controllers, memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple processor is practically implemented in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.

Technological Fundamentals of Computers

Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer structures look like at the lowest level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce the consumption; what the limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a computer power supply looks like (in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.

SW Development Technologies

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This course is aimed at one of the rudimental team software development technology - version control. To be more specific, we will introduce students to Git, the information manager from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.

BIK-TDP.21 Documentation and Presentation

Ζ

The course is focused on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically final university theses. Students learn to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically present it in front of classmates and the teacher. The course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first 14 days of teaching. Within the exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.

Unix-like Operating Systems

Unix-like operating systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative functions of multiuser operating systems for computers and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic properties of this OS family, such as processes and threads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level of advanced users who are not only able to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting interface, called shell.

Name of the block: Compulsory courses in the specialization

Minimal number of credits of the block: 40

The role of the block: PS

Code of the group: BIK-SI-PS.21

Name of the group: Compulsory courses of specialization Software engineering, part-time study, version 2021

Requirement credits in the group: In this group you have to gain 40 credits

Requirement courses in the group: In this group you have to complete 8 courses

Credits in the group: 40

Note on the group.

Note on the gr	oup.					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
BIK-KOM.21	Conceptual Modelling Robert Pergl, Mohamed Bettaz Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	14KP+4KC	Z	PS
BIK-OOP.21	Object-Oriented Programming Filip K ikava, Filip ina Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	14KP+4KC	Z	PS
BIK-PPA.21	Programming Paradigms Tomáš Pecka, Jan Janoušek, Filip Gregor Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	14KP+4KC	Z	PS
BIK-SWI.21	Software Engineering Ji í Mlejnek, Zden k Rybola Zden k Rybola Ji í Mlejnek (Gar.)	Z,ZK	5	14KP+2KC	L	PS
BIK-SP1.21	Team Software Project 1 Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	5	8KC		PS
BIK-SP2.21	Team Software Project 2 Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	5	4KC		PS
BIK-TJV.21	Java Technology Ji í Dan ek Ond ej Guth (Gar.)	Z,ZK	5	14KP+4KC	Z	PS
BIK-IDO.21	Introduction to DevOps Ji í Mlejnek, Tomáš Vondra Tomáš Vondra Ji í Mlejnek (Gar.)	Z,ZK	5	14KP+4KC	Z	PS

Characteristics of the courses of this group of Study Plan: Code=BIK-SI-PS.21 Name=Compulsory courses of specialization Software engineering, part-time study, version 2021

BIK-KOM.21 Conceptual Modelling

The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key terms in a domain, the ability to categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the OntoUML notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data representation in the Internet. They also learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO method and the BPMN notation will be taught. The course is designed with the respect to continuation in software implementations.

BIK-OOP.21 Object-Oriented Programming

Z,ZK

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Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together by message passing. In this course students get acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The emphasis is on practical techniques for developing software, which includes testing, error handing, refactoring, and application of design pattern.

BIK-PPA.21 Programming Paradigms

Z,ZK

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The course deals with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of particular approaches. Functional programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The principles are demonstrated on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages such as C++ and Java.

BIK-SWI.21 Software Engineering

Z.ZK

5

Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They consolidate and practically verify their knowledge during the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hands-on experience with CASE tools using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design and testing. Within the course, students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development.

BIK-SP1.21 Team Software Project 1

ΚZ

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Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teacher, in the role of the team and project leader, regularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software artefact will be further developed and finished in the BIE-SP2 course.

BIK-SP2.21 Team Software Project 2 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).

KZ

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BIK-TJV.21 Java Technology

Z,ZK

The aim of the course is to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get acquainted with general theoretical concepts and will be able to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing the course students will be able to participate in the development of software systems on the Java platform.

BIK-IDO.21 Introduction to DevOps

Z,ZK

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The course deals with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of systems and services. The course covers the tools to support software development, testing and compilation. It also focuses on tools for automating infrastructure management and building and deploying software to the Cloud. It is an introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquainted with modern technologies used in practice.

Name of the block: Elective vocational courses in the branch/specialization

Minimal number of credits of the block: 0

The role of the block: VO

Code of the group: BIK-SI-VO.21

Name of the group: Elective Vocational Courses for a Bachelor Specialization BIK-SI.21, version 2021

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0

Note on the group:

Note on the g	τοup.					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BIK-ADU.1	Unix Administration Petr Zemánek	Z,ZK	5	14KP+4KC	L	VO
BIK-AWD.21	Web and Database Server Administration Lukáš Ba inka, Michal Valenta Lukáš Ba inka Michal Valenta (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-ASB.21	Applied Network Security Ji í Dostál Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-APS.1	Architectures of Computer Systems Pavel Tvrdík	Z,ZK	5	14KP+4KC	Z	VO
BIK-BEK.21	Secure Code Josef Kokeš Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	14KP+4KC	L	VO
BIK-EHA.21	Ethical Hacking Ji í Dostál, Andrej Šímko, Martin Kolárik Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	14KP+4KC	L	VO
BIK-HWB	Hardware Security Ji í Bu ek	Z,ZK	5	14KP+4KC	Z	VO
BIK-IOT.21	Internet of Things Jan Jane ek Jan Jane ek (Gar.)	Z,ZK	5	14KP+4KC	Z	VO

BIK-SIP.21	Network Programming Jan Fesl Jan Fesl (Gar.)	Z	5	14KP+4KC	Z	VO
BIK-SPS.21	Administration of Computer Networks and Services Libor Dostálek, Jan Kubr Pavel Tvrdík Libor Dostálek (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-TAB.21	Applications of Security in Technology Ji í Dostál	Z,ZK	5	14KP+4KC	L	VO
BIK-TPS.21	Computer Networks Technologies Vladimír Smotlacha	Z,ZK	5	14KP+4KC	Z	VO
BIK-UKB.21	Introduction to Cybersecurity Jan B lohoubek, Jakub Tetera Jakub Tetera Jan B lohoubek (Gar.)	Z,ZK	5	21KP+2KC	Z	VO
BIK-VDC.21	Virtualization and Data Centers Jií Kašpar Jií Kašpar Jií Kašpar (Gar.)	Z,ZK	5	14KP+4KC	L	VO
BIK-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	14KP+4KC	L	VO
BIK-ZSB.21	Basics of System Security Ji í Dostál, Marián Svetlík Ji í Dostál Marián Svetlík (Gar.)	Z,ZK	5	14KP+4KC	Z	VO

Characteristics of the courses of this group of Study Plan: Code=BIK-SI-VO.21 Name=Elective Vocational Courses for a Bachelor Specialization BIK-SI.21, version 2021 BIK-ADU.1 Unix Administration Z.ZK 5 Students became familiar with the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of their protection against unauthorized use. In the seminars they will verify the information from the lectures on real life examples from practice. They will understand the differences between user and administrator roles. They gain theoretical and practical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file systems, disk subsystems, processes, memory, network services, shared file systems, name services, remote access, and system boot. Web and Database Server Administration Students will get acquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and backup complex database and web service systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of a web server. BIK-ASB.21 Applied Network Security The aim of the course is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gained in course BI-PSI with actual security applications like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishing the course student will get knowledge of security applications in computer networks. BIK-APS.1 **Architectures of Computer Systems** Z,ZK This course is presented in Czech. BIK-BEK.21 Secure Code Z.ZK 5 The students will learn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting familiar with the threat modeling theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every program needs to run with administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing data and the relationships of security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the defense against them. BIK-EHA.21 Ethical Hacking 7.7K The course gives a professional and academic introduction to computer and information security using the ethical hacking approach, which enables improved defence thanks to adopting an attacker mindset when discovering vulnerabilities, hands-on experience with different attacks, facilitates linking theory and practice in significant areas of one's digital literacy, and can therefore be utilized by (future) security professionals, (informed) decision-makers, (savvy) users and developers alike. **BIK-HWB** Hardware Security Z.ZK The course deals with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar with the operating principles of cryptographic modules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HW resources, including side-channel attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including applications and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers. BIK-IOT.21 Z.ZK Internet of Things The course is focused on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an overview of sensors and actuators, wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT architectures for different application areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development environments (hardware - ARM, ESP, STM; software - Arduino, Raspberry Pi OS) BIK-SIP.21 **Network Programming** The course covers fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming using BSD sockets. The second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of middleware technologies. The final part introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in computer labs using a chosen programming language environment. Administration of Computer Networks and Services BIK-SPS.21 Z,ZK The aim of the course is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrated under the operating systems Linux and Windows. The course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained by practical hands-on experience with real network infrastructure. BIK-TAB.21 Applications of Security in Technology Z,ZK 5 The goal of the course is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Students get a broader overview of cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security. BIK-TPS.21 Computer Networks Technologies Z,ZK The course introduces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical layer with the overlap to the link layer. The lectures provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies will be demonstrated and with the most important ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethernet, modern wireless networks, always with focus on high-speed networks. BIK-UKB.21 Introduction to Cybersecurity The goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic overview of threats in cyberspace

and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace regulations.

BIK-VDC.21 Virtualization and Data Centers

Z.ZK

5

The aim of the course is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and implementation of data center infrastructure, such as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data center technologies from private to public and hybrid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications. Students will understand the design, validation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, outages, and data losses.

BIK-VPS.21 Selected Topics in Computer Networking

Z.ZK

5

The course builds upon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technologies used in modern computer networks from local area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical experience with real network devices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance, and security.

BIK-ZSB.21 Basics of System Security

Z,ZK

5

The goal of the course is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forensic analysis and related topics such as malware analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of modern operating systems security, as well as skills needed for independent work in the area of operating system security incident analysis.

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 5

The role of the block: PV

Code of the group: BIK-SI-PV.21

Name of the group: Compulsory elective courses of the specialization Software engineering, part-time

study, version 2021

Requirement credits in the group: In this group you have to gain at least 5 credits (at most 15)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 3)

Credits in the group: 5 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BIK-EPP.21	Economic Business Processes David Buchtela Tomáš Evan (Gar.)	Z,ZK	5	14KP+4KC	L	PV
BIK-FBI.21	Financial Business Intelligence David Buchtela	Z,ZK	5	14KP+4KC	Z,L	PV
BIK-PAI.21	Law and Informatics Zden k Ku era	ZK	5	14KP+8KC	L	PV

Characteristics of the courses of this group of Study Plan: Code=BIK-SI-PV.21 Name=Compulsory elective courses of the specialization Software engineering, part-time study, version 2021

BIK-EPP.21 Economic Business Processes

Z,ZK

5

The aim of the course is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic and financial aspects of business in the market environment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the company's life cycle, from the establishment of the company, through the management of property and capital structure, financing of the company, determining the cost function of the company and labor costs, to evaluating the financial health of the company and its eventual rehabilitation or termination.

BIK-FBI.21 Financial Business Intelligence

Z,ZK

5

The aim of the course is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for business analysis, determining its value and other indicators for comparison with other companies and management decision process at the tactical and strategic level. The second view is management accounting as a tool for financial management and prediction of business development. Management accounting allows monitoring of the financial status and performance of business activities over several accounting periods, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital and to use value information to assess options related to future business decisions. The principles of management accounting, described in this course, are the basis of Business Intelligence modules in business information systems, decision support systems, and other knowledge-oriented systems.

BIK-PAI.21 Law and Informatics

7K

5

The aim of the course is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge of doing business in the Czech Republic and will be alerted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding contracts in real and Internet environment, will know their responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able to use commercial license types and open-source licenses. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protection against their misuse. Students will also be alerted to such behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses of real cases from practice.

Name of the block: Povinná zkouška z angli tiny

Minimal number of credits of the block: 2

The role of the block: PJ

Code of the group: BI-ZKA.21

Name of the group: English Language Exam

Requirement credits in the group: In this group you have to gain at least 2 credits (at most 4)

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 2

Note on the group:

BI-ANG, ending with an exam for two credits, is enrolled by students who have completed preparator English courses and have a credit from the BI-A2L course.

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br> BI-ANG1, ending with an exam for two credits, is enrolled by students who prepared for the exam independently and do not have credit from BI-A2L. These students must complete a credit paper before their own exam. After passing the exam, the student will also be recognized for the course BI-ANGS (Independent preparation for the English exam) for 2 credits.

The BIE-ECC course can be recognized for any active semester after the submission of a external certificate at the level of at least B2 according to the Common European Framework of Reference.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ANG1	English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová (Gar.)	Z,ZK	2	2D	L	PJ
BIE-EEC	English language external certificate Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	4	2D	L	PJ
BI-ANG	English Language, Internal Certificate Kate ina Valentová Kate ina Valentová (Gar.)	ZK	2	2D	Z,L	PJ

Characteristics of the courses of this group of Study Plan: Code=BI-ZKA.21 Name=English Language Exam

BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2				
BIE-EEC	English language external certificate	Z	4				
The BIE-ECC course ca	The BIE-ECC course can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in English comparable to or exceeding						
the B2 level of the Com	mon European Framework of Reference for Languages.						
BI-ANG	BI-ANG English Language, Internal Certificate ZK 2						
Course information and	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-ANG						

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: BIK-V.2021

Name of the group: Purely Elective Courses of Bachelor Programme, part-time Study, Version 2021 till 2024

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0

Note on the group:

Note on the g	Name of the course / Name of the group of courses		1	1	 	
Code	(in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BIK-ADW.1	Windows Administration Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	14KP+2KC	Z	V
BIK-STO	Storage and Filesystems Ji í Kašpar	Z,ZK	4	13KP+4KC	L,Z	V
BIE-DIF	Differential equations Antonella Marchesiello, Ond ej Bouchala, Jan Valdman Tomáš Kalvoda Ond ej Bouchala (Gar.)	Z,ZK	5	2P+2C	L	V
BIK-EJA	Enterprise Java Ji í Dan ek	KZ	4	13KP+4KC	Z	V
BIK-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová Alena Šolcová (Gar.)	ZK	3	13KP+2KC	L	V
BIK-SQL.1	Language SQL Michal Valenta Michal Valenta (Gar.)	KZ	4	13KP+4KC	L	V
BIK-OOP.21	Object-Oriented Programming Filip K ikava, Filip íha Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	14KP+4KC	Z	V
BIK-PJV	Programming in Java Jan Blizni enko Jan Blizni enko (Gar.)	Z,ZK	4	13KP+4KC	Z	V
BIK-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	14KP+4KC	Z	V
BIK-PKM	Introduction to Mathematics Karel Klouda Tomáš Kalvoda (Gar.)	Z	4		Z	V
BIK-TAB.21	Applications of Security in Technology Ji i Dostál	Z,ZK	5	14KP+4KC	L	V
TVV	Physical education	Z	0	0+2	Z,L	V
TV1	Physical Education	Z	0	0+2	Z	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TV2K1	Physical Education 2	Z	1		L,Z	V

BIK-TUR.21	User Interface Design Jan Schmidt Jan Schmidt Jan Schmidt (Gar.)	Z,ZK	5	14KP+4KC	L	V
BIK-KSA	Cultural and Social Anthropology Alena Libánská, Tomáš Houdek, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	13KP	L	V
BIK-ZWU	Introduction to Web and User Interfaces Ji í Pavelka	Z,ZK	4	13KP+4KC	Z	V

Characteristics of the courses of this group of Study Plan: Code=BIK-V.2021 Name=Purely Elective Courses of Bachelor Programme, part-time Study, Version 2021 till 2024

part-time Study,			
BIK-OOP.21	Object-Oriented Programming	Z,ZK	5
	amming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate toget		
-	equainted with the main principles of object-oriented programming and design, used in modern programming languages. The equation is also that the programming languages and applications of design and the programming languages.	empnasis is on prac	ticai technique
	e, which includes testing, error handing, refactoring, and application of design pattern.	7.71	
BIK-TAB.21	Applications of Security in Technology	Z,ZK	5
•	e is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Si	tudents get a broad	er overview of
	ions and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.		
BIK-ADW.1	Windows Administration	Z,ZK	4
This course is preser		T	
BIK-STO	Storage and Filesystems	Z,ZK	4
	principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and	archiving, as so as	storage scaling
oad balancing and h		1	
BIE-DIF	Differential equations	Z,ZK	5
•	a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essen		
-	rems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered		
	ollowed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world applica	=	
· · · · · · · · · · · · · · · · · · ·	ations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving OI	DEs and PDEs, incli	uding implicit
<u> </u>	hods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.	1 1	
BIK-EJA	Enterprise Java	KZ	4
	a technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems). T		pically manag
	ccessible to clients via the REST API and are created in the microservice architecture and deployed into orchestrated contain		
BIK-HMI	History of Mathematics and Informatics	ZK	3
his course is preser	ted in Czech.		
3IK-SQL.1	Language SQL	KZ	4
Course is based on k	lowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language.	In particular stored	program unites
riggers, recursive que	ries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the p	oint of view of speci	alized database
structures like indexe			anzoa aatabao
vill be discussed. Led	s, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution pla	n and possibilities o	
PostgreSQL.	s, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution pla tures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on O	· ·	f its. changes
3IK-PJV		· ·	f its. changes
JII \ −Γ J V		· ·	f its. changes
	tures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on O	racle DBMS and pa	f its. changes rtially on
his course is preser	tures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on O Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).	racle DBMS and pa	f its. changes rtially on
his course is preser BIK-PRR.21	tures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on O Programming in Java	Z,ZK	f its. changes rtially on 4
his course is preser BIK-PRR.21 Project management	tures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on O Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management	Z,ZK	f its. changes rtially on 4
his course is preser BIK-PRR.21 Project management nly in IT in various p	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a substitutions and different projects available at your hands.	Z,ZK Z,ZK Z,ZK ocial art. 20 years o	f its. changes rtially on 4 5 f experience no
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This course is preser BIK-PRR.21 Project management only in IT in various particular by BIK-PKM This course is preser TVV TV1	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a so estitions and different projects available at your hands. Introduction to Mathematics ted in Czech. Physical education Physical Education	Z,ZK Z,ZK Z,ZK ocial art. 20 years o	f its. changes rtially on 4 5 f experience no 4 0 0
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This course is preser BIK-PRR.21 Project management inly in IT in various particles ourse is preser TVV TV1 TVV0 TV2K1	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a substitions and different projects available at your hands. Introduction to Mathematics ted in Czech. Physical education Physical Education Physical education Physical education	Z,ZK Z,ZK Cocial art. 20 years or Z Z Z Z Z	f its. changes rtially on 4 5 f experience no 4 0 0 0
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This course is present BIK-PRR.21 Project management inly in IT in various particular in	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a sobstitions and different projects available at your hands. Introduction to Mathematics ted in Czech. Physical education Physical Education Physical Education Physical Education Physical Education 2 User Interface Design overview of methods for designing and testing common user interfaces. They get experience to solve the problems where so user optimally, since the needs and characteristics of users are not taken into account during product development. Students excelopment process to ensure optimal interface for them. Cultural and Social Anthropology	Z,ZK Z,ZK ocial art. 20 years o Z Z Z Z Z Z,ZK offtware and other pressing an overview of the world -	f its. changes ritially on 4 5 f experience n 4 0 0 0 1 5 oducts do not of methods that 2 examples from
This course is present BIK-PRR.21 Project management only in IT in various particular in	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a sositions and different projects available at your hands. Introduction to Mathematics ted in Czech. Physical education Physical Education Physical Education Physical Education Physical Education Physical Education 2 User Interface Design overview of methods for designing and testing common user interfaces. They get experience to solve the problems where so user optimally, since the needs and characteristics of users are not taken into account during product development. Students excelopment process to ensure optimal interface for them. Cultural and Social Anthropology urse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the div	Z,ZK Z,ZK ocial art. 20 years o Z Z Z Z Z Z,ZK offtware and other pressing an overview of the world -	f its. changes ritially on 4 5 f experience n 4 0 0 0 1 5 oducts do not of methods that 2 examples from
This course is preser BIK-PRR.21 Project management only in IT in various p BIK-PKM This course is preser TVV TV1 TVV0 TV2K1 BIK-TUR.21 Students gain a basic communicate with the oring users into the d BIK-KSA The one-semester coanthropological resea	Programming in Java ted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a sobsitions and different projects available at your hands. Introduction to Mathematics ted in Czech. Physical education Physical Education Physical Education Physical Education Physical Education Physical Education Czech. User Interface Design Overview of methods for designing and testing common user interfaces. They get experience to solve the problems where so user optimally, since the needs and characteristics of users are not taken into account during product development. Students evelopment process to ensure optimal interface for them. Cultural and Social Anthropology urse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the divertifier on our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization, , material	Z,ZK Z,ZK ocial art. 20 years o Z Z Z Z Z Z,ZK offtware and other pressing an overview of the world -	f its. changes rtially on 4 5 f experience no 0 0 1 5 oducts do not of methods that 2 examples fror

List of courses of this pass:

This course is presented in Czech.

Code	Name of the course	Completion	Credits
BI-ANG	English Language, Internal Certificate	ZK	2
	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN	G	

BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-BAP.21	Bachelor Thesis	Z Z	14
BIE-DIF	Differential equations	Z,ZK	5
	ational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential	1 ' 1	e separatio
of variables. Key theorems	on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered w	ith methods like cha	aracteristic
	ed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application		
partial differential equation	s (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODE	s and PDEs, includi	ing implicit
	and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
BIE-EEC	English language external certificate	Z	4
he BIE-ECC course can be	recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in Eng	ish comparable to o	r exceedin
DUC A A O O4	the B2 level of the Common European Framework of Reference for Languages.	7 71/	_
BIK-AAG.21	Automata and Grammars	Z,ZK	5
	asic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite Hation finite automata, construction and use of pushdown automata, hierarchy of formal languages. Knowledge acquired th	-	-
and rogular grammaro, train	to creation of algorithms for pattern matching, data compression, translation, simple parsing, and creation of digital circuit	_	о арріїсаві
BIK-ADU.1	Unix Administration	Z,ZK	5
l l	h the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of their	1 ' 1	
	rill verify the information from the lectures on real life examples from practice. They will understand the differences between	-	
hey gain theoretical and pr	actical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file system	s, disk subsystems,	, processe
	memory, network services, shared file systems, name services, remote access, and system boot.		
BIK-ADW.1	Windows Administration	Z,ZK	4
	This course is presented in Czech.		
BIK-AG1.21	Algorithms and Graphs 1	Z,ZK	5
· · · · · · · · · · · · · · · · · · ·	n Czech. The course covers the basics from the efficient algorithm design, data structures, and graph theory, belonging to	_	-
	nts learn techniques of proofs of correctness of algorithms and techniques of asymptotic mathematics for estimation of the		
r average case (the course	ncludes basics from probability theory needed for understanding randomized algorithms). Within exercises students learn ap	plications of studied	a algorithn
DIV ADC 4	for solving practical problems.	7.71/	F
BIK-APS.1	Architectures of Computer Systems This course is presented in Czech.	Z,ZK	5
BIK-ASB.21	•	Z.ZK	5
	Applied Network Security ntroduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gain	1 ' 1	_
	ne public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishin		
occurry applications into	knowledge of security applications in computer networks.	ig the course clade	nt wiii got
BIK-AWD.21	Web and Database Server Administration	Z,ZK	5
	with the administration of database and web servers and services. They will be able to install, configure, operate, test, and	1 '	ļ
- '	ns. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of the principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of the principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of the principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of the principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as an example of the principles will be used as a principle of the principles will be used as a principle of the p		
BIK-BEK.21	Secure Code	Z,ZK	5
The students will learn how	assess security risks and how to take them into account in the design phase of their own code and solutions. After getting	amiliar with the thre	at modelin
theory, students gain pra	ctical experience with running programs with reduced privileges and methods of specifying these privileges, since not ever	y program needs to	run with
	ingers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing	•	•
	systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and t		
BIK-BPR.21	Bachelor project	Z	1
	emester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the	-	
-	to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at		
•	e information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cv orm must be delivered in person or by email to the SZZ coordinator, who will arrange for the credit to be granted. 3. If the to	-	
·	nore generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the ass		
	can be supplemented and approved at the end of the semester.	5	3
BIK-DBS.21	Database Systems	Z,ZK	5
	h the architecture of the database engine and typical user roles. They learn to design the structure of a smaller data store	1 ' 1	
sing a conceptual model ar	d then implement them in a relational database engine. They get acquainted with the SQL language and also with its theore	tical basis - relation	al databas
nodel. They will get acquain	ted with the principles of relational database schema normalization. They understand the basic concepts of transaction pro-	ocessing and contro	of parall
user	access to a single data source. At the end of the course, students will be introduced to alternative nonrelational database		
BIK-DML.21	Discrete Mathematics and Logic	Z,ZK	5
	with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts from	-	-
Special attention is paid to r	elations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cour	se also lays down th	he basics
	combinatorics and number theory, with emphasis on modular arithmetics.		
BIK-EHA.21	Ethical Hacking	Z,ZK	5
- ·	nal and academic introduction to computer and information security using the ethical hacking approach, which enables impro		-
an allacker minuset when c	scovering vulnerabilities, hands-on experience with different attacks, facilitates linking theory and practice in significant are can therefore be utilized by (future) security professionals, (informed) decision-makers, (savvy) users and developers alik	_	петасу, ап
DIK E IV			4
BIK-EJA	Enterprise Java nologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems). Thes	KZ	
	ta, are accessible to clients via the REST API and are created in the microservice architecture and deployed into orchestra		any mana(
persistent da	Economic Business Processes	Z,ZK	5
	Economic Dusiness i 100esses	1 ' 1	
BIK-EPP.21	resent typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic an		
BIK-EPP.21 he aim of the course is to	present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic an If the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the	=	le, from th
BIK-EPP.21 The aim of the course is to in the market environment		company's life cycl	
BIK-EPP.21 The aim of the course is to in the market environment	of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the	company's life cycl	
BIK-EPP.21 The aim of the course is to in the market environment	of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the ny, through the management of property and capital structure, financing of the company, determining the cost function of the	company's life cycl	
BIK-EPP.21 The aim of the course is to in the market environment establishment of the compa	of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the ny, through the management of property and capital structure, financing of the company, determining the cost function of the evaluating the financial health of the company and its eventual rehabilitation or termination.	e company's life cycl ne company and lab	oor costs,

_	ement and prediction of business development. Management accounting allows monitoring of the financial status and performance of bids, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital and		
• .	lated to future business decisions. The principles of management accounting, described in this course, are the basis of Business Inte information systems, decision support systems, and other knowledge-oriented systems.		
BIK-GIT.21	SW Development Technologies	Z	3
	ed at one of the rudimental team software development technology - version control. To be more specific, we will introduce students to from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use	Git, the information	-
BIK-HMI	History of Mathematics and Informatics	ZK	3
Sirt riivii	This course is presented in Czech.	,	
BIK-HWB	Hardware Security	Z,ZK	5
The course deals	s with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar with	n the operating prir	nciples of
,, , ,	ules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about vo		
including side-char	nel attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card tec and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of		applications
BIK-IDO.21	Introduction to DevOps	Z,ZK	5
The course deals v	with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of syst	ems and services.	The course
	support software development, testing and compilation. It also focuses on tools for automating infrastructure management and buildi introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquainte used in practice.		
BIK-IOT.21	Internet of Things	Z,ZK	5
	cused on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to		
	s communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of I		
application areas.	Within the computer labs, students will gain practical experience with developing simple IoT systems using common development en	vironments (hardwa	are - ARM,
	ESP, STM; software - Arduino, Raspberry Pi OS).		
BIK-KAB.21	Cryptography and Security	Z,ZK	5
	derstand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to		-
	ems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in appl actical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procec		
BIK-KOM.21	Conceptual Modelling	Z,ZK	5
	Conceptual Modelling 		
	cify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological struct		-
notation. Next, they	learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent	ation in the Interne	t. They also
learn the foundation	ns of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO m	nethod and the BPN	MN notation
	will be taught. The course is designed with the respect to continuation in software implementations.		
BIK-KSA	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity		-
anthropological res	earch from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization, , material cul death, etc). The course is an interesting alternative to other humanities, taught at FIT.	ture, language, nea	aitn, nistory,
BIK-LA1.21	Linear Algebra 1	Z,ZK	5
	students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field	, , , , , , , , , , , , , , , , , , ,	
	fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian eliminates of the concepts of basis and dimension and learn to solve systems of linear equations.		
the connection w	ith linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenv	alues and eigenve	ctors of a
	matrix. We will also demonstrate some applications of these concepts in computer science.		
BIK-MA1.21	Mathematical Analysis 1	Z,ZK	5
ū	se by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers. I	•	
	of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functio ot-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and		
	ssue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical descripti		
BIK-MA2.21	Mathematical Analysis 2	Z,ZK	6
	etes the theme of analysis of real functions of a real variable initiated in BIK-MA1 by introducing the Riemann integral. Students will le		te by parts
and use the substit	ution method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylors theorem to	the computation of	elementary
· · · · · · · · · · · · · · · · · · ·	escribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, and	-	
-	we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and H		-
=	of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integre e can be enrolled only after successful completion of the course BIK-MA1, which can be replaced by the course BIK-ZMA in the case		
BIK-OOP.21	Object-Oriented Programming	Z,ZK	5
	programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		
	t acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The emph		-
	for developing software, which includes testing, error handing, refactoring, and application of design pattern.		
BIK-OSY.21	Operating Systems	Z,ZK	5
	s a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread imp		
critical regions, thre	ead scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS monit		le to design
DIV DA4 24	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS W		7
BIK-PA1.21	Programming and Algorithmics 1 ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, struc	Z,ZK	7 xpressions
_	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searching with linked lists.		·
BIK-PA2.21	Programming and Algorithmics 2	Z,ZK	7
	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que	-	-
table). They lear	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e	.g., template progr	amming,
	copying/moving of objects, operator overloading, inheritance, polymorphism).		

BIK-PRA 2 Law and informations The ain of the course is to irreduce students into the basic legal internations that they will recover the practice. Students will gain knowledge of compliances in the Carbon Reports of will be alkered to the private that the practice of the property o				
sequence and will be altered to the pathel shat await then in housiness from the pathel share the responsibilities or wasting with the intermit, will be failther with the residuated preparely two, and like add to two accommendations against their instances. Emphasis will also be put on the legislar protection of state and protection against their instances. Because the protection of the pathel share the course and protection against their instances. Because the pathel share the pathel share the course will be controlled to the share of the first of the pathel share the first of the pathel share the course is presented in Case. He programming in Jazza. BIK-PKM This course is presented in Case. He programming the pathel share the first of the pathel share the pa	I I		1	
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and sport-course Emphass will also be aut on the legal protection of date on the Internet, the registration of Internet domains and protection against their missues. Subsenits all slot to belands up who helevision in the lide of IT that care the established as immains under the Cases have The course will also to the above on the lide of IT that care the established as immains under the Cases have The course will be subsenited in Cases. I Naverse, there is an English variation in the full-filted program informatics (B1601 / 4753). BIK-PRA 21 IN This course is presented in Cases. I Naverse, there is an English variation in the full-filted program informatics (B1601 / 4753). BIK-PRA 21 Programming Paradigms Programming Paradigms Programming Paradigms Programming Paradigms Programming Paradigms Programming Paradigms Bik-PRA 21 Bik			=	
BIK-PIM This course is presented in Czech. Hoosever, there is an English variation in the full-time program informatics (\$1801 / 4733). BIK-PIM Introduction to Mathematics This course is presented in Czech. BIK-PIM Introduction to Mathematics BIK-PIM.21 Programming Paradigms Programming Paradigms Programming paradigms of high-level programming in large parameters in Czech. BIK-PIM.21 Programming paradigm and its base procedure are explained in group programming paradigms of the plant programming in the paradigms of the plant programming paradigms of the plant programming in the paradigms of the plant programming paradigms of the plant programming paradigms of the plant programming to the plant programming paradigms of the plant paradigms of th	•	-		
This course is presented in Crock. However, there is an English variant in the full-time program informatics (81601 / 4753). BIK-PPA 21	will also be alerted to such behaviour in the fi	eld of IT that can be classified as criminal under the Czech law. The course will also include analys	ses of real cases from p	oractice.
BIK-PPA 21 Programming Paradigms The course deads with beate paradigms of high-level programming language, including their basic secución models, benefits, and imitations of particular approaches. Prunctional nariod actuals and or their places are operating languages, including their basic secución or declarative programming. The principles are demonstrated on introduce de a snother every of declarative programming. The principles are demonstrated on modern manistrated promorphisms. Prunctional introduced as a social actual programming languages. Moreover, usage of these principles is demonstrated on modern manistratem programming. The principles are demonstrated on modern manistratem programming languages. Moreover, usage of these principles is demonstrated on modern manistratem programming languages. Moreover, usage of these principles is demonstrated on modern manistratem programming languages. Moreover, usage of these principles is demonstrated on modern manistratem programming languages. Moreover, usage of these principles is demonstrated on modern manistratem programming languages. Moreover, usage of these principles is demonstrated to a social act 20 years of appropriate programming languages. Moreover, usage of these principles is demonstrated to a social act 20 years of appropriate programming and interest programming and and programming and pro	BIK-PJV	Programming in Java	Z,ZK	4
BIK-PPA.21 Superior of high-level programming languages, including their basic asceude models, benefits, and irritations of particular approaches precisional regramming benefits and instance accludes and on Laps (Rescue) and photology programming languages, including their basic asceudes models, benefits, and irritations of particular approaches precisional regramming benefits and photology programming benefits and photology programming in produced as another way of doclarative programming in programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages such as exclusion and of the principles and photology of the programming in programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages such as exclusion and programming languages. Moreover, usage of these principles is demonstrated on modern mainstrates in programming and programming languages. In the programming and programming and programming and or managing projects, but also as a social stat. 2 years of experience or only in Time various positions and definition of the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local relevance and the programming and the managing programming and the programming and	This course is prese	inted in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4		
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The course deals with hastic panalingms of high-level programming languages, including their lastic execution models, such improvement particular approximation. The principles are ordinarios of control and protectives are ordinarios of controls. Logic programming is institution as uniform to your discrimination of programming languages. Moreover, usage of these principles lis demonstrated on modern maintaines more programming languages. Some over the principles lis demonstrated on modern maintaines more programming languages. Some of the principles list demonstrated on modern maintaines more programming languages. Some of the principles list demonstrated on modern maintaines more programming languages. Some of the principles are demonstrated on modern maintaines more programming languages. Some of the principles are demonstrated on modern maintaines more programming languages and the principles in the principles are demonstrated on modern maintaines. The programming languages are languaged to the principles and common decidence of the principles are demonstrated on the principles are demonstrated on the principles of computer networking. The Networks are languaged to the course introduces adulted to the principles of computer networking in Computer Networks. In course basic technologies, protocols, and services commonly used in local networks and in the Institution of the course introduces adulted to the principles of computer networks. The networks are demonstrated in the language and the languages are programming and demonstrated the advantage of advantages and the Institution of the languages. The languages are languages and the languages and the languages and the languages and the languages. Institution of the languages are the languages and		·		
reopramming paradigm and its basic principles are explained in defails. Logic programming is introduced as another way of declarative programming. The principles are demonstrated on involve maintained and in Lago (Radwel) and Prolog programming languages. Moreov. Langul of these principles is demonstrated on modern maintained programming languages such as C++ and Jakes. BIK-PR.21 Project management not only as a common dictionary and setting necessary processes while properting and / or management projects, but also as a social art. 20 years of department on the course introduces students to the principles of computer networking. It covers be associated and officent projects unabled any port hand the course introduces students to the principles of computer networking. It covers be associated paragraphic projects, but also as a social art. 20 years of department of the course introduces students to the principles of computer networking. It covers be associated paragraphic projects, but also as a social art. 20 years of department of the course introduces students to the principles of computer networking. It covers be associated paragraphic projects, but also as a social art. 20 years of department of the course introduces with the course introduced to the mention of the course introduced to the mention of the course introduces. BIK-PST.21 Computer STAZI and the social projects and the principles and principles and principles and the principles and principles and principles and principles and principles. BIK-PST.21 Probability and Statistics and computer science. Use the statistical induction they will be able to specify the principles and posterior information and learn to work with random variable. They will be able to perform with the principles of individual principles and posterior information and learn to work with random variables. BIK-SAP.21 Propect of the principles and	· ·			_
on ambido acciulus and on Lusp (Racket) and Prolog programming languages soches principles is demonstrated on modern mainstream programming languages such as C++ and Jaws. BIK-PR.21 "Project management not only as a common dictionary and setting necessary processes while prepariting and / or managing projects, but also as a social art. 2 years of experimens not only as a common dictionary and setting necessary processes while prepariting and / or managing projects, but also as a social art. 2 years of experimens not only in Til in various positions and afferent projects availabile at your hands. BIK-PSI 21 "Computer Networks" "Z/K" 5 **Networks will be amended by prospenitives that inflowed social and demonstrate the abilities of advanced storehologies. Students will be amended by prospenitives that inflowed social and demonstrate the abilities of advanced to the propagating and a statistics. BIK-PSI 21 "Probability and Statistics." BIK-PSI 22 "Students will be an experiment or proceed and so we peption probabilistic problems in informatics and computer advance. Using the statistical induction. They will be able to perform models of another variable distributions and solve expelled probabilistic problems in informatics and computer advance. Using the statistical induction. They will be able to perform estimations of unknown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical hypotheres and solve expelled probabilistic problems in informatics and common variables. BIK-SAP21 Computer Structure and Architecture Students will get acquainted with the basic architecture and program information and common variables. BIK-SIP21 Network Project 1 minute and adjust to program information and common variables. BIK-SIP21 Network Project 1 minute and program controlled simple processor is practically implemented in its devote to designing communication protocols and their winformation and common variables. BIK-SP21 N	· · · · · · · · · · · · · · · · · · ·			
BIK-PR.21 Project management not only as a common dictorary and setting necessary processes will be repeating and / or managing projects, but also as a social art. 20 years of experience not only in Till visions positions and different projects available at your hands. BIK-PSI 21 Computer Networks ZZK 5 BIK-PSI 21 Computer Networks ZZK 5 BIK-PSI 21 Computer Networks A state terminologies, protection, and services commonly used in local networks and in the internet as well. The textures will be amended by proservinants that introduce students into network programming and demonstrate the abilities of advanced retworks technologies, Students protecting visiting to protecting and the protections of the computer internet as well. The textures will be amended by proservinants that introduce students into network programming and demonstrate the abilities of advanced retworks technologies, Students will be a mended by proservinants that introduce students into network programming and demonstrate the abilities of advanced retworks technologies, Students will be abilities of protecting into the protection of the prote			•	
Project management not anny as a common dictionary and setting necessary processes while preparing and/ or managing projects, but also as a social art. 20 years of experience on only in Jin in various positions and different projects available at your hands. BIK-PSI.21	., (,		7 3 4 3	33
only in IT in various positions and different projects available at your hands. Computer Networks	BIK-PRR.21	Project management	Z,ZK	5
EIK-SP.21 Computer Networks The course introduces students to the principles of computer networking. It consets basis technologies, protocols, and services commonly used in local networks and in the linement as well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced network technologies. Students representative verify configurations and management of network devices in the let within the environment of the operating systems in Livux and Ciscon ICSs. BIK-PST.21 The probability of the probability of the probability and Statistics BIK-SP.21 The probability of the probability of the probability of the probability and Statistics The statistical dependence of two or more random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction they will be able to perform the statistical dependence of two or more random variables. BIK-SP.21 Computer Structure and Architecture BIK-SAP.21 Computer Structure and Architecture Computer Structure and Architecture BIK-SP.21 Computer Structure and Architecture Computer Structure and Architecture BIK-SP.21 Computer Structure and Architecture Computer Structure and Architecture BIK-SP.21 Network of the statistical dependence of two or more random variables. BIK-SP.21 Network of the structure and Architecture BIK-SP.21 Network of the structure and Architecture and a structure and Architecture and a percentage and applications of consecsor is practically implemented in the labs using programmable circuits (FPGA), a single-chip microcomputer, and more design (FDA) tools. BIK-SP.21 Network of the structure and Architecture and Architecture and Architecture and Architecture and Arc	Project management not only as a common diction	nary and setting necessary processes while preparing and / or managing projects, but also as a so	cial art. 20 years of exp	erience not
the course introduces students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local intervorks and in the Internet as well. The lectures will be amended by prosemisms that introduce students into network programming and demonstrate the abilities of proceedings. Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable distributions and solve applicable probabilistic pr				
well. The lactures will be amended by proseminant that introduce students into network programming and demonstrate the abilities of advanced network technologies. Students programming programming and demonstrate the abilities of a various control of the students of the potential systems in turn and Clasco ISS. BIK.SP.12 Tyrobabilistic thinking, the ability to synthesize or on and posterior information and learn to work with random variables. They will be able to perform extinctions of an international programming and programming and the programming and extinctions of a control of the students will be able to perform extinguished the programming and the students of the programming will be able to perform extinguished of unknown distributions parameters from anoma sample characteristics. They will also be introduced to the methods for testing statistical hypotheses and determining the statistical dependence of two or more random variables. BIK.SP.21 Communication, nethods of data transfers between the will. The lack students of the statistical dependence of two or more random variables. BIK.SP.21 Communication, nethods of data transfers between the will. The lack students of the statistical dependence of two or more random variables. BIK.SP.21 Network Programming will be students to the statistical programming the lack students of the statistical dependence of two or more random variables. BIK.SP.21 Network Programming metwork applications in the statistical dependence of the course covers fundamental topics of programming network applications in the course covers fundamental topics of programming network applications of the students of the statistical dependence of the statistical de	· · · · · · · · · · · · · · · · · · ·	·		
practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS. BIK-PST21 Probability and Statistics ZZK 5 Students will learn the basics of probabilistic trinking, the ability to synthesize prior and posterior information and kenn to work with random variables. They will be abile to apply basic models of remotive variable distributions and solve applied probabilistic pr				
BIK-SP2.1 Probabilistic minking, the ability to syntheses prior and posterior information and learn to work with random variables. They will be abile to papit beast controlled of random variable distributions and solve applied probabilistic proteiners in informatics and computer science. Using the statistical induction they will be abile to perform estimations of unknown distributions and solve applied probabilistic proteiners in informatics and computer science. Using the statistical induction they will be abile to perform estimations of unknown distributions parameters from random sample characteristics. They will also be introduced to the methods for testing statistical hypotheses and determining the statistical dependence of two or more random variables. BIK-SP21	· · ·		•	Students
Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with admoin variables. They will be able to perform estimation would be a standard probabilistic probabili				5
expected of random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical hypotheses and determining the statistical dependence of two or more random variables. BIK-SAP.21	· ·	•		
the statistical dependence of two or more random variables. Computer Structure and Architecture Z,ZK 5			•	
BIK-SR-21 Computer Structure and Architecture Z,K S Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arithmetic-logic unit, controllers, remony, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple processor is practically implemented in the labs using programmable circuits (PPGA), a single-chip microcomputer, and modern design (EDA) tools. BIK-SIP.21 Network Programming Network applications. It consists of 4 parts. The introductory part is focused on low-level programming in settle programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming in settle programming and applications of middleware technologies. The final part introduces basic modern models of distributed computing - P2P and blockchain. All topics will be principles and applications of middleware technologies. The final part introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in computer labs using a chosen programming language environment. BIK-SP1.21 Team Software Project 1 Team Software Project 1 Team Software Project 1 Team Software Project 1 Team Software Project 2 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). KZ SIK-SP2.21 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). KZ This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). KZ This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). KZ This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). KZ This course is presented in Czech. However, the	estimations of unknown distributional parameter	s from random sample characteristics. They will also be introduced to the methods for testing statis	stical hypotheses and d	etermining
Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arithmetic-logic unit, controllers, memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple processor is practically implemented in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools. BIK-SIP.21 Network Programming A part of a part of the programming detection of their verification. The third part introduces the principles and applications of middleware technologies. The final part introduces their modern design grommunication protocols and their verification. The third part introduces the principles and applications of middleware technologies. The final part introduces their modern design distributed computing - P2P and block-chia. All topics will be first explained theoretically and then practices in computer labs using a chosen programming language environment. BIK-SP1.21 Team Software Project 1 Suddents gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will wink on a specific project. The teacher, in the role of the team and finished in the BIE-SP2 course. BIK-SP2.21 This course is presented in Teach. However, there is an English variant in the program Informatics (B1801 / 4753). BIK-SPS.21 Administration of Computer Networks and Services SIK-SPS.21 Administration of Computer Networks and Services SIK-SPS.21 Language SQL Language SQL Language SQL SUcreases will be demonstrated on Protectical skills will be gained by practical hands-on experience with real networks infrastructure. BIK-SPS.21 Applications of storage systems architecture. The module explains principles of data store, prot				
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	•			
exercises or the course, an active approach to the creation or individual parts or the pachetor's thesis is assumed.		·	,	vithin the
	exercises of the	, occuso, an active approach to the creation of individual parts of the bachelor's thesis is assumed.	<u>'</u>	

BIK-TJV.21	Java Technology	Z,ZK	5
_	rrse is to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get acqua	,	_
concepts and will	be able to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing the	e course students	will be able
	to participate in the development of software systems on the Java platform.		
BIK-TPS.21	Computer Networks Technologies	Z,ZK	5
The course introdu	uces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical	al layer with the ov	erlap to the
link layer. The lectu	res provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies	gies will be demo	nstrated and
with the most impo	rtant ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethern	et, modern wireles	ss networks,
	always with focus on high-speed networks.		
BIK-TUR.21	User Interface Design	Z,ZK	5
	asic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where softwa	•	
communicate with	the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gain	n an overview of n	nethods that
DIV TZDO4	bring users into the development process to ensure optimal interface for them.	7 71/	
BIK-TZP.21	Technological Fundamentals of Computers	Z,ZK	5
- '	inted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer si oduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to redu		
-	um operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a con	· · · · · · · · · · · · · · · · · · ·	
	(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.	ipator power capp	ny looko liko
BIK-UKB.21	Introduction to Cybersecurity	Z.ZK	5
_	urse is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over	,	1 - 1
	and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace rec	gulations.	
BIK-UOS.21	Unix-like Operating Systems	KZ	5
Unix-like operating	systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu	nctions of multius	er operating
systems for comp	uters and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic propert	ties of this OS fam	ily, such as
l ·	eads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level of		
	to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting in		
BIK-VDC.21	Virtualization and Data Centers	Z,ZK	5
	rse is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and	•	
	h as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data cer	_	
	rid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications. ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or		
BIK-VPS.21			5
_	Selected Topics in Computer Networking pon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technolo	Z,ZK	1 -
	al area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical	•	
	rices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance		our notwork
BIK-ZSB.21	Basics of System Security	Z,ZK	5
	purse is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forens	1 '	
_	analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of moder	-	
	as well as skills needed for independent work in the area of operating system security incident analysis.		•
BIK-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
	This course is presented in Czech.	•	·
TV1	Physical Education	Z	0
TV2K1	Physical Education 2	Z	1
TVV	Physical education	Z	0
T) () (0		-	 -

Physical education

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 2025-08-01, time 09:47.

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