Study plan

Name of study plan: Bachelor Specialization Information Security, 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: prof. lng.

Róbert Lórencz, CSc., email: robert.lorenz@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 Jan Janoušek, 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, Jan Trávní ek, Ladislav Vagner, Josef Vogel, Ond ej Štorc, 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 (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

BIK-AG1.21	Algorithms and Graphs 1	Z,ZK	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,ZK

5

Students 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	Z	14
BIK-BPR.21	Bachelor project	Z	1

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.

BIK-DBS.21 Database Systems

Z.ZK

5

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

5

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

5

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

5

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

6

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

5

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

5

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.

BIK-PA1.21 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

BIK-PA2.21 Programming and Algorithmics 2

with linked lists

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).

BIK-SAP.21 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

Ζ

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

3

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

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-IB-PS.21

Name of the group: Compulsory Courses of the Specialization Information Security, 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:

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.21	Unix Administration Zden k Muziká, Petr Zemánek Petr Zemánek Zden k Muziká (Gar.)	Z,ZK	5	14KP+4KC	L	PS
BIK-ASB.21	Applied Network Security Ji i Dostál	Z,ZK	5	14KP+4KC	; Z	PS
BIK-APS.21	Architectures of Computer Systems Michal Štepanovský Michal Štepanovský (Gar.)	Z,ZK	5	14KP+4KC	, Z	PS
BIK-BEK.21	Secure Code Josef Kokeš Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	14KP+4KC	; L	PS
BIK-EHA.21	Ethical Hacking Ji í Dostál, Andrej Šimko, Martin Kolárik Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	14KP+4KC	L L	PS
BIK-HWB.21	Hardware Security Ji í Bu ek	Z,ZK	5	14KP+4KC	; Z	PS
BIK-UKB.21	Introduction to Cybersecurity	Z,ZK	5	21KP+2KC	Z	PS
BIK-ZSB.21	Basics of System Security Ji í Dostál, Marián Svetlík Ji í Dostál Marián Svetlík (Gar.)	Z,ZK	5	14KP+4KC	; Z	PS

Characteristics of the courses of this group of Study Plan: Code=BIK-IB-PS.21 Name=Compulsory Courses of the Specialization Information Security, part-time study, version 2021

BIK-ADU.21 Unix Administration Z,ZK 5

Students will learn the internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They will understand the differences between user and administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights, file systems, disk subsystems, processes, memory, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knowledge from the lectures on specific examples from practice.

BIK-ASB.21 Applied Network Security

Z,ZK

5

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.21 Architectures of Computer Systems

Z,ZK

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Students will learn the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Special emphasis is given on the pipelined instruction processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of instruction processing not only in scalar processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of the sequential model of the program. The course further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence and consistency in such systems.

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

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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.21 Hardware Security

Z.ZK

5

The course deals with hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the operating principles of cryptographic modules, 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 methods of efficient implementations of ciphers.

BIK-UKB.21 Introduction to Cybersecurity

Z,ZK

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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-ZSB.21 Basics of System Security

z,zk

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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: 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-IB-VO.21

Name of the group: Elective Vocational courses originating from neighboring spec. for bachelor spec.BI-BIT,

ver. 2021

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

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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-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-APS.1	Architectures of Computer Systems Pavel Tvrdík	Z,ZK	5	14KP+4KC	, z	VO
BIK-IOT.21	Internet of Things Jan Jane ek	Z,ZK	5	14KP+4KC	Z	VO
BIK-KOM.21	Conceptual Modelling Robert Pergl, Mohamed Bettaz Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-OOP.21	Object-Oriented Programming Filip K ikava Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-PPA	Programming Paradigms Jan Janoušek	Z,ZK	5	14KP+4KC	Z	VO
BIK-SIP.21	Network Programming Jan Fesl	Z	5	14KP+4KC	Z	VO
BIK-SWI.21	Software Engineering Ji í Mlejnek, Zden k Rybola Zden k Rybola Ji í Mlejnek (Gar.)	Z,ZK	5	14KP+2KC	L	VO

BIK-SP1.21	Team Software Project 1 Ji í Mlejnek Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	5	8KC		VO
BIK-SP2.21	Team Software Project 2 Ji í Mlejnek Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	5	4KC		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 i Dostál	Z,ZK	5	14KP+4KC	L	VO
BIK-TJV.21	Java Technology Ond ej Rozinek Ond ej Rozinek (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-TPS.21	Computer Networks Technologies Vladimír Smotlacha	Z,ZK	5	14KP+4KC	Z	VO
BIK-IDO.21	Introduction to DevOps Ji í Mlejnek, Tomáš Vondra Tomáš Vondra Ji í Mlejnek (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
BIK-VDC.21	Virtualization and Data Centers Ji í Kašpar Ji í Kašpar Ji í 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-IB-VO.21 Name=Elective Vocational coneighboring spec. for bachelor spec.BI-BIT, ver. 2021	ourses origina	ating from
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 fore	1 ' 1	
such as malware analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of mo	dern operating sys	stems security,
as well as skills needed for independent work in the area of operating system security incident analysis.		-
BIK-AWD.21 Web and Database Server Administration	Z,ZK	5
Students will get acquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a	1 ' 1	-
web service systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of		
BIK-APS.1 Architectures of Computer Systems	Z,ZK	5
This course is presented in Czech.	2,21	· ·
BIK-IOT.21 Internet of Things	Z,ZK	5
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	1 ' 1	-
actuators, wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview		
application areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development		
ESP, STM; software - Arduino, Raspberry Pi OS).	environments (na	idware - Artivi,
	7.74	5
BIK-KOM.21 Conceptual Modelling	Z,ZK	-
The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key	-	
categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological state in the control of the contr	_	
notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data repre		- 1
learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEN	no method and the	BPIVIN HOLALION
will be taught. The course is designed with the respect to continuation in software implementations.	7.71	
BIK-OOP.21 Object-Oriented Programming	Z,ZK	5
Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together.		
course students get acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The e	mphasis is on prac	ctical techniques
for developing software, which includes testing, error handing, refactoring, and application of design pattern.		
BIK-PPA Programming Paradigms	Z,ZK	5
The course deals with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of paradigms.		
programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming		
on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern main	nstream programm	ning languages
such as C++ and Java.		
BIK-SIP.21 Network Programming	Z	5
The course covers fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming network applications.	ramming using B	3D sockets. The
second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of midd	•	
introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in c	omputer labs using	g a chosen
programming language environment.		
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. The	y 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 har		
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design	gn and testing. Wit	hin 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	t.	
BIK-SP1.21 Team Software Project 1	KZ	5
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the	ne 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 te	acher, 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 fu	rther developed
and finished in the BIE-SP2 course.		
BIK-SP2.21 Team Software Project 2	KZ	5
This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	. '	
BIK-SPS.21 Administration of Computer Networks and Services	Z,ZK	5
The aim of the course is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administ		
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		• •

with real network infrastructure.

BIK-TAB.21 Applications of Security in Technology

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-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

BIK-TPS.21 Computer Networks Technologies

to participate in the development of software systems on the Java platform.

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-IDO.21 Introduction to DevOps

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.

BIK-VDC.21 Virtualization and Data Centers

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

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.

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-IB-PV.21

Name of the group: Compulsory elective courses of the specialization Information Security, part-time study,

v.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-TAB.21	Applications of Security in Technology Ji í Dostál	Z,ZK	5	14KP+4KC	L	PV
BIK-VES	Embedded Systems Miroslav Skrbek	Z,ZK	5	13KP+4KC	L	PV
BIK-ZUM.21	Artificial Intelligence Fundamentals Pavel Surynek	Z,ZK	5	14KP+4KC	L	PV

Characteristics of the courses of this group of Study Plan: Code=BIK-IB-PV.21 Name=Compulsory elective courses of the specialization Information Security, part-time study, v.2021

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-VES Embedded Systems

Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedded processors, their integrated peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools

Artificial Intelligence Fundamentals

Z,ZK

Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical tasks from the areas of state space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithms and the neural networks, will be presented as well.

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.

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 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	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 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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BIK-ADW.1	Windows Administration Miroslav Prágl	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 Tomáš Kalvoda	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 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 (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	Z,ZK	5	14KP+4KC	L	V
BIK-KSA	Cultural and Social Anthropology	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		Z,ZK	5
	Object-Oriented Programming	1 '	-
	ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate togo		
	acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The	e emphasis is on prac	licai techniques
	re, 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.	Students get a broad	er overview of
	tions and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.	T	
BIK-ADW.1	Windows Administration	Z,ZK	4
This course is preser	in Czech.		
BIK-STO	Storage and Filesystems	Z,ZK	4
	principles and current solutions of storage systems architecture. The module explains principles of data store, protection, an	d archiving, as so as	storage scaling
load balancing and h	igh availability.		
BIE-DIF	Differential equations	Z,ZK	5
This course provides	a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to esse	ential solution methods	s like separation
of variables. Key theo	prems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covere	ed with methods like of	characteristic
polynomial analysis,	followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world applic	cations. Finally, an intr	oduction to
partial differential equ	uations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving C	DDEs and PDEs, inclu	uding implicit
and explicit Euler me	thods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
BIK-EJA	Enterprise Java	KZ	4
The course covers Ja	va technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems).	. These applications ty	pically manag
persistent data, are a	ccessible to clients via the REST API and are created in the microservice architecture and deployed into orchestrated conta	iners.	
			2
BIK-HMI	History of Mathematics and Informatics	l ZK l	
BIK-HMI This course is preser	History of Mathematics and Informatics ated in Czech.	ZK	3
This course is preser	nted in Czech.	' '	
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List of courses of this pass:

	Name of the course Completion	Credits
BI-ANG	English Language, Internal Certificate ZK Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-ANG	2
BI-ANG1	English Language Examination without Preparatory Courses Z,ZK	2
BI-BAP.21	Bachelor Thesis Z	14
BIE-DIF	Differential equations Z,ZK	5
	lational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential solution methods I	1
of variables. Key theorems polynomial analysis, follow	on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered with methods like of ved by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world applications. Finally, an intended is (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODEs and PDEs, included and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.	naracteristic oduction to
BIE-EEC	English language external certificate Z	4
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 Common European Framework of Reference for Languages.	
BIK-AAG.21	Automata and Grammars Z,ZK	5
Students are introduced to b	pasic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite automata, regula	expressions
and regular grammars, trans	slation 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.	
BIK-ADU.21	Unix Administration Z,ZK	5
Students will learn the intern	al structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They will understand t	e difference
between user and administra	ator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights, file systems, disl	subsystems
processes, memory, netwo	ork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knowledge from the specific examples from practice.	lectures on
BIK-ADW.1	Windows Administration Z,ZK	4
'	This course is presented in Czech.	'
BIK-AG1.21	Algorithms and Graphs 1 Z,ZK	5
	in Czech. The course covers the basics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowled	e of every
computing curriculum. Stude	ents learn techniques of proofs of correctness of algorithms and techniques of asymptotic mathematics for estimation of their complexity in th	best, worse
or average case (the course	includes basics from probability theory needed for understanding randomized algorithms). Within exercises students learn applications of stud	ed algorithm
	for solving practical problems.	
BIK-APS.1	Architectures of Computer Systems Z,ZK	5
<u>'</u>	Architectures of Computer Systems Z,ZK This course is presented in Czech.	<u>'</u>
BIK-APS.21	Architectures of Computer Systems Z,ZK This course is presented in Czech. Architectures of Computer Systems Z,ZK	5
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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-EHA.21 Ethical Hacking Z,ZK 5 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-EJA Enterprise Java The course covers Java technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems). These applications typically manage persistent data, are accessible to clients via the REST API and are created in the microservice architecture and deployed into orchestrated containers. BIK-GIT.21 SW Development Technologies 3 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-HMI** History of Mathematics and Informatics ZK 3 This course is presented in Czech. BIK-HWB.21 Hardware Security Z,ZK 5 The course deals with hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the operating principles of cryptographic modules, 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 methods of efficient implementations of ciphers. BIK-IDO.21 Introduction to DevOps 7.7K 5 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. BIK-IOT.21 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-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. 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-KSA** Cultural and Social Anthropology The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity of the world - examples from anthropological research from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization,, material culture, language, health, history, death, etc ...). The course is an interesting alternative to other humanities, taught at FIT. 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 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 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-OOP.21 Object-Oriented Programming Z,ZK 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-OSY.21 Operating Systems Z.ZK 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-PA1.21	Programming and Algorithmics 1	Z,ZK	7
	ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, struc	'	1 1
statements, function	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searchi with linked lists.	ng, sorting, and m	nanipulating
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 n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e copying/moving of objects, operator overloading, inheritance, polymorphism).		
BIK-PJV	Programming in Java This course is presented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753)	Z,ZK	4
BIK-PKM	Introduction to Mathematics This course is presented in Czech.	Z	4
BIK-PPA The course deals	Programming Paradigms with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of partic	Z,ZK	5 Functional
programming parac	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The sand on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr such as C++ and Java.	ne principles are d	emonstrated
BIK-PRR.21	Project management	Z,ZK	5
Project manageme	nt not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a social only in IT in various positions and different projects available at your hands.		perience not
BIK-PSI.21	Computer Networks	Z,ZK	5
well. The lecture	ces students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local r is will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced netwactically verify configurations and management of network devices in the lab within the environment of the operating systems Linux a	vork technologies.	
BIK-PST.21	Probability and Statistics	Z,ZK	5
	the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. T	•	
	om variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction in nown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical	=	
Community of unit	the statistical dependence of two or more random variables.	hypotheses and	determining
BIK-SAP.21	Computer Structure and Architecture	Z,ZK	5
	acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arith	_	
memory, I/O commi	unication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple proces in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.	ssor is practically i	implemented
BIK-SIP.21	Network Programming	7	5
	fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level program	nming using BSD	
•	oted to designing communication protocols and their verification. The third part introduces the principles and applications of middlewa	_	
	modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in comprogramming language environment.		
BIK-SP1.21 Students gain ha	Team Software Project 1 ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the	KZ e BIF-SWI course	that runs
concurrently and th	nat teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teach ularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software art and finished in the BIE-SP2 course.	ner, in the role of the	he team and
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	5
BIK-SPS.21	Administration of Computer Networks and Services	Z,ZK	5
	rse is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrated. The course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained by with real network infrastructure.	-	
BIK-SQL.1	Language SQL	KZ	4
triggers, recursive q structures like inde	knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In paqueries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan article. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Oracle DBMS. PostgreSQL.	of view of specialized nd possibilities of i	zed database its. changes
BIK-STO The student will lea	Storage and Filesystems rn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archi load balancing and high availability.	Z,ZK iving, as so as sto	4 rage scaling,
BIK-SWI.21	Software Engineering	Z,ZK	5
	ainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They co		
	ring the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hands-c nguage UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design a	•	
	Idents also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their		
BIK-TAB.21 The goal of the co	Applications of Security in Technology urse is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stude cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware	_	5 overview of
BIK-TDP.21	Documentation and Presentation	KZ	3
The course is focus	sed on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically file	•	
	of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically prese		
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 exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.	uays of teaching.	vviuilli lile

BIK-TJV.21	Java Technology	Z,ZK	5
	urse is to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get acqua		
	be able to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing the		
	to participate in the development of software systems on the Java platform.		
BIK-TPS.21	Computer Networks Technologies	Z,ZK	5
	uces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical		1
link layer. The lectu	ares 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	ortant ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethern always with focus on high-speed networks.	et, modern wireles	ss 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	re and other prod	ucts do not
communicate with	the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gai	n an overview of n	nethods that
	bring users into the development process to ensure optimal interface for them.		
BIK-TZP.21	Technological Fundamentals of Computers	Z,ZK	5
Students get acqua	inted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer s	tructures look like	at the lowest
level. They are intr	oduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to redu	ice the consumption	on; what the
limits to the maxin	num 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	nputer power supp	ly looks like
	(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.	1	
BIK-UKB.21	Introduction to Cybersecurity	Z,ZK	5
The goal of the co	urse is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over		cyberspace
	and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace required.		
BIK-UOS.21	Unix-like Operating Systems	KZ	5
	g systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu		
	uters and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic proper		I .
1	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		
	e 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	•	
	th 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.	-	- 1
	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or		
BIK-VES	Embedded Systems	Z,ZK	5
	esign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedd	,	- 1
Otadorito idarrito d	peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	ou procedere, are	on integrated
BIK-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
	pon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technology	,	- 1
	al area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical	-	
	vices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance	-	
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.	. 3,	"
BIK-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
	luced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classic		1
	ii-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm		
	be presented as well.		
BIK-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
		,	1
	This course is presented in Czech.		
TV1	This course is presented in Czech. Physical Education	Z	0

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 2025-11-05, time 20:29.

TV2K1

TVV

TVV0

Physical Education 2

Physical education

Physical education

0