#### Study plan

# Name of study plan: Bachelor Specialization Computer Systems and Virtualization, 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. Ing. Pavel Tvrdík, CSc., email: pavel.tvrdik@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 <b>Jan Holub</b> 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 <b>Róbert Lórencz</b> Róbert Lórencz (Gar.)	Z,ZK	5	14KP+4KC	E 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	<b>Operating Systems</b> Michal Šoch, Jan Trdli ka, Pavel Tvrdík <b>Michal Šoch</b> 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 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
	ne courses of this group of Study Plan: Code=BIK-PP.21 Name=C ne study, version 2021	Compulsory	Courses	of Bache	lor Study	Program

BIK-AG1.21	Algorithms and Graphs 1	Z,ZK	5
	I in Czech. The course covers the basics from the efficient algorithm design, data structures, and graph theory, belonging to	I ' I	-
	Students learn techniques of proofs of correctness of algorithms and techniques of asymptotic mathematics for estimation of t		
or average case (the co	urse includes basics from probability theory needed for understanding randomized algorithms). Within exercises students learn	applications of st	udied algorithms
for solving practical prol	plems.		-
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 fin		lar expressions,
and regular grammars,	translation finite automata, construction and use of pushdown automata, hierarchy of formal languages. Knowledge acquired	through the mode	ule is applicable
to creation of algorithms	s 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 th	e semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange th	e partial tasks tha	t he / she will
perform during the sem	ester 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 ente	rs the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.	cvut.cz/student/stu	udijni/formulare).
The completed and sign	ned 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
	ted more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the a	ssignment so that	t the assignment
	nd approved at the end of the semester.		
BIK-DBS.21	Database Systems	Z,ZK	5
	d with the architecture of the database engine and typical user roles. They learn to design the structure of a smaller data stor		
, , , , , , , , , , , , , , , , , , ,	el and then implement them in a relational database engine. They get acquainted with the SQL language and also with its the		
	uainted with the principles of relational database schema normalization. They understand the basic concepts of transaction	processing and co	ontrol of parallel
	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
• ·	nted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts		
	to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The co	ourse also lays do	wn the basics of
	ber theory, with emphasis on modular arithmetics.		
BIK-KAB.21	Cryptography and Security	Z,ZK	5
	d the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able t		
	based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in a		
	n using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedure		
BIK-LA1.21	Linear Algebra 1	Z,ZK	5
	nts to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the file		-
	s. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian eli		
	ar manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eige nonstrate some applications of these concepts in computer science.	Ivalues and eigen	ivectors of a
BIK-MA1.21		Z,ZK	5
	Mathematical Analysis 1 introducing students to the set of real numbers and its properties, and we note its differences with the set of machine number		-
	and variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of fu	-	-
	iding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation		
	of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical desc		
BIK-MA2.21	Mathematical Analysis 2	Z.ZK	6
	he theme of analysis of real functions of a real variable initiated in BIK-MA1 by introducing the Riemann integral. Students w	I ' I	-
	method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylors theorem		
	bed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms		
	oduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and		-
analytical method of loc	alization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the ir	tegration of multiv	ariate functions.
This course can be enro	olled only after successful completion of the course BIK-MA1, which can be replaced by the course BIK-ZMA in the case of r	epetitive students.	
BIK-OSY.21	Operating Systems	Z,ZK	5
In this course that is a fo	llow-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 s	cheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS n	onitoring. They ar	e able to design
and implement simple n	nultithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.		
BIK-PSI.21	Computer Networks	Z,ZK	5
The course introduces s	students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in loc		n the Internet as
well. The lectures will be	e amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced net	work technologies	. Students
practically verify configu	rrations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS	j.	

BIK-PST.21	Probability and Statistics	Z,ZK	5
-	isics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable	,	le to apply basic
	le distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction	-	
estimations of unknown d	listributional parameters from random sample characteristics. They will also be introduced to the methods for testing statisti	cal hypotheses ar	nd determining
the statistical dependence	e of two or more random variables.		
BIK-PA1.21	Programming and Algorithmics 1	Z,ZK	7
Students gain the ability t	o formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, s	tructured, pointer	s), expressions,
statements, functions, co	ncept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searc	ching, sorting, and	d manipulating
with linked lists.			
BIK-PA2.21	Programming and Algorithmics 2	Z,ZK	7
Students know the instrur	nents of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack,	queue, enlargeab	le array, list, set,
table). They learn these s	kills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (	e.g., template pro	gramming,
copying/moving of objects	s, operator overloading, inheritance, polymorphism).		
BIK-SAP.21	Computer Structure and Architecture	Z,ZK	5
Students will get acquain	ted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of ari	thmetic-logic unit	, controllers,
memory, I/O communicati	ion, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple pro	ocessor is practica	ally implemented
	mable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.		
BIK-TZP.21	Technological Fundamentals of Computers	Z,ZK	5
Students get acquainted	with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how compute	er structures look	like at the lowest
	I to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to re		•
	erating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a d	computer power s	upply looks like
(in principle). In the labs,	students model the behavior of basic electrical circuits in SW Mathematica.		
BIK-GIT.21	SW Development Technologies	Z	3
This course is aimed at o	ne of the rudimental team software development technology - version control. To be more specific, we will introduce studen	ts to Git, the infor	mation manager
from hell, as Linus Torval	ds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.		
BIK-TDP.21	Documentation and Presentation	KZ	3
The course is focused on	the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typical	ly final university f	heses. Students
learn to create text of a te	echnical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically pr	esent it in front of	classmates and
the teacher. The course is	s intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first 1	4 days of teaching	g. Within the
exercises of the course, a	an active approach to the creation of individual parts of the bachelor's thesis is assumed.		
BIK-UOS.21	Unix-like Operating Systems	KZ	5
	ns represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative		
systems for computers ar	nd their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic prop	erties of this OS f	amily, such as
processes and threads, a	ccess rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the lev	el of advanced us	ers who are not
only able to utilize powerf	ul 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-PS-PV.21

Name of the group: Compulsory courses of specialization Computer Systems and Virtualization, part-time study, 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-AWD.21	Web and Database Server Administration Lukáš Ba inka, Michal Valenta Lukáš Ba inka Michal Valenta (Gar.)	Z,ZK	5	14KP+4KC	z	PS
BIK-APS.21	Architectures of Computer Systems Michal Štepanovský Michal Štepanovský Michal Štepanovský (Gar.)	Z,ZK	5	14KP+4KC	z	PS
BIK-SPS.21	Administration of Computer Networks and Services Libor Dostálek, Jan Kubr Pavel Tvrdík Libor Dostálek (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
BIK-VDC.21	Virtualization and Data Centers Ji í Kašpar <b>Ji í Kašpar</b> Ji í Kašpar (Gar.)	Z,ZK	5	14KP+4KC	L	PS
BIK-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	14KP+4KC	; L	PS
BIK-ZSB.21	Basics of System Security Ji í Dostál, Marián Svetlík <b>Ji í Dostál</b> Marián Svetlík (Gar.)	Z,ZK	5	14KP+4KC	Z	PS

Characteristics of the courses of this group of Study Plan: Code=BIK-PS-PV.21 Name=Compulsory courses of specialization Computer Systems and Virtualization, part-time study, 2021

BIK-ADU.21	Unix Administration	Z,ZK	5
Students will learn the inte	ernal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T	hey will understan	d the differences
	strator roles. They will get theoretical and practical knowledge of user management and administration, of users access righ		
	vork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the k	nowledge from th	e lectures on
specific examples from p	ractice.		
BIK-AWD.21	Web and Database Server Administration	Z,ZK	5
Students will get acquain	ted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a	nd backup compl	ex database and
web service systems. The	e principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of	a web server.	
BIK-APS.21	Architectures of Computer Systems	Z,ZK	5
	nstruction principles of internal architecture of computers with universal processors at the level of machine instructions. Sp	ecial emphasis is	given on the
pipelined instruction proce	essing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the p	principles of instru	ction processing
not only in scalar process	sors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness o	of the sequential r	nodel of the
program. The course furth	ner elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory $lpha$	pherence and cor	sistency in such
systems.			
BIK-SPS.21	Administration of Computer Networks and Services	Z,ZK	5
	to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administ		perating systems
Linux and Windows. The o	course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained	I by practical hand	ls-on experience
with real network infrastru	ucture.		
BIK-IDO.21	Introduction to DevOps	Z,ZK	5
	e topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of		ices. The course
covers the tools to suppo	rt software development, testing and compilation. It also focuses on tools for automating infrastructure management and bu	ilding and deploy	ing software to
the Cloud. It is an introdu	ction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquai	nted with modern	technologies
used in practice.			Ū
BIK-VDC.21	Virtualization and Data Centers	Z.ZK	5
The aim of the course is t	o familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design	and implementation	on of data center
infrastructure, such as va	rious kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data of	center technologie	es from private
to public and hybrid cloud	Is. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications	s. Students will un	derstand the
design, validation, and op	peration of complex infrastructures for modern applications with respect to scalability and protection against overloads, outa	ges, and data los	ses.
BIK-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
	e Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and tech	nologies used in n	nodern computer
	networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practi	-	
devices in the lab and lea	arning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securit	y.	
BIK-ZSB.21	Basics of System Security	Z.ZK	5
	to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of fore	,	-
-	s or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of mod		
	or 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-PV-VO.21

Name of the group: Elective Vocational Courses for a Bachelor Specialization, part-time study, version 2021 Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

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-ASB.21	Applied Network Security Ji í Dostál <b>Ji í Dostál</b> Ji í Dostál (Gar.)	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 Šimko, Martin Kolárik <b>Ji í Dostál</b> 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 Jan Jane ek (Gar.)	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	<b>Object-Oriented Programming</b> Filip K ikava, Filip íha <b>Filip K ikava</b> 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 Jan Fesl Jan Fesl (Gar.)	Z	5	14KP+4KC	Z	VO

BIK-SWI.21	Software Engineering	Z,ZK	5	14KP+2KC	L	VO
DIR-3001.21	Ji í Mlejnek, Zden k Rybola <b>Zden k Rybola</b> Ji í Mlejnek (Gar.)	Ζ,ΖΝ	5	1417-72700	L	
BIK-SP1.21	Team Software Project 1         Ji í Mlejnek Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	5	8KC		VO
BIK-SP2.21	<b>Team Software Project 2</b> Ji í Mlejnek <b>Ji í Mlejnek</b> 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 í Dostál	Z,ZK	5	14KP+4KC	L	VO
BIK-TJV.21	Java Technology Ji í Dan ek Ond ej Guth (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-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	Z,ZK	5	14KP+4KC	L	VO
BIK-ZSB.21	Ji í Kašpar <b>Ji í Kašpar</b> Ji í Kašpar (Gar.) Basics of System Security Ji í Dostál, Marián Svetlík <b>Ji í Dostál</b> Marián Svetlík (Gar.)	Z,ZK	5	14KP+4KC	Z	VO
The aim of the course is to Linux and Windows. The c	Administration of Computer Networks and Services of deepen the theoretical knowledge of network technologies and protocols in the enviror ourse syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE			ninistrated un		0,
with real network infrastru	cture.					
BIK-IDO.21						
-	ntroduction to DevOps			1	,ZK	5
The course deals with the	topic of DevOps and prepares future developers and administrators for a modern culture		•	on of systems	and servic	ces. The cou
The course deals with the covers the tools to suppor	topic of DevOps and prepares future developers and administrators for a modern culture t software development, testing and compilation. It also focuses on tools for automating	infrastructure man	agement a	on of systems	and servic	ces. The country of t
The course deals with the covers the tools to suppor the Cloud. It is an introduct	topic of DevOps and prepares future developers and administrators for a modern culture	infrastructure man	agement a	on of systems	and servic	ces. The country of t
The course deals with the covers the tools to suppor the Cloud. It is an introduc used in practice.	topic of DevOps and prepares future developers and administrators for a modern culture t software development, testing and compilation. It also focuses on tools for automating tion to technologies that will then be discussed in more detail in related follow-up course	infrastructure man	agement a	on of systems nd building a cquainted wit	and servic nd deployin h modern t	ces. The court og software to echnologies
The course deals with the covers the tools to suppor the Cloud. It is an introduc used in practice.	topic of DevOps and prepares future developers and administrators for a modern culture t software development, testing and compilation. It also focuses on tools for automating stion to technologies that will then be discussed in more detail in related follow-up course //irtualization and Data Centers	infrastructure man es. The student wil	agement a I also get a	on of systems nd building a cquainted wit	and servic and deployin h modern t	ces. The court og software to echnologies 5
The course deals with the covers the tools to suppor the Cloud. It is an introduc used in practice. BIK-VDC.21	topic of DevOps and prepares future developers and administrators for a modern culture t software development, testing and compilation. It also focuses on tools for automating stion to technologies that will then be discussed in more detail in related follow-up course //irtualization and Data Centers o familiarize students with technology basis of cloud computer systems. It shows principle	infrastructure man es. The student wil	agement a I also get a used in de	on of systems nd building a cquainted wit Z sign and imp	and services and s	ees. The count of software to echnologies 5 n of data cent
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BIK-IOT.21 | Internet of Things Z,ZK 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-KOM.21 Conceptual Modelling

Z,ZK 5 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	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 em	ipnasis is on prac	tical 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 partic		
programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming.	The principles ar	e demonstrated
on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mains	stream programm	ing 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.	amming using BS	D sockets. The
second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of middley	ware technologie	s. The final part
introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in con	•	
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. They designed and implemented in teams.	, 1	oractically 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		
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design	•	
students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development.	and tooting. With	
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		
concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teaches	cher, in the role o	of the team and
concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teac project leader, regularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software a	cher, in the role o	of the team and
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#### 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-PV-PV.21

Name of the group: Compulsory elective courses of specialization Computer Systems and Virtualization, 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:

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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-BIG.21	DB Technologies for Big Data Josef Gattermayer	KZ	5	14KP+4KC	; L	PV
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

## Characteristics of the courses of this group of Study Plan: Code=BIK-PV-PV.21 Name=Compulsory elective courses of specialization Computer Systems and Virtualization, 2021

BIK-TAB.21	Applications of Security in Technology	Z,ZK	5
The goal of the course i	s to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stu	dents get a broad	ler overview of
cybersecurity applicatio	ns and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.		

	DB Technologies for Big Data				KZ	5
	, ced into the field of Big Data processing where nonrelational (NoSQL) database engines ar dents were able to choose suitable tools (mostly open source) and techniques,design and i		-			
	on/aggregation, presentation). Students get acquainted with various architectures for proces as will be supplemented with specific case studies.	sing and storing	big data. A tl	heoretical fo	oundation and	presentation
BIK-VES	Embedded Systems			Z	Z,ZK	5
	n embedded systems and develop software for them. They get basic knowledge of the most c ramming methods, and applications. They get practical skills with development kits and too		trollers and	embedded p	processors, the	eir integrated
Name of the b	lock: Povinná zkouška z angli tiny					
	er of credits of the block: 2					
The role of the						
Code of the g	oup: BI-ZKA.21					
•	roup: English Language Exam					
	credits in the group: In this group you have to gain at I	east 2 cre	dits (at	most 4	4)	
			-		/	
Requirement (	courses in the group: In this group you have to comple	ete 1 cours	se			
•	courses in the group: In this group you have to comple group: 2	ete 1 cours	se			
Credits in the	group: 2			ompleted	d preparate	or Englis
Credits in the Note on the		tudents who	have co	•		•
Credits in the Note on the	group: 2 BI-ANG, ending with an exam for two credits, is enrolled by s courses and have a credit from the BI-A2L course. <br is enrolled by students who prepared for the exam independ</br 	tudents who > BI-ANG1, ently and do	have co ending v not have	vith an e e credit t	xam for tw from BI-A2	vo credita 2L. Thes
Credits in the Note on the	group: 2 BI-ANG, ending with an exam for two credits, is enrolled by s courses and have a credit from the BI-A2L course.  is enrolled by students who prepared for the exam independ students must complete a credit paper before their own exar	tudents who > BI-ANG1, ently and do n. After pase	have co ending v not have sing the	vith an e e credit f exam, th	from BI-A2	vo credits 2L. Thes will also
Credits in the Note on the	group: 2 BI-ANG, ending with an exam for two credits, is enrolled by s courses and have a credit from the BI-A2L course.  br is enrolled by students who prepared for the exam independ students must complete a credit paper before their own exam be recognized for the course BI-ANGS (Independent prepare	tudents who > BI-ANG1, ently and do n. After pase ation for the	have cc ending v not hav sing the English	vith an e e credit t exam, th exam) fo	from BI-A2 from BI-A2 ne student or 2 credite	vo credits 2L. Thes will also s.
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Credits in the Note on the group:	<ul> <li>group: 2</li> <li>BI-ANG, ending with an exam for two credits, is enrolled by scourses and have a credit from the BI-A2L course. <ul> <li>senrolled by students who prepared for the exam independ students must complete a credit paper before their own exam be recognized for the course BI-ANGS (Independent prepara </li></ul></li></ul>	tudents who BI-ANG1, ently and do n. After pase ation for the e semester a on European <b>Completion</b>	have co ending v not have sing the English after the Framew	vith an e e credit f exam, th exam) fo submiss vork of R Scope	from BI-A2 ne student or 2 credits sion of a e Reference.	vo credits 2L. Thes will also s. xternal <b>Role</b>

BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BIE-EEC	English language external certificate	Z	4
The BIE-ECC course ca	n be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in E	nglish comparable	e 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	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:

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 Miroslav Prágl (Gar.)	Z,ZK	4	14KP+2KC	Z	V
BIK-STO	Storage and Filesystems <i>Ji í Kašpa</i> r	Z,ZK	4	13KP+4KC	L,Z	V
BIE-DIF	Differential equations Antonella Marchesiello, Ond ej Bouchala, Jan Valdman <b>Tomáš Kalvoda</b> 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 Michal Valenta (Gar.)	KZ	4	13KP+4KC	L	V
BIK-OOP.21	Object-Oriented Programming Filip K ikava, Filip íha <b>Filip K ikava</b> Filip K ikava (Gar.)	Z,ZK	5	14KP+4KC	Z	V
BIK-PJV	Programming in Java Jan Blizni enko 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 í 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

	Object-Oriented Programming	Z,ZK	5
Object-oriented pro	pgramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate tog	1 1	ssing. In this
course students ge	et acquainted with the main principles of object-oriented programming and design, used in modern programming languages. Th	e emphasis is on prac	tical technique
or developing soft	ware, which includes testing, error handing, refactoring, and application of design pattern.		
BIK-TAB.21	Applications of Security in Technology	Z,ZK	5
The goal of the cou	urse is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries.	Students get a broad	er overview of
cybersecurity appli	cations 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 pres	ented in Czech.	1	
BIK-STO	Storage and Filesystems	Z,ZK	4
The student will lea	arn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, ar	nd archiving, as so as	storage scaling
bad balancing and	high availability.		
BIE-DIF	Differential equations	Z,ZK	5
his course provide	es a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to ess		s like separatio
f variables. Key th	eorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are cover	red with methods like	characteristic
olynomial analysi	s, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world appli	cations. Finally, an inti	oduction to
artial differential e	equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving	ODEs and PDEs, incl	uding implicit
and explicit Euler r	nethods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
3IK-EJA	Enterprise Java	KZ	4
he course covers	Java technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems)	). These applications ty	pically manag
persistent data, are	e accessible to clients via the REST API and are created in the microservice architecture and deployed into orchestrated conta	ainers.	
ЗІК-НМІ	History of Mathematics and Informatics	ZK	3
This course is pres	ented in Czech.		
3IK-SQL.1	Language SQL	KZ	4
Course is based or	n knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL languag	e. In particular stored	
riggers, recursive			program unite
	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the		
tructures like inde	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p	e point of view of speci	alized databas
		e point of view of speci plan and possibilities o	alized databas f its. changes
vill be discussed. I	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p	e point of view of speci plan and possibilities o	alized databas f its. changes
vill be discussed. I PostgreSQL.	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p	e point of view of speci plan and possibilities o	alized databas f its. changes
vill be discussed. I PostgreSQL. BIK-PJV	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on	e point of view of speci plan and possibilities o Oracle DBMS and pa	alized databas f its. changes rtially on
vill be discussed. I PostgreSQL. BIK-PJV This course is pres	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p ectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Programming in Java	e point of view of speci plan and possibilities o Oracle DBMS and pa	alized databas f its. changes rtially on
vill be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21	ectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Programming in Java sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).	e point of view of speci blan and possibilities of Oracle DBMS and pa Z,ZK	alized databas f its. changes rtially on 4 5
vill be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project manageme	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Programming in Java sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management	e point of view of speci blan and possibilities of Oracle DBMS and pa Z,ZK	alized databas f its. changes rtially on 4 5
vill be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project management only in IT in various	xes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution p ectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Programming in Java sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753). Project management int not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a	e point of view of speci blan and possibilities of Oracle DBMS and pa Z,ZK	alized databas f its. changes rtially on 4 5
will be discussed. I PostgreSQL. BIK-PJV Fhis course is pres BIK-PRR.21 Project manageme poly in IT in various BIK-PKM	wess, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution predetores will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on         Programming in Java         wented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).         Project management         ent of only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a spositions and different projects available at your hands.         Introduction to Mathematics	e point of view of speci olan and possibilities of Oracle DBMS and pa Z,ZK Z,ZK a social art. 20 years o	alized databas f its. changes rtially on 4 5 experience no
will be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project manageme only in IT in variou: BIK-PKM This course is pres	Aves, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution preventers will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on         Programming in Java         sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).         Project management         ent not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a spositions and different projects available at your hands.         Introduction to Mathematics         sented in Czech.	e point of view of speci olan and possibilities of Oracle DBMS and pa Z,ZK Z,ZK a social art. 20 years o	alized databas f its. changes rtially on 4 5 c experience no
will be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project manageme only in IT in various BIK-PKM This course is pres TVV	wess, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution prectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on         Programming in Java         sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).         Project management         ent not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a spositions and different projects available at your hands.         Introduction to Mathematics         sented in Czech.         Physical education	e point of view of speci olan and possibilities of Oracle DBMS and pa Z,ZK z,ZK a social art. 20 years o Z	alized databas f its. changes rtially on 4 5 f experience no 4
will be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project manageme only in IT in various BIK-PKM This course is pres TVV TV1	wess, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution prectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on         Programming in Java         sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).         Project management         ent on only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a spositions and different projects available at your hands.         Introduction to Mathematics         sented in Czech.         Physical education         Physical Education	e point of view of speci olan and possibilities of Oracle DBMS and pa Z,ZK z,ZK a social art. 20 years of Z Z Z	alized databas f its. changes rtially on 4 5 f experience no 4 0 0
will be discussed. I PostgreSQL. BIK-PJV This course is pres BIK-PRR.21 Project manageme only in IT in various BIK-PKM This course is pres TVV	wess, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution prectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on         Programming in Java         sented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753).         Project management         ent not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a spositions and different projects available at your hands.         Introduction to Mathematics         sented in Czech.         Physical education	e point of view of speci olan and possibilities of Oracle DBMS and pa Z,ZK z,ZK a social art. 20 years o Z	alized databas f its. changes rtially on 4 5 experience no 4 0

BIK-TUR.21	User Interface Design	Z,ZK	5
Students gain a basic o	verview of methods for designing and testing common user interfaces. They get experience to solve the problems where soft	ware and other p	roducts do not
communicate with the u	ser optimally, since the needs and characteristics of users are not taken into account during product development. Students	gain an overview	of methods that
bring users into the dev	elopment process to ensure optimal interface for them.		
BIK-KSA	Cultural and Social Anthropology	ZK	2
The one-semester cour	se aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the dive	ersity of the world	- examples from
anthropological researc	h from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization, , materia	I culture, language	e, health, history,
death, etc). The cours	se is an interesting alternative to other humanities, taught at FIT.		
BIK-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presente	d in Czech.		

### List of courses of this pass:

Code	Name of the course	Completion	Credits
BI-ANG	English Language, Internal Certificate Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN	ZK G	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
This course provide	s a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential so		e separation
of variables. Key t	heorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered wi	th methods like cha	aracteristic
polynomial analy	sis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application	ns. Finally, an intro	duction to
partial differential	equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODEs and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.	and PDEs, includ	ing implicit
BIE-EEC	English language external certificate	Z	4
The BIE-ECC cours	se can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in Engli	sh comparable to c	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 introd	uced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite a	automata, regular e	expressions,
and regular gramm	ars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages. Knowledge acquired thr to creation of algorithms for pattern matching, data compression, translation, simple parsing, and creation of digital circuits	-	s applicable
BIK-ADU.21	Unix Administration	Z,ZK	5
	he internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They		-
	administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights,		
	ry, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knows specific examples from practice.	-	-
BIK-ADW.1	Windows Administration	Z,ZK	4
DIK-ADW.I	This course is presented in Czech.	ζΛ	4
		Z,ZK	5
BIK-AG1.21	Algorithms and Graphs 1	· ·	-
	esented in Czech. The course covers the basics from the efficient algorithm design, data structures, and graph theory, belonging to t im. Students learn techniques of proofs of correctness of algorithms and techniques of asymptotic mathematics for estimation of their	-	-
	e course includes basics from probability theory needed for understanding randomized algorithms). Within exercises students learn ap		
of average case (iff	for solving practical problems.		u algoriums
BIK-APS.21	Architectures of Computer Systems	Z,ZK	5
	n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec		-
	n processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of RISC architectures and the principles of RISC architectures		
	processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of		
-	e further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory cohe	-	
	systems.		
BIK-ASB.21	Applied Network Security	Z.ZK	5
	rse is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine	, ,	-
	ons like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishin		
	knowledge of security applications in computer networks.	9	
BIK-AWD.21	Web and Database Server Administration	Z,ZK	5
Students will get ad	quainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and	backup complex da	atabase and
web serv	ice systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an exan	nple of a web serve	er.
BIK-BEK.21	Secure Code	Z,ZK	5
The students will le	arn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fa	amiliar with the thre	at modeling
	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
	leges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing		-
-	database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	e defense against	
BIK-BIG.21	DB Technologies for Big Data	KZ	5
	oduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is f		
	e students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me		
collection, transform	nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic	al foundation and p	presentation
1	of individual technologies will be supplemented with specific case studies.		

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	e / 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 supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the subject BI-BPR at the supervisor will award him a credit from the	he end of the seme	ester. 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.cvu		
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 to		
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 assi- can be supplemented and approved at the end of the semester.	gnment so that the	assignment
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 (	I ' I	-
using a conceptual model and then implement them in a relational database engine. They get acquainted with the SQL language and also with its theoret		
model. They will get acquainted with the principles of relational database schema normalization. They understand the basic concepts of transaction pro	cessing and contro	l of parallel
user access to a single data source. At the end of the course, students will be introduced to alternative nonrelational database n	nodels.	
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 fro		
Special attention is paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cours	se also lays down th	ne basics of
combinatorics and number theory, with emphasis on modular arithmetics.	774	5
BIK-EHA.21   Ethical Hacking The course gives a professional and academic introduction to computer and information security using the ethical hacking approach, which enables impro-	Z,ZK	-
an attacker mindset when discovering 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 alike	-	5,
BIK-EJA Enterprise Java	KZ	4
The course covers Java technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems). These	applications typica	ally manage
persistent data, are accessible to clients via the REST API and are created in the microservice architecture and deployed into orchestra	ted containers.	
BIK-GIT.21 SW Development Technologies	Z	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		on 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.	774	
BIK-HWB Hardware Security	Z,ZK	5
The course deals with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar with cryptographic modules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about v		-
including side-channel 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	· ·	
BIK-IDO.21 Introduction to DevOps	Z,ZK	5
The course deals with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of sys	tems and services.	The course
covers the tools to support software development, testing and compilation. It also focuses on tools for automating infrastructure management and build		
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 acquaint	ed with modern teo	chnologies
used in practice.	774	-
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		5
actuators, wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of		
application areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development en		
ESP, STM; software - Arduino, Raspberry Pi OS).	,	
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 app		
will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic proce		
BIK-KOM.21 Conceptual Modelling	Z,ZK	5
The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key te		-
categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structure notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent	-	
learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO r		-
will be taught. The course is designed with the respect to continuation in software implementations.		
BIK-KSA Cultural and Social Anthropology	ZK	2
The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit	y of the world - exa	mples from
anthropological research from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization, , material cu	lture, language, hea	alth, history,
death, etc). The course is an interesting alternative to other humanities, taught at FIT.		
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 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 elimin	-	
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 eigen		
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.	I	
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functions	ons. This theoretica	l foundation
is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and	-	-
problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical descript		-
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 le	-	
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 functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, ar		-
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and H		
I medicini. Timaliy, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, diadient, and i		

	of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integ		
	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 at acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The empt		-
course students ge	for developing software, which includes testing, error handing, refactoring, and application of design pattern.		rtechniques
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 im	· ·	-
	ead scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS moni		
	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS W		
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, stru		-
-	ions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for search		
	with linked lists.		
BIK-PA2.21	Programming and Algorithmics 2	Z,ZK	7
Students know the	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que	eue, enlargeable ar	ray, list, set,
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 prog	ramming,
	copying/moving of objects, operator overloading, inheritance, polymorphism).		
BIK-PJV	Programming in Java	Z,ZK	4
	This course is presented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753	).	
BIK-PKM	Introduction to Mathematics	Z	4
	This course is presented in Czech.		
BIK-PPA	Programming Paradigms	Z,ZK	5
	s with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of partie		
	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The		
on lambda calculu	is and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr	ream programming	languages
	such as C++ and Java.		_
BIK-PRR.21	Project management	Z,ZK	5
Project manageme	ent not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a social	art. 20 years of exp	perience not
	only in IT in various positions and different projects available at your hands.		
BIK-PSI.21	Computer Networks	Z,ZK	5
	ices students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local r		
	es will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced netw actically verify configurations and management of network devices in the lab within the environment of the operating systems Linux a	-	Students
BIK-PST.21	Probability and Statistics	Z,ZK	5
Students will learn		1 '	-
	the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. T	hey will be able to	apply basic
models of rande	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	hey will be able to they will be able to	apply basic perform
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models of rand estimations of unk BIK-SAP.21 Students will get memory, I/O comm BIK-SIP.21 The course covers second part is dew introduces basic BIK-SP1.21 Students gain h concurrently and t project leader, regi BIK-SP2.21 BIK-SP2.21 The aim of the cou Linux and Windows BIK-SPS.21 The aim of the cou Linux and Windows BIK-SQL.1 Course is based or triggers, recursive of structures like ind will be discusse BIK-STO The student will lead BIK-SWI.21 Students get acquite	the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. Tom variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction rown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistica the statistical dependence of two or more random variables. Computer Structure and Architecture acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of ariti unication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple proce in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools. Network Programming fundamental topics of programming network applications. It consists of 4 parts. The introduces the principles and applications of middlews condern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in comproarem models of distributed computing - P2P and blockchain. All topics will be first explained theoretical support is provided in the hat teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teach and finished in the BIE-SP2 course. Team Software Project 2 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Administration of Computer Networks and Services roe is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrate is. 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. Language SQL Language SQL Language SQL Storage and Filesystems run princi	They will be able to they will be able to I hypotheses and d Z,ZK metic-logic unit , c ssor is practically ir Z ming using BSD s are technologies. Ti mputer labs using KZ e BIE-SWI course her, in the role of th tefact will be furthe KZ Z,ZK d under the operat practical hands-on KZ articular stored prog of view of specialize and possibilities of it acle DBMS and pai Z,ZK iving, as so as store Z,ZK mosolidate and prace	apply basic perform determining 5 controllers, mplemented 5 sockets. The he final part a chosen 5 that runs le team and r developed 5 5 ing systems o experience 4 gram unites, ed database s. changes rtially on 4 age scaling, 5 ttically verify

nin the cour	•	the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their
5	Z,ZK	K-TAB.21 Applications of Security in Technology
er overview	lents get a broader	goal of the course 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
3	KZ	C-TDP.21 Documentation and Presentation
-	1	ourse is focused on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically f
	-	to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically presentation using the LaTeX.
		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.
5	Z,ZK	K-TJV.21 Java Technology
eral theoret		aim of the course is to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get acqu
nts will be a	he course students	epts and will be able to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing th to participate in the development of software systems on the Java platform.
5	Z.ZK	C-TPS.21 Computer Networks Technologies
-	1 '	course introduces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physic
-	-	yer. The lectures provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies and explain relevant physical principles.
	•	he most important ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Etherr always with focus on high-speed networks.
5	Z,ZK	C-TUR.21 User Interface Design
-	1	ents gain a basic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where softw
	-	nunicate with the user optimally, since the needs and characteristics of users are not taken into account during product development. Students ga bring users into the development process to ensure optimal interface for them.
5	Z,ZK	
-		K-TZP.21 Technological Fundamentals of Computers nts get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer s
-		They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce 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 con-
ippiy iooks		to the maximum operating nequency are and now to raise them, why a computer bus needs to be terminated, what happens in it is not, now a computer bus needs to be terminated, what happens in it is not, now a computer bus needs to be terminated.
		(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica
5	7.71	(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.
5	Z,ZK	C-UKB.21 Introduction to Cybersecurity
	erview of threats in	C-UKB.21 Introduction to Cybersecurity goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over
in cyberspa	erview of threats in egulations.	C-UKB.21 Introduction to Cybersecurity goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace re
in cyberspa	erview of threats in egulations.	C-UKB.21 Introduction to Cybersecurity goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace re Unix-like Operating Systems
in cyberspa	erview of threats in egulations. KZ functions of multius	C-UKB.21 Introduction to Cybersecurity goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace re C-UOS.21 Unix-like Operating Systems like operating systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu
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