#### Study plan

# Name of study plan: Bachelor branch Security and Information Technology, part-time, in Czech, 2020

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Informatics, valid until 2024

Type of study: Bachelor combined

Required credits: 156 Elective courses credits: 24 Sum of credits in the plan: 180

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 116

The role of the block: PP

Code of the group: BIK-PP.2015

Name of the group: Compulsory Courses of Bachelor Study Program Informatics, in Czech, Version 2015

Requirement credits in the group: In this group you have to gain 116 credits

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

Credits in the group: 116

Note on the group: přechodně jsou ve skupině vzálemně se vylučující předměty BIK-BPR a BI-BPR. Později zde

zůstane pouze BI-BPR. Mezi oběma předměty je nastavena ekvivalence.

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	Algorithms and Graphs 1	Z,ZK	6	14KP+4KC	Z	PP
BIK-AAG	Automata and Grammars Ond ej Guth	Z,ZK	6	13KP+4KC	Z	PP
BI-BAP	Bachelor Thesis Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BIK-BPR	Bachelor project Zden k Muziká Zden k Muziká (Gar.)	Z	2		Z,L	PP
BIK-BEZ	Security Ji í Dostál	Z,ZK	6	13KP+4KC	L	PP
BIK-CAO	Digital and Analog Circuits  Martin Da hel	Z,ZK	5	13KP+4KC	Z	PP
BIK-DBS	Database Systems Michal Valenta	Z,ZK	6	13KP+8KC	L	PP
BIK-DPR	Documentation, presentation, and rhetoric Ond ej Guth, Dana Vynikarová Dana Vynikarová (Gar.)	KZ	4	5ZP	L	PP
BIK-LIN	Linear Algebra Karel Klouda Karel Klouda (Gar.)	Z,ZK	7	26KP+4KC	L	PP
BIK-MLO	Mathematical Logic Karel Klouda Karel Klouda (Gar.)	Z,ZK	5	13KP+4KC	Z	PP
BIK-OSY	Operating Systems Michal Šoch	Z,ZK	5	13KP+4KC	L	PP
BIK-PSI	Computer Networks	Z,ZK	5	13KP+4KC	L	PP
BIK-PST	Probability and Statistics Daniel Vasata	Z,ZK	5	13KP+4KC	Z	PP
BIK-PA1	Programming and Algorithmics 1  Josef Vogel	Z,ZK	6	20KP+6KC	Z	PP
BIK-PA2	Programming and Algorithmics 2	Z,ZK	7	13KP+4KC	L	PP
BIK-PS1	Programming in Shell 1 Dana ermáková	KZ	5	13KP+4KC	Z	PP
BIK-SI1.2	Software Engineering I Ji í Mlejnek Ji í Mlejnek Ji í Mlejnek (Gar.)	Z,ZK	5	13KP+4KC	Z,L	PP

BIK-SAP	Computer Structure and Architecture  Martin Da hel	Z,ZK	6	13KP+4KC	L	PP
BIK-ZDM	Elements of Discrete Mathematics Eva Pernecká Josef Kolá Josef Kolá (Gar.)	Z,ZK	5	13KP+4KC	Z	PP
BIK-ZMA	Elements of Calculus Ivo Petr Ivo Petr Tomáš Kalvoda (Gar.)	Z,ZK	6	20KP+4KC	Z	PP
	he courses of this group of Study Plan: Code=BIK-PP.2015	Name=Compulsory	/ Cours	es of Bache	lor Stu	dy Progra
Iformatics, in Czec BIK-AG1	ch, Version 2015 Algorithms and Graphs 1			Z,2	ZK	6
his course is presented				· 	71/	
1	Automata and Grammars obscit theoretical and implementation principles of the following topics: constructions.	ction, use and mutual trans	formations	Z,Z s of finite automa		6 ar expression
	anslation finite automata, construction and use of pushdown automata, hierarchy				_	-
	or pattern matching, data compression, translation, simple parsing, and creation	n of digital circuits.				
	Bachelor Thesis			Z		14
	Bachelor project			Z,2		6
1	Security nathematical fundamentals of cryptography and have an overview of current crypto	graphic algorithms and appl	lications: s			-
	also learn the fundamentals of secure programming and IT security, the fundam				-	
	erly and securely cryptographic primitives and systems that are based on these	primitives.				
	Digital and Analog Circuits			Z,2	1	5
•	ental understanding of technologies underlying electronic digital systems. The un					•
f electronic devices.	, and conductors. They are able to design simple circuits and evaluate circuit par	rameters. They understand	the diliere	ences between a	maiog an	u digital mod
	Database Systems			Z,2	7K	6
· ·	o the database engine architecture and typical user roles. They are briefly introd	luced to various database	models. Th			_
ncluding integrity constra	aints) using a conceptual model and implement them in a relational database en	gine. They get a hands-on	experience	e with the SQL I	anguage,	as well as w
	the relational database model. They learn the principles of normalizing a relational				-	
	rallel user access to a single data source, as well as recovering a database eng	· ·	-	-		-
	th respect to speed of access to large quantities of data. This introductory-level of ications, distributed database systems, data stores.	course does not cover. Adi	IIIIIISIIalio	ii oi dalabase s	ysterns, u	ebugging and
	Documentation, presentation, and rhetoric			K	7	4
	in Czech. However, there is an English variant in the program Informatics (B180	1 / 4753).		10	_	7
	Linear Algebra	·		Z,2	ZK	7
	theoretical foundation of algebra and mathematical principles of linear models of	f systems around us, wher	e the depe	endencies amon	g compoi	nents are only
•	ic methods for operating with matrices and linear spaces. They are able to perfo	•	-	-	uations. T	hey can appl
<del></del>	iples to solving problems in 2D or 3D analytic geometry. They understand the en	ror-detecting and error-cor	recting co			
	Mathematical Logic	or the Deelson electro ha	th theoreti	Z,Z		5
<del>_</del>	of the syntax and semantics of the propositional and predicate logic. They masted by describe the world of digital systems. They get skills to handle Boolean function	=		=		_
nodules.	s december the world of digital systems. They got entitle to harriage bedied in tariotics	no, norma formo, mapo, ai	14 111111111	audit mourodo i	100000	ano rantinoi
	Operating Systems			Z,2	ZK	5
	classical theory of operating systems (OS) in addition to the knowledge gained i	in the module "Programmir	ng in Shell			_
ernels, processes and th	reads implementations. They understand the problems of race conditions, threa	d scheduling, resource allo	ocation and	d deadlocks, the	techniqu	es of the
	emory, principles and architectures of disks, RAID and file systems. They are ab	le to design and implemen	t simple m			
	Computer Networks			Z,Z		5
	basic common techniques, protocols, technologies, and algorithms necessary to DOSI model. They also get a basic understanding of communication media, sec	· ·		•		
•	onfigure a simple network.	curity, and network adminis	lialion. Sil	idents will be at	ne to write	e a Simple
	Probability and Statistics			Z,2	7K	5
-	o elements of probability thinking, ability of the synthesis both prior and posterior	information and use to wo	rk with ran			_
	the distribution of random variables and to solve applied probability problems in				-	
nethods, they master me	thods of statistical inference to estimate unknown population parameters on the b	basis of sample. They get a	cquainted	with basic meth	ods of the	e determination
f possible statistical dep	endence of two or more random variables.					
	Programming and Algorithmics 1			Z,Z		6
-	o formulate algorithms for solving basic problems and write them in the C langua	-		-		-
tatements, functions, coi rith linked lists.	ncept of recursion. They learn to analyse simple cases of algorithm complexity. T	ney know fundamental alg	oritnms to	r searching, sor	ting, and	manipulating
	Programming and Algorithmics 2			Z,2	7K	7
· ·	<ul> <li>rogramming and Algorithmics 2</li> <li>nents of object-oriented programming and are able to use them for specifying ar</li> </ul>	nd implementing abstract o	lata tvnes	1 .		•
	nt linked structures. They learn these skills using the programming language C++.	· -			_	-
	ded to achieve the main objective (operator overloading, templates).	<u> </u>	1 - 3	<b>J</b>		
BIK-PS1	Programming in Shell 1			K	Z	5
'	red and knowledgeable users of common UNIX-like operating systems. They und	derstand the fundamental p	orinciples o	,		
	ccess rights, memory management, network interfaces). They gain the knowledge	e of advanced users, with h	ands-on e	experience of the	shell, ba	sic command
nd filters.						
	Software Engineering I			Z,2		. 5
	ds of analysis and design of large software systems, which are typically designe	•		-		
	esign of a large-scale software project that is to be developed within the concurre ted problems. They get overview of object-oriented analysis, design, architecture				anu UIVIL	ioi modellin

and solving software-related problems. They get overview of object-oriented analysis, design, architecture, validation, verification, and testing processes.

BIK-SAP | Computer Structure and Architecture | Z,ZK | 6 | Students understand basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inputs, outputs, data storage and transfer. In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern digital design tools. The subject teaches basic knowledge of digital computer construction principles, how a computer performs its operations, what is machine code, and what are its connections to higher programming languages.

BIK-ZDM Elements of Discrete Mathematics

Z,ZK

Students get both a mathematical sound background, but also practical calculation skills in the area of combinatorics, value estimation and formula approximation, tools for solving recurrent equations, and basics of graph theory.

BIK-ZMA Elements of Calculus

Z,ZK

6 e able to

Students acquire knowledge and understanding of the fundamentals of classical calculus so that they are able to apply mathematical way of thinking and reasoning and are able to use basic proof techniques. They get skills to practically handle functions of one variable in solving the problems in informatics. They understand the links between the integrals and sums of sequences. They are able to estimate lower or upper bounds of values of real functions and to handle simple asymptotic expressions.

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 32

The role of the block: PO

Code of the group: BIK-PO-BIT.2015

Name of the group: Compulsory Courses of Bc. Branch Security and IT, Part-Time Form, in English, Version

2015

Requirement credits in the group: In this group you have to gain 32 credits

Requirement courses in the group: In this group you have to complete at least 7 courses

Credits in the group: 32

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.1	Unix Administration	Z,ZK	5	14KP+4KC	L	PO
BIK-ADW.1	Windows Administration Miroslav Prágl	Z,ZK	4	14KP+2KC	Z	РО
BIK-APS.1	Architectures of Computer Systems Pavel Tvrdík	Z,ZK	5	14KP+4KC	Z	РО
BIK-BEK	Secure Code Róbert Lórencz	Z,ZK	5	14KP+4KC	L	PO
BIK-HWB	Hardware Security Ji í Bu ek, Róbert Lórencz Ji í Bu ek Róbert Lórencz (Gar.)	Z,ZK	5	14KP+4KC	Z	РО
BIK-PAI	Law and Informatics  Zden k Ku era	ZK	3	13KP	Z	РО
BIK-SSB	System and Network Security Jií Dostál Jií Dostál Jií Dostál (Gar.)	Z,ZK	5	14KP+4KC	Z	РО

### Characteristics of the courses of this group of Study Plan: Code=BIK-PO-BIT.2015 Name=Compulsory Courses of Bc. Branch Security and IT, Part-Time Form, in English, Version 2015

BIK-ADU.1 Unix Administration Z,ZK 5
Students became familiar with the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of their protection against unauthorized use. In the seminars they will verify the information from the lectures on real life examples from practice. They will understand the differences between user and administrator roles. They gain theoretical and practical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file systems, disk subsystems, processes, memory, network services, shared file systems, name services, remote access, and system boot.

BIK-ADW.1 Windows Administration

This course is presented in Czech.

BIK-APS.1 Architectures of Computer Systems
This course is presented in Czech.

BIK-BEK Secure Code

Z,ZK 5

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-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 the operating principles of cryptographic modules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HW resources, including side-channel attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including applications and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.

BIK-PAI	Law and Informatics	ZK	3
BIK-SSB	System and Network Security	Z,ZK	5
This course is focused	on selected areas of computer networks and computer systems in terms of cyber security		'

Name of the block: Compulsory elective economic-management courses

Minimal number of credits of the block: 4

The role of the block: VE

Code of the group: BIK-PV-EM.2015

Name of the group: Compulsory Elective Economics Bachelor Courses, Part-time Form of Study, in Czech,

Ver. 2015

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 5)

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

Credits in the group: 4 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-MEK	Macroeconomic Context of Domestic and World Economy Ivo Straka	KZ	4	13KP+2KC	L	VE
BIK-PRP	Law and Business  Zden k Ku era	Z,ZK	4	13KP+4KC	L	VE
BIK-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	14KP+4KC	Z	VE

Characteristics of the courses of this group of Study Plan: Code=BIK-PV-EM.2015 Name=Compulsory Elective Economics Bachelor Courses, Part-time Form of Study, in Czech, Ver. 2015

BIK-MEK	Macroeconomic Context of Domestic and World Economy	KZ	4
This course is presente	d in Czech.		,
BIK-PRP	Law and Business	Z,ZK	4
Students understand th	e basic issues when engaging in business activities in the CR and in the EU. Students learn to establish companies, gain nece	essary business p	ermits, conclude
commercial or civil cont	racts. Students also get acquainted with the principles of antitrust regulation and learn to resolve disputes in the area of busi	ness, labour, or c	ivil relationships
in courts.			
BIK-PRR.21	Project management	Z,ZK	5
Project management no	ot only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a so	cial art. 20 years o	of experience not
only in IT in various pos	itions and different projects available at your hands.		

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

Name of the group: English Language, Internal Certifica

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:

Ze skupiny je nutné absolvovat jeden ze dvou předmětů, představujících interní zkoušku z angličtiny. -- Předmět BI-ANG si zapisují studenti, kteří absolvovali přípravné kurzy z angličtiny a mají zápočet z předmětu BI-A2L. -- Předmět BI--ANG1 si zapisují studenti, kteří se na zkoušku připravovali samostatně. Tito studenti musí před vlastní zkouškou absolvovat zápočtovou písemku.

		p p				
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		L	PJ
BIE-EEC	English language external certificate  Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	4		L	PJ
BI-ANG	English Language, Internal Certificate  Kate ina Valentová Kate ina Valentová (Gar.)	ZK	2		Z,L	PJ

Characteristics of the courses of this group of Study Plan: Code=BI-ZKA Name=English Language, Internal Certifica

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: Compulsory elective humanities courses

Minimal number of credits of the block: 2

The role of the block: VH

Code of the group: BIK-PV-HU.2015

Name of the group: Compulsory Elective Humanity Courses of Bc. Program Informatics, Part-time Form, in

Czech, Ver. 2015

Requirement credits in the group: In this group you have to gain at least 2 credits (at most 20)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 9)

Credits in the group: 2

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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
FI-FIL	Philosophy Peter Zamarovský Peter Zamarovský (Gar.)	ZK	2	2P	Z,L	VH
BIK-HMI	History of Mathematics and Informatics  Alena Šolcová Alena Šolcová (Gar.)	ZK	3	13KP+2KC	; L	VH
FI-HTE	History of Technology and Economics  Jan Mikeš, Marcela Efmertová Jan Mikeš Jan Mikeš (Gar.)	ZK	2	2+0	Z,L	VH
FI-HPZ	Humanities subject from a study abroad  Miroslav Balík	Z	3	0+0	Z,L	VH
FI-MPL	Managerial Psychology	ZK	2	2+0	Z,L	VH
FI-KSA	Cultural and Social Anthropology  Jakub Šenovský	ZK	2	2P	L,Z	VH
BIK-KSA	Cultural and Social Anthropology Alena Libánská, Tomáš Houdek, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	13KP	L	VH
FI-ULI	Introduction to Linguistics for Computer Václav Cvr ek	ZK	2	2P	L	VH
FI-GNO	Introduction to Gnoseology Ivo Janoušek	ZK	2	2+0	L	VH

Characteristics of the courses of this group of Study Plan: Code=BIK-PV-HU.2015 Name=Compulsory Elective Humanity Courses of Bc. Program Informatics. Part-time Form. in Czech. Ver. 2015

ee A0B16  BIK-HMI History of Mathematics and Informatics  This course is presented in Czech.  FI-HTE History of Technology and Economics  The course introduces the scientific disciplines of history and technology, economic and social history of the Czech land	ZK	3
This course is presented in Czech.  FI-HTE History of Technology and Economics The course introduces the scientific disciplines of history and technology, economic and social history of the Czech land		3
FI-HTE History of Technology and Economics The course introduces the scientific disciplines of history and technology, economic and social history of the Czech land	ZK	
he course introduces the scientific disciplines of history and technology, economic and social history of the Czech land	ZK	
, , , , , , , , , , , , , , , , , , , ,		2
ne European region 19 to 21 century .	ds and Czechoslovakia in comparison with the c	development
FI-HPZ Humanities subject from a study abroad	Z	3
"Humanities subject that has been studied abroad" is covered by the Humanities subject from a study abroad in Comp	oulsory Humanities Module that is required in th	e curriculum
he substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.		
FI-MPL Managerial Psychology	ZK	2
FI-KSA Cultural and Social Anthropology	ZK	2
he one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific dis	scipline dealing with the diversity of the world - e	examples fro
nthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , m	naterial culture, language, health, history, death	, etc) will b
hown. The course is an interesting alternative to other humanities, taught at FIT.		
BIK-KSA Cultural and Social Anthropology	ZK	2
he one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific dis	scipline dealing with the diversity of the world - o	examples fro
nthropological research from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migra	ation, globalization, , material culture, language,	health, histo
leath, etc). The course is an interesting alternative to other humanities, taught at FIT.		
FI-ULI Introduction to Linguistics for Computer	ZK	2
his course is presented in Czech.	· ·	
and the state of t		$\overline{}$
TI-GNO Introduction to Gnoseology	ZK	2

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

The role of the block: V

Ing. Ivo Janoušek CSc.

proces . V návaznosti na teorii p írodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém p ehledu nastín na hlediska estetického vnímání. Samostatnou kapitolou jsou modely spojitých p írodních soustav a systém , v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje. P edm t p ednáší a garantuje

Code of the group: BIK-V.2017

Name of the group: Purely Elective Courses of Bachelor Programme BI, Version 2017

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-STO	Storage and Filesystems Ji í Kašpar	Z,ZK	4	13KP+4KC	L,Z	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	Object-Oriented Programming Filip K ikava Filip K ikava Filip K ikava (Gar.)	Z,ZK	4	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
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	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.2017 Name=Purely Elective Courses of Bachelor Programme BI, Version 2017

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	experience no
only in IT in various	is positions and different projects available at your hands.		
BIK-HMI	History of Mathematics and Informatics	ZK	3
This course is pres	sented in Czech.		
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, protectio	on, and archiving, as so as s	storage scaling
load balancing and	d high availability.		
BIK-EJA	Enterprise Java	KZ	4
The course covers	s Java technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information System	ems). 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 or	containers.	
BIK-SQL.1	Language SQL	KZ	4
Course is based on	n knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL lan	guage. İn particular stored	program unites
triagers recursive o	guarian OLAD current phicat relational constructions. Part of the accuracy in dedicated to practical database entimization from		alizad databas
inggoro, roodroivo c	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from	m the point of view of specia	alizeu ualabas
	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization fro exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execut		
structures like inde		tion plan and possibilities o	f its. changes
structures like inde	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execut	tion plan and possibilities o	f its. changes
structures like inde will be discussed. L	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execut	tion plan and possibilities o	f its. changes
structures like inde will be discussed. L PostgreSQL. BIK-OOP	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execut Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based	tion plan and possibilities or and on Oracle DBMS and particles.	f its. changes rtially on
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Code of the group: BIK-BIT-VO.2017

Name of the group: Elective Vocational Courses for a Bachelor Branch BIK-BIT, Version 2017

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

Credits in the group: 0

Note on the grou	ıp: Všechny povinné předměty ob	orů a zaměře	ní s výji	mkou tol	noto oboru	
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-ADS	Network Administration  Viktor erný	Z,ZK	5	13KP+4KC	Z	V
BIK-AWD	Web and Database Server Administration  Lukáš Ba inka	Z,ZK	4	13KP+4KC	; L	V
BIK-EFA	Efficient Algorithms Ji í Chludil	Z,ZK	5	13KP+4KC	, Z	V
BIK-EIA	Efficient Implementation of Algorithms  Ivan Šime ek	Z,ZK	5	13KP+4KC	Z	V
BIK-GRA	Graph Algorithms Ji i Chludil	Z,ZK	5	13KP+4KC	, L	V
BIK-JPO	Computer Units Kate ina Hyniová	Z,ZK	5	13+4	Z	V
BIK-KOM	Conceptual Modelling Marek Suchánek, Michal Valenta, Robert Pergl, Mohamed Bettaz Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	14KP+4KC	, z	V
BIK-MGA	Multimedia and Graphics Applications Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.)	Z,ZK	5	13KP+4KC	Z	V
BIK-OMO	Object Modeling Robert Pergl	Z,ZK	5	13KP+4KC	Z	V
BIK-OOP	Object-Oriented Programming Filip K ikava Filip K ikava Filip K ikava (Gar.)	Z,ZK	4	14KP+4KC	Z	V
BIK-PGR	Computer Graphics	Z,ZK	6	13KP+4KC	Z	V
BIK-PWT	Enterprise Web Technologies	Z,ZK	5	2+2	L	V
BIK-PNO	Practical Digital Design Kate ina Hyniová	KZ	5	13+4	Z	V
BIK-PRP	Law and Business Zden k Ku era	Z,ZK	4	13KP+4KC	L	V
BIK-PJP	Programming Languages and Compilers Karel Müller	Z,ZK	5	13KP+2KC	L	V
BIK-PPA	Programming Paradigms	Z,ZK	5	14KP+4KC	Z	V
BIK-SKJ	Scripting Languages  Lukáš Ba inka	Z,ZK	4	13KP+2KC	L	V
BIK-SI2.2	Software Engineering 2 Ji í Mlejnek	ZK	5	13KP	Z	V
BIK-SI2.3	Software Engineering 2 Ji í Mlejnek Ji í Mlejnek (Gar.)	Z,ZK	3	14KP	Z	V
BIK-SP1	Team Software Project 1 Ji í Mlejnek	KZ	4	8KC	L	V
BIK-SP2	Team Software Project 2 Michal Valenta	KZ	6	12KC	Z	V
BIK-SP2.1	Team Software Project 2 Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	4	12KC	Z	V
BIK-SRC	Real-time Systems Jan Šlechta	KZ	4	13+4	L	V
BIK-TJV	Java Technology Ond ej Guth	Z,ZK	4	14KP+4KC	z	V
BIK-TIS	Information Systems Design	Z,ZK	5	13KP+2KC	, Z	V
BIK-TUR	User Interface Design Jan Schmidt	Z,ZK	4	13KP+4KC	; L	V
BIK-WT2	Web Application Design Peter Vojtáš	Z,ZK	5	13KP+4KC	L	V
BIK-FIP	Accounting and Corporate Finance	Z,ZK	5	13KP+4KC	Z	V
BIK-VES	Embedded Systems Miroslav Skrbek	Z,ZK	5	13KP+4KC	; L	V
BIK-VWM	Searching the Web and Multimedia Databases Ji í Novák	Z,ZK	5	13KP+2KC	; L	V
BIK-VZD	Data Mining Pavel Kordík	Z,ZK	4	13KP+4KC	, L	V
BIK-WT1	Web Technology I (Web and Multimedia) Tomáš Kadlec	Z,ZK	5	13KP+2KC	Z	V

Characteristics of the courses of this group of Study Plan: Code=BIK-BIT-VO.2017 Name=Elective Vocational Courses for a Bachelor Branch BIK-BIT, Version 2017

BIK-PRP Law and Business Students understand the basic issues when engaging in business activities in the CR and in the EU. Students learn to establish companies, gain necessary business permits, conclude commercial or civil contracts. Students also get acquainted with the principles of antitrust regulation and learn to resolve disputes in the area of business, labour, or civil relationships in courts. **BIK-OOP** Object-Oriented Programming This course is presented in Czech. 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 we look at some of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development including testing, error handing, refactoring and design patterns. **BIK-ADS Network Administration** Students acquire basic skills needed to administrate computer networks, networking technologies, services, and to ensure their security. They understand and are able practically use Ethernet technology, VLAN, authorisation, security architecture of computer networks, routing protocols and backbone routing mechanisms, directory and naming services and addressing, administration of networking equipment, secure client connections and secure data transfer, flow control mechanisms, and service availability monitoring **BIK-AWD** Web and Database Server Administration Student in the branch "BI-IT Information technology" who lack the compulsory BIK-AWD course, ask the office of study affairs for enrolling an equivalent course BIK-AWD.1, which has a block lectures. Students are introduced to the administration of database and web servers and services. Students will be able to install, configure, maintain, test and backup complex systems of database and web services. To provide a balanced overview, students will be introduced to three different database engines: Oracle as a representative of a large commercial system; PostgreSQL as a representative of a complex and advanced open-source, community-developed software; MySQL as the most common database engine to use with the Apache web server. **BIK-EFA** Efficient Algorithms Z.ZK Students get a solid overview of efficient algorithms for solving classical algorithmic problems: selecting, searching, sorting, and other basic forms of reshaping and processing tree-like data structures. Students are able to design and implement such algorithms, to analyse their complexity, and to develop an optimised efficient algorithm under specific requirements or constraints. They are able to recognise a proper algorithm variant for any specific usage. **BIK-EIA** Efficient Implementation of Algorithms Z.ZK 5 Student learn to combine their SW skills (efficient algorithms) and HW knowledge (utilization of all available features of the particular processor and memory architecture). Students learn the basics of code tuning **BIK-GRA** Graph Algorithms Z.ZK 5 Students get an overview of typical usages of graph models in computing. They learn algorithmic methods of solution of graph problems, using the programming techniques presented in the BI-EFA module. They understand algorithms for the key application domains of graph theory (flows in networks, heuristic search, approximation of complex problems, matching problems). Students get basic competence in computer science background: they understand Turing machine models and issues of NP-completeness and NP-hardness. **BIK-JPO** Computer Units Z,ZK 5 Students get knowledge of the internal structure and organisation of computer or processor components and their interfacing with the environment, the organisation of main memory and other internal memories (addressable, LIFO, FIFO, and CAM)and with design methodology for the control unit and controllers, basic principles of communication with peripheral devices and buses BIK-KOM Conceptual Modelling Z,ZK 5 **BIK-MGA** Multimedia and Graphics Applications Z.ZK 5 Students gain practical experience with applications for 2D/3D graphics and DTP, as well as with basic methods of creating and editing computer graphics. Students learn theoretical fundamentals of computer graphics. During the semester, students work on various parts of a complex project involving 2D/3D graphics and DTP. **BIK-OMO** Z,ZK Object Modeling 5 Students will practically master conceptual modelling of business structures, they will learn fundamentals of OntoUML notation and methodology. Students will learn fundamentals of pure object-oriented paradigm, i.e. terms object, method, message, class, class instance, composition, inheritance, collections. Students will learn to transform a conceptual model to object-oriented implementation model and they will learn fundamentals of pure object-oriented implementation in Smalltalk and pure object database. Students will learn to formulate rules and queries upon the object database. **BIK-PGR** Computer Graphics Z.ZK 6 Students are able to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textures imitating geometric details and materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in computer graphics, such as graphical pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fundamentals for your professional development, e.g. for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces, and scientific visualisation. **Enterprise Web Technologies** Z,ZK Cílem p edm tu je seznámit studenty s využitím webu jako platformy pro vytvá ení Rich Internet Applications (RIA). Proto se musí nau it používat webové technologie z hlediska prezenta ní ásti webových stránek a interakce s uživatelem a tedy s technologiemi HTML, CSS a Javascript. Dále se nau í navrhnout a realizovat webovou aplikaci. Pro realizaci serverové strany se nau í jazyk PHP. Budou um t realizovat aplikace se zabezpe eným p ístupem a používat technologie efektivní komunikace mezi klientem a serverem. Practical Digital Design Students get an overview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the basics of the VHDL language, and implementation technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern, industry-standard CAD design tools BIK-PJP **Programming Languages and Compilers** Z,ZK Students master basic methods of implementation of common high-level programming languages. They get experience with the design and implementation of individual compiler parts for a simple programming language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that has a certain syntax into a target form and write a compiler based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages, but extends to all other programs for parsing and processing text in a language defined by a LL(1) grammar. **BIK-PPA Programming Paradigms** 7.7K The course deals with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of particular approaches. Functional programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The principles are demonstrated on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages such as C++ and Java. **BIK-SKJ** Scripting Languages Z,ZK 4 This course is presented in Czech. BIK-SI2.2 ZK 5 Software Engineering 2 BIK-SI2.3 Software Engineering 2 Z,ZK 3 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).

**RIK-SP1** Team Software Project 1 Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the BEI-SWI course that runs concurrently and that teaches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in the role of the team and project leader, regularly consults with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be further developed and finished in the BEI-SP2 course. ΚZ BIK-SP2 Team Software Project 2 Students gain hands-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result of the BEI-SP1 course project. However, this time, the functionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people. The teacher, in the role of the team and project leader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. The BEI-SI2 course that runs concurrently will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the software product. BIK-SP2.1 Team Software Project 2 ΚZ 4 **BIK-SRC** Real-time Systems ΚZ 4 Students get basic knowledge in the area of designing SW for embedded systems with a real-time operating system (RTOS). **BIK-TJV** Java Technology Z,ZK 4 The subject goal is to introduce the programming language Java. The student gains practical experiences for smaller enterprise application programming. This subject presents how to build the three and more layers enterprise systems. The student practically exercises all communication interfaces for each layers (JDBC, RestWeb services, JNDI etc.). At the course end is student able to create three layers enterprise application. Information Systems Design Z,ZK Students know various types of ISs and their practical implementation aspects and are able to match the needs of different market segments (customers) with applications of existing technologies (databases, programming languages, GUI etc.). Z,ZK**BIK-TUR** User Interface Design Students have a basic overview of the methods for designing and testing common user interfaces. They have experience to solve the problems where software and other products do not communicate with the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gain an overview of the methods that bring users into the development process to ensure optimal communication with a user. BIK-WT2 Web Application Design Z,ZK Students are able to design and implement a complete web application (both the client side and the server side). PHP is the most popular programming language for writing dynamic web applications, and is used as the primary programming language of this module. Students learn to design and implement, for instance, an e-shop, a gallery, a shared calendar, and so on. Tools for quick and secure application development are introduced. **BIK-FIP** Accounting and Corporate Finance Z,ZK 5 Students know the principles and practicalities of financing and financial policies of companies or organisations. **RIK-VFS Embedded Systems** Z.ZK 5 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. Searching the Web and Multimedia Databases **BIK-VWM** Z.ZK 5 Students gain basic knowledge concerning retrieval techniques on the web, where the web environment is viewed as a large distributed and heterogenous data repository. In particular, the students shall understand the techniques for retrieving text and hypertext documents (the web pages). Moreover, they shall be aware of similarity retrieval methods focused on heterogenous multimedia databases (unstructured data collections, respectively). BIK-VZD  $Z,Z\overline{K}$ 4 **Data Mining** Students are introduced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, multidimensional data visualization, statistical techniques of data transformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships between model bias and variance, and know the fundamentals of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic data mining tools to common problems (classification, regression, clustering). BIK-WT1 Web Technology I (Web and Multimedia) Students learn the presentation side of web technologies. They understand the principles of proper (X)HTML, CSS, XML, and JavaScript design. They are able to use the multimedia elements that can be used on the Web, such as raster graphics, video and 3D graphics. They gain a professional-level ability to design and implement the complete presentation side

of a web application.

#### List of courses of this pass:

Campalation Constitu

Name of the course

C - -I -

Code	Name of the course	Completion	Credits
BI-ANG	English Language, Internal Certificate	ZK	2
	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN	Ġ	
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-BAP	Bachelor Thesis	Z	14
BIE-EEC	English language external certificate	Z	4
The BIE-ECC cour	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	r exceeding
	the B2 level of the Common European Framework of Reference for Languages.		
BIK-AAG	Automata and Grammars	Z,ZK	6
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 gramn	nars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages. Knowledge acquired thr	ough the module is	s applicable
	to creation of algorithms for pattern matching, data compression, translation, simple parsing, and creation of digital circuits	i.	
BIK-ADS	Network Administration	Z,ZK	5
Students acquire b	, asic skills needed to administrate computer networks, networking technologies, services, and to ensure their security. They understa	nd and are able pra	actically use
Ethernet techno	ology, VLAN, authorisation, security architecture of computer networks, routing protocols and backbone routing mechanisms, director	y and naming serv	ices and
addressing	a administration of networking equipment, secure client connections and secure data transfer, flow control mechanisms, and service	availahility monitor	ina

BIK-ADU.1	Unix Administration	Z,ZK	5
	amiliar with the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of their pars they will verify the information from the lectures on real life examples from practice. They will understand the differences between		
	als they will verify the information from the fectives of real life examples from practice. They will diderstand the differences between all and practical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file systems		
, ,	memory, network services, shared file systems, name services, remote access, and system boot.		/· /
BIK-ADW.1	Windows Administration This course is presented in Czech.	Z,ZK	4
BIK-AG1	Algorithms and Graphs 1 This course is presented in Czech.	Z,ZK	6
BIK-APS.1	Architectures of Computer Systems	Z,ZK	5
BIK-AWD	This course is presented in Czech.  Web and Database Server Administration	Z,ZK	4
Student in the bran a block lectures. St	rich "BI-IT Information technology" who lack the compulsory BIK-AWD course, ask the office of study affairs for enrolling an equivalent udents are introduced to the administration of database and web servers and services. Students will be able to install, configure, main	t course BIK-AWD.1 ntain, test and back	1, which has kup complex
-	se and web services. To provide a balanced overview, students will be introduced to three different database engines: Oracle as a repre- SQL as a representative of a complex and advanced open-source, community-developed software; MySQL as the most common data Apache web server.	_	
BIK-BEK	Secure Code	Z,ZK	5
	earn 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		
	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
	rileges. 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		
BIK-BEZ	Security	Z,ZK	6
	Indition the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetrics		
and hash functions	s. They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptos They are able to use properly and securely cryptographic primitives and systems that are based on these primitives.	systems for comput	ter systems.
BIK-BPR	Bachelor project	Z	2
BIK-CAO	Digital and Analog Circuits	Z,ZK	5
_	e fundamental understanding of technologies underlying electronic digital systems. The understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences beto		-
transistors, gates, t	of electronic devices.	veen analog and di	igital modes
BIK-DBS	Database Systems	Z,ZK	6
	oduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lear	-	
	constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with the		
	lation? the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda Illing parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced	•	
T -	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of data optimizing database applications, distributed database systems, data stores.		
BIK-DPR	Documentation, presentation, and rhetoric  This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	KZ	4
BIK-EFA	Efficient Algorithms	Z,ZK	5
_	d overview of efficient algorithms for solving classical algorithmic problems: selecting, searching, sorting, and other basic forms of rest		-
data structures. S	tudents are able to design and implement such algorithms, to analyse their complexity, and to develop an optimised efficient algorithr or constraints. They are able to recognise a proper algorithm variant for any specific usage.	n under specific re	quirements
BIK-EIA	Efficient Implementation of Algorithms	Z,ZK	5
	ombine their SW skills (efficient algorithms) and HW knowledge (utilization of all available features of the particular processor and m		
	learn the basics of code tuning.		
BIK-EJA	Enterprise Java	KZ	4
	Java technologies (Jakarta EE, Microprofile, etc.) which are used for the development of EIS (Enterprise Information Systems). These sistent data, are accessible to clients via the REST API and are created in the microservice architecture and deployed into orchestra		ally manage
BIK-FIP	Accounting and Corporate Finance	Z,ZK	5
	Students know the principles and practicalities of financing and financial policies of companies or organisations.	,	
BIK-GRA	Graph Algorithms	Z,ZK	5
_	erview of typical usages of graph models in computing. They learn algorithmic methods of solution of graph problems, using the progi ule. They understand algorithms for the key application domains of graph theory (flows in networks, heuristic search, approximation o		
	due. They understand algorithms for the key application domains of graph theory (nows in networks, fledistic search, approximation c Students get basic competence in computer science background: they understand Turing machine models and issues of NP-complete		
BIK-HMI	History of Mathematics and Informatics	ZK	3
	This course is presented in Czech.		'
BIK-HWB	Hardware Security	Z,ZK	5
	s with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar wi ules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about v		-
	and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of	chnology including	
BIK-JPO	Computer Units	Z,ZK	5
	reledge of the internal structure and organisation of computer or processor components and their interfacing with the environment, the		
and other internal	memories (addressable, LIFO, FIFO, and CAM)and with design methodology for the control unit and controllers, basic principles of devices and buses.	communication with	n peripheral
BIK-KOM	Conceptual Modelling	Z,ZK	5

BIK-KSA	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity earch from our culture as well as from the "exotic" ones (topics: kinship, religion, social exclusion, migration, globalization, , material cul		
. 3	death, etc). The course is an interesting alternative to other humanities, taught at FIT.	, ,	, ,,
BIK-LIN	Linear Algebra	Z,ZK	7
Students understa	nd the theoretical foundation of algebra and mathematical principles of linear models of systems around us, where the dependencies	among compone	nts are only
· · · · · · · · · · · · · · · · · · ·	the basic methods for operating with matrices and linear spaces. They are able to perform matrix operations and solve systems of line	· ·	y can apply
	hese mathematical principles to solving problems in 2D or 3D analytic geometry. They understand the error-detecting and error-corre		
BIK-MEK	Macroeconomic Context of Domestic and World Economy  This course is presented in Czech.	KZ	4
BIK-MGA	Multimedia and Graphics Applications	Z,ZK	5
	tical experience with applications for 2D/3D graphics and DTP, as well as with basic methods of creating and editing computer graph	•	1
	undamentals of computer graphics. During the semester, students work on various parts of a complex project involving 2D/3D graphic		
BIK-MLO	Mathematical Logic	Z,ZK	5
Students have know	wledge of the syntax and semantics of the propositional and predicate logic. They master the Boolean algebra, both theoretically as an	instance of unive	rsal algebra,
and practically as	s a tool to describe the world of digital systems. They get skills to handle Boolean functions, normal forms, maps, and minimisation me	ethods needed in	the further
DII.( 0140	modules.	7.71	
BIK-OMO	Object Modeling ically master conceptual modelling of business structures, they will learn fundamentals of OntoUML notation and methodology. Stude	Z,ZK	5
•	id paradigm, i.e. terms object, method, message, class, class instance, composition, inheritance, collections. Students will learn to tra		
	plementation model and they will learn fundamentals of pure object-oriented implementation in Smalltalk and pure object database. S		
	rules and queries upon the object database.		
BIK-OOP	Object-Oriented Programming	Z,ZK	4
•	ented in Czech. Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of object-oriented programming has been used to be a solve computation of the last 50 years to solve comput	-	- 1
by message passin	g. In this course we look at some of the main principles of object-oriented programming and design. The emphasis is on practical technic	ques for software o	development
DIK OCV	including testing, error handing, refactoring and design patterns.	7 71/	
BIK-OSY Students understa	Operating Systems and the classical theory of operating systems (OS) in addition to the knowledge gained in the module "Programming in Shell 1". They	Z,ZK	5 dae of OS
	ses and threads implementations. They understand the problems of race conditions, thread scheduling, resource allocation and deadl	-	- 1
· ·	nt of virtual memory, principles and architectures of disks, RAID and file systems. They are able to design and implement simple mult	-	
BIK-PA1	Programming and Algorithmics 1	Z,ZK	6
-	ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, structure)		
statements, function	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searching the searching the search of the sear	ng, sorting, and m	nanipulating
BIK-PA2	with linked lists.	Z,ZK	7
	Programming and Algorithmics 2 e instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, q	•	1
	olement linked structures. They learn these skills using the programming language C++. Although this is not a module of programming in	_	-
	with all C++ features needed to achieve the main objective (operator overloading, templates).		
BIK-PAI	Law and Informatics	ZK	3
BIK-PGR	Computer Graphics	Z,ZK	6
	o program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textu		
•	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in a geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fund		<i>'</i>
• • • • • • • • • • • • • • • • • • • •	for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surface:	•	
BIK-PJP	Programming Languages and Compilers	Z,ZK	5
Students master ba	sic methods of implementation of common high-level programming languages. They get experience with the design and implementation	on of individual co	mpiler parts
	amming language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that has		- 1
form and write a co	empiler based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages, but	extends to all oth	er programs
BIK-PJV	for parsing and processing text in a language defined by a LL(1) grammar.	Z,ZK	4
DIK-F3V	Programming in Java This course is presented in Czech. However, there is an English variant in the full-time program Informatics (B1801 / 4753)		1 4
BIK-PKM	Introduction to Mathematics	Z	4
Direct reivi	This course is presented in Czech.	_	' '
BIK-PNO	Practical Digital Design	KZ	5
Students get an ov	rerview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the	basics of the VHD	L language,
and implementation	on technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern, in	dustry-standard C	AD design
DIIK DDA	tools.	7.71/	
BIK-PPA The course deals	Programming Paradigms swith basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of partic	Z,ZK	5 Functional
	is with basic paradights of high-level programming languages, including their basic execution models, benefits, and limitations of partic digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. Th		
	s and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr		
	such as C++ and Java.		
BIK-PRP	Law and Business	Z,ZK	4
	nd the basic issues when engaging in business activities in the CR and in the EU. Students learn to establish companies, gain necessary	-	
commercial or civil	contracts. Students also get acquainted with the principles of antitrust regulation and learn to resolve disputes in the area of busines	s, labour, or civil r	elationships
RIK-DDD 24	in courts.  Project management	Z,ZK	5
BIK-PRR.21 Project manageme	Project management  nt not only as a common dictionary and setting necessary processes while preparing and / or managing projects, but also as a social is	•	5 perience not
	only in IT in various positions and different projects available at your hands.		- 5

	Drawa was in a Chall 4	1/7	
BIK-PS1	Programming in Shell 1   aced and knowledgeable users of common UNIX-like operating systems. They understand the fundamental principles of the oper	KZ ating evetame (f	5
	ccess rights, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of		-
, ,	and filters.	,,	
BIK-PSI	Computer Networks	Z,ZK	5
udents understand the	basic common techniques, protocols, technologies, and algorithms necessary to communicate in computer networks. The topics	are primarily fo	cused on th
2nd to 4th layer of the	ISO OSI model. They also get a basic understanding of communication media, security, and network administration. Students wi	Il be able to writ	e a simple
	network application and configure a simple network.		_
BIK-PST	Probability and Statistics	Z,ZK	5
	o elements of probability thinking, ability of the synthesis both prior and posterior information and use to work with random variabl of the distribution of random variables and to solve applied probability problems in the area of informatics and computer science.	-	
	of the distribution of random variables and to some applied probability problems in the area of information and computer solence, thods of statistical inference to estimate unknown population parameters on the basis of sample. They get acquainted with basic r	-	
, ,	of possible statistical dependence of two or more random variables.		
BIK-PWT	Enterprise Web Technologies	Z,ZK	5
·	námit studenty s využitím webu jako platformy pro vytvá ení Rich Internet Applications (RIA). Proto se musí nau it používat web	_	
	vých stránek a interakce s uživatelem a tedy s technologiemi HTML, CSS a Javascript. Dále se nau í navrhnout a realizovat web		
BIK-SAP	nau í jazyk PHP. Budou um t realizovat aplikace se zabezpe eným p ístupem a používat technologie efektivní komunikace mez  Computer Structure and Architecture	Z,ZK	rverem.
	sic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inputs	•	1
	dents gain practical experience with the design and implementation of the logic of a simple processor using modern digital design	-	_
basic knowledge of dig	gital computer construction principles, how a computer performs its operations, what is machine code, and what are its connection	ns to higher pro	gramming
	languages.		
BIK-SI1.2	Software Engineering I	Z,ZK	5
	thods of analysis and design of large software systems, which are typically designed and implemented in teams. They get practic		
	lesign of a large-scale software project that is to be developed within the concurrent BI-SP1 module. They get skill to use CASE t g software-related problems. They get overview of object-oriented analysis, design, architecture, validation, verification, and testi		or modellin
BIK-SI2.2	Software Engineering 2	ZK	5
BIK-SI2.3	Software Engineering 2	Z,ZK	3
Dirk 612.0	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	2,210	1
BIK-SKJ	Scripting Languages	Z,ZK	4
1	This course is presented in Czech.	,	
BIK-SP1	Team Software Project 1	KZ	4
Students gain hands-	on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	BEI-SWI course	that runs
	aches the passagery tackning and the ary. Tacma consisting of 4.6 atudents will work an a passific project. The tackbar in the		
concurrently and that te	aches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in the	role of the team	and projec
	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur		
eader, regularly consult	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.	ther developed	and finishe
BIK-SP2	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.  Team Software Project 2	ther developed	and finishe
BIK-SP2 tudents gain hands-on	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of	KZ the BEI-SP1 co	and finishe
BIK-SP2   cudents gain hands-on owever, this time, the fi	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.  Team Software Project 2	KZ the BEI-SP1 colle. The teacher,	and finished 6 burse projectin the role
BIK-SP2   tudents gain hands-on owever, this time, the fithe team and project le	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be further in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people.	KZ the BEI-SP1 cole. The teacher, e BEI-SI2 cours	and finishe  6  burse projectin the role
BIK-SP2   tudents gain hands-on owever, this time, the fithe team and project le	s with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be further in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. The	KZ the BEI-SP1 cole. The teacher, e BEI-SI2 cours	and finishe  6  burse projectin the role of
BIK-SP2 tudents gain hands-on owever, this time, the fit the team and project le concurrent!	swith the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. They will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the solution. They are software Project 2  Language SQL	KZ if the BEI-SP1 colle. The teacher, e BEI-SI2 cours offware product.  KZ  KZ	and finishe  6  ourse projecting the role of that runs  4  4
BIK-SP2  rudents gain hands-on owever, this time, the fit the team and project le concurrent!  BIK-SP2.1  BIK-SQL.1  purse is based on know	swith the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be fur in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. They will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the solution. They are software Project 2  Language SQL  ledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In part	KZ If the BEI-SP1 colle. The teacher, e BEI-SI2 cours offware product.  KZ  KZ  KZ  icular stored pro	and finished  6 ourse projection the role of the truns  4 4 ogram unite
BIK-SP2  cudents gain hands-on- owever, this time, the fi the team and project le concurrentl  BIK-SP2.1  BIK-SQL.1  burse is based on know ggers, recursive querie	swith the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be furth in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. They will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the solution area. Team Software Project 2  Language SQL  ledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In parts, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of	KZ If the BEI-SP1 colle. The teacher, e BEI-SI2 cours of tware product.  KZ  KZ  icular stored proview of specialize	and finished  6 ourse projection the role of the truns  4 4 ogram united and databased databased
BIK-SP2 udents gain hands-on owever, this time, the fit the team and project lead concurrent BIK-SP2.1 BIK-SQL.1 ourse is based on know ggers, recursive querie structures like indexes,	Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. They will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the sorten Software Project 2  Language SQL  ledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In particular, older opening the support, object-relational constructions. Part of the course is dedicated to practical database optimization. Execution plan and clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan and	KZ f the BEI-SP1 colle. The teacher, e BEI-SI2 cours of tware product.  KZ KZ cicular stored proview of specialize possibilities of	and finished  6 ourse projection the role that runs  4 4 ogram united the project of the project
BIK-SP2 tudents gain hands-on owever, this time, the fi the team and project le concurrentl BIK-SP2.1 BIK-SQL.1 ourse is based on know ggers, recursive querie structures like indexes,	swith the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be furth in the BEI-SP2 course.  Team Software Project 2  experience with the iterative development process while working on a large-scale software project. The first iteration is the result of unctionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 people ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. They will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the solution area. Team Software Project 2  Language SQL  ledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In parts, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of	KZ f the BEI-SP1 colle. The teacher, e BEI-SI2 cours of tware product.  KZ KZ cicular stored proview of specialize possibilities of	and finishe  6 ourse projectin the role of the truns  4 4 ogram unite the truns  4 dogram unite the truns  4 dogram unite the truns  6 dogram unite the truns  7 dogram unite
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BIK-VWM	Searching the Web and Multimedia Databases	Z,ZK	5
-	knowledge concerning retrieval techniques on the web, where the web environment is viewed as a large distributed and heterogenous		
the students shall	understand the techniques for retrieving text and hypertext documents (the web pages). Moreover, they shall be aware of similarity re heterogenous multimedia databases (unstructured data collections, respectively).	enievai memous	locused on
BIK-VZD	Data Mining	Z,ZK	4
	ced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, multid	•	1
	s of data transformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships betw		
	damentals of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic date.		
	problems (classification, regression, clustering).		0 00111111011
BIK-WT1	Web Technology I (Web and Multimedia)	Z,ZK	5
	oresentation side of web technologies. They understand the principles of proper (X)HTML, CSS, XML, and JavaScript design. They a		_
	e used on the Web, such as raster graphics, video and 3D graphics. They gain a professional-level ability to design and implement th		
	of a web application.		
BIK-WT2	Web Application Design	Z,ZK	5
	o design and implement a complete web application (both the client side and the server side). PHP is the most popular programming	•	_
	d is used as the primary programming language of this module. Students learn to design and implement, for instance, an e-shop, a g		
,	so on. Tools for quick and secure application development are introduced.	,,	,
BIK-ZDM	Elements of Discrete Mathematics	Z,ZK	5
	a mathematical sound background, but also practical calculation skills in the area of combinatorics, value estimation and formula app	•	_
3 · · · · ·	recurrent equations, and basics of graph theory.	,	
BIK-ZMA	Elements of Calculus	Z,ZK	6
	nowledge and understanding of the fundamentals of classical calculus so that they are able to apply mathematical way of thinking ar	•	1
	hniques. They get skills to practically handle functions of one variable in solving the problems in informatics. They understand the link		
	sums of sequences. They are able to estimate lower or upper bounds of values of real functions and to handle simple asymptotic exp		Ü
BIK-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
	minodiction to mod and occi interactor		
'	This course is presented in Czech.	_,、	
FI-FII	This course is presented in Czech.  Philosophy		1
FI-FIL	This course is presented in Czech.  Philosophy see A0B16	ZK	2
'	Philosophy see A0B16	ZK	1
FI-GNO	Philosophy see A0B16 Introduction to Gnoseology	ZK ZK	2
FI-GNO	Philosophy see A0B16	ZK ZK u a um ním. Roz	2 borem d ji
FI-GNO P edm t studenty u	Philosophy see A0B16 Introduction to Gnoseology vádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do	ZK  ZK  u a um ním. Roz  dhaleny mechani	2 borem d ji
FI-GNO P edm t studenty u nodernismu a myšle rroces .V návaznos	Philosophy see A0B16  Introduction to Gnoseology vádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do enkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní o	ZK  ZK  a um ním. Roz  Zhaleny mechani ckého vnímání. S	2 2 borem d jii smy tv r íc
FI-GNO P edm t studenty u nodernismu a myšle rroces .V návaznos	Philosophy see A0B16  Introduction to Gnoseology vádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do enkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní o sti na teorii p írodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém p ehledu nastín na hlediska estet	ZK  ZK  a um ním. Roz  Zhaleny mechani ckého vnímání. S	2 borem d jii smy tv r íc
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FI-GNO P edm t studenty u nodernismu a myšle vroces .V návaznos apitolou jsou model FI-HPZ A "Humanities subje	Philosophy see A0B16  Introduction to Gnoseology vádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do sti na teorii p írodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém p ehledu nastín na hlediska estet ly spojitých p írodních soustav a systém , v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje. I lng. Ivo Janoušek CSc.  Humanities subject from a study abroad ect that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.  History of Technology and Economics	ZK  ZK  u a um ním. Roz  dhaleny mechani ického vnímání. S  edm t p ednáš  Z  is required in the	2 2 2 2 2 2 2 3 3 2 2 3 2 2 2 3 2 2 2 2
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