Study plan

Name of study plan: Bachelor branch Computer Science, in Czech, 2015-2020

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 full-time

Required credits: 159 Elective courses credits: 21 Sum of credits in the plan: 180

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

roku 2015/2016 do prezen ní formy studia bakalá ského programu.

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: BI-PP.2015

Name of the group: Compulsory Courses of Bachelor Study Program Informatics, Presented 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 20 courses

Credits in the group: 116

Note on the group: Povinný předmět BI-SI1 se studentům bez oboru nezapisuje automaticky. Zapíší si jej

	individuálně podle pokynů z katedry Soft	warového inž	enýrství.			
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-AG1	Algorithms and Graphs 1 Dušan Knop	Z,ZK	6	2P+2C	Z	PP
BI-AAG	Automata and Grammars Jan Janoušek	Z,ZK	6	2P+2C	Z	PP
BI-BAP	Bachelor Thesis Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BI-BPR	Bachelor project Zden k Muziká Zden k Muziká (Gar.)	Z	2		Z,L	PP
BI-BEZ	Security Ji í Dostál	Z,ZK	6	2P+2C	L	PP
BI-CAO	Digital and Analog Circuits Martin Kohlík	Z,ZK	5	2P+2C	Z	PP
BI-DBS	Database Systems Ji í Hunka	Z,ZK	6	2P+2R+1L	Z,L	PP
BI-DPR	Document., Presentation, Rhetorics Alena Libánská, Ond ej Guth, Petra Pavlí ková, Dana Vynikarová Ond ej Guth Dana Vynikarová (Gar.)	KZ	4	2P+2C	Z,L	PP
BI-LIN	Linear Algebra Daniel Dombek Daniel Dombek (Gar.)	Z,ZK	7	4P+2C	L	PP
BI-MLO	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+1C	Z	PP
BI-OSY	Operating Systems Ladislav Vagner	Z,ZK	5	2P+1R+1L	L	PP
BI-PSI	Computer Networks Jan Fesl	Z,ZK	5	2P+1R+1C	L	PP
BI-PST	Probability and Statistics Petr Novák	Z,ZK	5	2P+1R+1C	Z	PP
BI-PA1	Programming and Algorithmics 1 Ladislav Vagner	Z,ZK	6	2P+2R+2C	Z	PP
BI-PA2	Programming and Algorithmics 2 Ladislav Vagner	Z,ZK	7	2P+1R+2C	L	PP

BI-PS1 Programming in Shell 1 Zden k Muziká	KZ	5	2P+2C	Z	PP
BI-SI1.2 Software Engineering I Ji í Mlejnek, Zden k Rybola Zden k Rybola Ji í Mlejnek (Gar.,	Z,ZK	5	2P+1C	Z,L	PP
BI-SAP Computer Structure and Architecture Hana Kubátová	Z,ZK	6	2P+1R+2C	L	PP
BI-ZDM Elements of Discrete Mathematics Ji ina Scholtzová, Jan Legerský Ji ina Scholtzová Josef Kolá	(Gar.) Z,ZK	5	2P+2C	Z	PP
BI-ZMA Elements of Calculus Ivo Petr Ivo Petr Tomáš Kalvoda (Gar.)	Z,ZK	6	3P+2C	Z	PP
Characteristics of the courses of this group of Study Plan: Code=BI-PP.20 Informatics, Presented in Czech, Version 2015)15 Name=Compulsory	Courses	of Bache	elor Stud	y Progra
BI-AG1 Algorithms and Graphs 1			Z,	ZK	6
The course covers the basics of efficient algorithm design, data structures, and graph theory, belong		-	-		
levelops the knowledge from the course BI-DML.21, in which students acquire the knowledge and s algorithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic	•		•	and space o	omplexity of
BI-AAG Automata and Grammars	, matriematics, in particular, the	asymptotic		ZK	6
Students are introduced to basic theoretical and implementation principles of the following topics: cor	nstruction, use and mutual trans	sformations			_
and regular grammars, translation finite automata, construction and use of pushdown automata, hiera				_	-
Knowledge acquired through the module is applicable in designs of algorithms for searching in text, or	data compression, simple parsir	ng and trans	lation, and d	esign of dig	ital circuits.
BI-BAP Bachelor Thesis				Z	14
BI-BPR Bachelor project				Z	2
BI-BEZ Security			Z,	ZK	6
Students understand the mathematical fundamentals of cryptography and have an overview of current cr		-		-	
and hash functions. They also learn the fundamentals of secure programming and IT security, the fun	• •	ing modern	cryptosysten	ns for comp	uter system
They are able to use properly and securely cryptographic primitives and systems that are based on t	inese primitives.			71/	
BI-CAO Digital and Analog Circuits	The course de moterne of the entire of the	stinal II	, ,	ZK	5
Students get the fundamental understanding of technologies underlying electronic digital systems. The ransistors, gates, circuits, and conductors. They are able to design simple circuits and evaluate circu	•				-
disistors, gates, circuits, and conductors. They are able to design simple circuits and evaluate circuit felectronic devices.	ni parameters. They understand	the different	ces between	analog and	uigitai mou
BI-DBS Database Systems			7	ZK	6
tudents are introduced to the database engine architecture and typical user roles. They are briefly in			-	-	
including integrity constraints) using a conceptual model and implement them in a relational databas					
ts theoretical foundation - the relational database model. They learn the principles of normalizing a rela	•				
processing, controlling parallel user access to a single data source, as well as recovering a database		=	-	-	_
n relational databases with respect to speed of access to large quantities of data. This introductory-liptimizing database applications, distributed database systems, data stores.	evel course does not cover: Adr	ministration (or database s	systems, ae	bugging and
BI-DPR Document., Presentation, Rhetorics				ζZ	4
his subject is aimed to the professional communication and writing of the scientific texts (bachelor's an	nd dinloma thesis). Students will le	earn to creat			•
nd presenting before an audience. Students will also learn to write technical reports and scientific te		oarr to oroat	o ana propan	o ii itoraotivo	procontation
BI-LIN Linear Algebra			Z.	ZK	7
he course is taught in Czech. Students understand the theoretical foundation of algebra and mather	matical principles of linear mode	els of system			dependencie
mong components are only linear. They know the basic methods for operating with matrices and line	ear spaces. They are able to per	form matrix	operations a	nd solve sys	tems of line
quations. They can apply these mathematical principles to solving problems in 2D or 3D analytic ge	ometry. They understand the er	ror-detecting	g and error-c	orrecting co	des.
BI-MLO Mathematical Logic The course seminary is taught in Czech.			Z,	ZK	5
BI-OSY Operating Systems			7.	ZK	5
Students understand the classical theory of operating systems (OS) in addition to the knowledge gai	ined in the module "Programmir	ng in Shell 1'	1 '	1	
ernels, processes and threads implementations. They understand the problems of race conditions, to	thread scheduling, resource allo	cation and	deadlocks, th	e technique	s of the
nanagement of virtual memory, principles and architectures of disks, RAID and file systems. They are	re able to design and implement	t simple mul	tithreaded ap	plications.	
BI-PSI Computer Networks			1 '	ZK	5
Students understand the basic common techniques, protocols, technologies, and algorithms necessary	•				
2nd to 4th layer of the ISO OSI model. They also get a basic understanding of communication media	, security, and network administ	tration. Stud	ents will be a	ible to write	a simple
network application and configure a simple network.			7	7K	
BI-PST Probability and Statistics The students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior	r information and learn to work	with random	1	ZK	5 ble to to ann
pasic models of random variable distributions and solve applied probabilistic problems in informatics				-	
estimations of unknown distributional parameters from random sample characteristics. They will also	·			-	-
			Z,	ZK	6
nore random variables.				nointoro)	-
nore random variables. BI-PA1 Programming and Algorithmics 1	anguage. They understand data	types (simp	ie, structured	i, pointers),	_
nore random variables. BI-PA1 Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C la					expression
nore random variables. BI-PA1 Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C la statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complex vith linked lists.			searching, so	orting, and r	expressions nanipulating
BI-PA1 Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C la statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complex with linked lists. BI-PA2 Programming and Algorithmics 2	xity. They know fundamental alg	orithms for s	searching, so	orting, and r	expressions nanipulating
BI-PA1 Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C last attements, functions, concept of recursion. They learn to analyse simple cases of algorithm complex with linked lists. BI-PA2 Programming and Algorithmics 2 Students know the instruments of object-oriented programming and are able to use them for specifying the solution of the control of the con	xity. They know fundamental alg	orithms for s	z, tack, queue,	ZK enlargeable	expressions nanipulating 7 e array, set,
BI-PA1 Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C last attements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity with linked lists. BI-PA2 Programming and Algorithmics 2 Students know the instruments of object-oriented programming and are able to use them for specifying able). They can implement linked structures. They learn these skills using the programming language of the structures.	xity. They know fundamental alg	orithms for s	z, tack, queue,	ZK enlargeable	expressions nanipulating 7 e array, set,
Programming and Algorithmics 1 Students gain the ability to formulate algorithms for solving basic problems and write them in the C latatements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexith linked lists. BI-PA2 Programming and Algorithmics 2 Students know the instruments of object-oriented programming and are able to use them for specifying able). They can implement linked structures. They learn these skills using the programming language with all C++ features needed to achieve the main objective (operator overloading, templates).	xity. They know fundamental alg	orithms for s	Z, tack, queue, mming in C+-	ZK enlargeable	expressions nanipulating 7 e array, set, are introduce
BI-PA1 Programming and Algorithmics 1 tudents gain the ability to formulate algorithms for solving basic problems and write them in the C la tatements, functions, concept of recursion. They learn to analyse simple cases of algorithm complex ith linked lists. BI-PA2 Programming and Algorithmics 2 tudents know the instruments of object-oriented programming and are able to use them for specifyi able). They can implement linked structures. They learn these skills using the programming language of	ing and implementing abstract d	orithms for s	Z, tack, queue, mming in C+-	ZK enlargeable students	expression: nanipulating 7 e array, set, are introduc

threads, access rights, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of the shell, basic commands, and filters to

process various text data.

BI-SI1.2 | Software Engineering I | Z,ZK | 5 | Students learn the methods of analysis and design of large software systems, which are typically designed and implemented in teams. They get practical skill thanks to applying hands-on analysis and design of a large-scale software project that is to be developed within the concurrent BI-SP1 module. They get skill to use CASE tools and UML for modelling and solving software-related problems. They get overview of object-oriented analysis, design, architecture, validation, verification, and testing processes.

BI-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.

BI-ZDM Elements of Discrete Mathematics

Z,ZK

5

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.

BI-ZMA Elements of Calculus

Z,ZK

ZK | 6 soning and are 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: 31

The role of the block: PO

Code of the group: BI-PO-TI.2015

Name of the group: Compulsory Courses of Bachelor Branch Computer Science, Presented in Czech, Version

2015

Requirement credits in the group: In this group you have to gain 31 credits

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

Credits in the group: 31

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-AG2	Algorithms and Graphs 2 Ond ej Suchý	Z,ZK	5	2P+2C	L	РО
BI-APS.1	Architectures of Computer Systems Pavel Tvrdík	Z,ZK	5	2P+2C	Z	РО
BI-OOP	Object-Oriented Programming Filip K ikava Filip K ikava Filip K ikava (Gar.)	Z,ZK	4	2P+2C	Z	РО
BI-PAI	Law and Informatics Zden k Ku era	ZK	3	2P	Z	РО
BI-PJP	Programming Languages and Compilers Jan Janoušek	Z,ZK	5	2P+1C	L	РО
BI-PPA	Programming Paradigms Jan Janoušek	Z,ZK	5	2P+2R	Z	РО
BI-VZD	Data Mining Alexander Kovalenko, Karel Klouda, Ond ej Tichý, Daniel Vašata Daniel Vašata Pavel Kordík (Gar.)	Z,ZK	4	2P+2C	L,Z	РО

Characteristics of the courses of this group of Study Plan: Code=BI-PO-TI.2015 Name=Compulsory Courses of Bachelor Branch Computer Science, Presented in Czech, Version 2015

BI-AG2	Algorithms and Graphs 2	Z,ZK	5					
This course, presented	This course, presented in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsory course BI-AG1. It further delves							
into advances data stru	ctures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English v	ersion of the cours	se see BIE-AG2.					
BI-APS.1	Architectures of Computer Systems	Z,ZK	5					
Students will learn the o	onstruction principles of internal architecture of computers with universal processors at the level of machine instructions. Sp	ecial emphasis is	given on the					
pipelined instruction pro	cessing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the p	orinciples of instru	ction processing					
not only in scalar proces	ssors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of	the sequential mo	del of programs.					
The course further elab	orates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence	and consistency	in such systems.					
BI-OOP	BI-OOP Object-Oriented Programming Z,ZK 4							
Object-oriented program	bject-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 dev	elopment includin	g testing, error					

handing, refactoring and design patterns.

BI-PAI Law and Informatics ZK 3
This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).

BI-PJP Programming Languages and Compilers Z,ZK 5

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.

BI-PPA Programming Paradigms

7.7K

5

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.

BI-VZD Data Mining

z,ZK

K

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).

Name of the block: Povinné ekonomické Minimal number of credits of the block: 4

The role of the block: PE

Code of the group: BI-PP-EM.2015

Name of the group: Compulsory Economics and Management Bachelor Courses, in Czech, Version 2015

Requirement credits in the group: In this group you have to gain 4 credits

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

Credits in the group: 4

Note on the group:

Povinný předmět BI-EMP se studentům bez oboru nezapisuje automaticky. Zapíší si jej

individuálně podle pokynů z katedry Softwarového inženýrství.

Code	members)	Completion	Credits	Scope	Semester	Role	
	Tutors, authors and guarantors (gar.)						ł
BI-EMP	Economics and Management Principles David Buchtela, Petra Pavlí ková David Buchtela David Buchtela (Gar.)	KZ	4	2P+2C	Z,L	PE	

Characteristics of the courses of this group of Study Plan: Code=BI-PP-EM.2015 Name=Compulsory Economics and Management Bachelor Courses, in Czech, Version 2015

BI-EMP Economics and Management Principles KZ

This course is aimed to fundamental problems of business economy. The course makes students familiar with a life cycle of business, specifically with fields: enterprise foundation, enterprise putting into state economic environment (CR), management of property and capital structure, business transaction records keeping during an accounting period, a relation between business production and costs, evaluation of enterprise financial health and business rehabilitation or termination.

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: BI-PV-EM.2015

Name of the group: Compulsory Elective Economical Courses of Bc. Program Informatics, Presented in

Czech, Ver. 2015

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 12)

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

Credits in the group: 4

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
BI-DAN	Taxes for non-Economists Savina Finardi, Tereza Ji íková Tereza Ji íková Savina Finardi (Gar.)	Z,ZK	4	2P+2C	Z	VE
FI-VEZ	economic-managerial course from a study abroad Miroslav Balík	Z	4	0+0	Z,L	VE
BI-FTR.1	Financial Markets Pavla Vozárová	Z,ZK	5	2P+2C	L	VE
BI-MEK	Macroeconomic Context of Domestic and World Economy Ivo Straka Ivo Straka (Gar.)	Z,ZK	4	2P+2C	Z	VE
BI-PRP	Law and business Zden k Ku era, Martin Samek Martin Samek Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	VE
BI-PRR	Project management David Pešek	KZ	4	2P+2C	Z	VE
BI-SEP	World Economy and Business Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	VE

BI-MIK	Fundamentals of Microeconomics Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	VE
	of the courses of this group of Study Plan: Code=BI-PV-EM.20 ormatics, Presented in Czech, Ver. 2015	15 Name=Compu	Isory Ele	ctive Eco	nomical	Courses o
BI-DAN	Taxes for non-Economists			Z	,ZK	4
Taxes, including socia	al insurance contributions, are obligatory payments paid by people or institutions to pub	olic budgets. This is the v	vay how a si	gnificant porti	on of GDP is	s redistributed.
This course concerns	s who pays which taxes or who bears the tax burden. The course introduces students to	the tax theory and poli	cy fundame	ntals and show	vs how they	affect taxation
of income, consumpti	ion, and wealth. The course provides practical information on calculations of tax liabilit	ies of both citizens and	institutions	as well as info	rmation abo	out important
taxpayers' formal dut	ties towards public administration.					
FI-VEZ	economic-managerial course from a study abroad				Z	4
A "Humanities subject	ct that has been studied abroad" is covered by the Humanities subject from a study ab	road in Compulsory Hu	manities Mo	dule that is re	quired in the	e curriculum.
The substitution is ap	proved by the Vice-Dean for study affairs on behalf of the Dean at the request of the s	student.				
BI-FTR.1	Financial Markets			Z	,ZK	5
This course is presen	nted in Czech. However, there is an English variant in the program Informatics (B1801	/ 4753).				
BI-MEK	Macroeconomic Context of Domestic and World Economy			Z	,ZK	4
This course is presen	nted in Czech.			'		
BI-PRP	Law and business			Z	,ZK	4
This course is presen	nted in Czech.					
BI-PRR	Project management				KZ	4
This course is presen	oted in Czech			'	'	

Z,ZK | World Economy and Business This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly by comparing individual countries and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of discussions based on individual readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.

Fundamentals of Microeconomics This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).

Name of the block: Povinná zkouška z angli tiny

Minimal number of credits of the block: 2

The role of the block: PJ

BI-SEP

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.

Z,ZK

Tito studenti musí před vlastní zkouškou absolvovat zápočtovou písemku.

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	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: Povinná t lesná výchova, sportovní kurzy

Minimal number of credits of the block: 0

The role of the block: PT

Code of the group: BI-PT.2015

Name of the group: Compulsory Physical Education of Bachelor Program Informatics, in Czech, Version 2015

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses

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
TV1	Physical Education	Z	0	0+2	Z	PT
TVV	Physical education	Z	0	0+2	Z,L	PT
TVV0	Physical education	Z	0	0+2	Z,L	PT
TV2	Physical Education	Z	0	0+2	L	PT
TVKLV	Physical Education Course	Z	0	7dní	L	PT
TVKZV	Physical Education Course	Z	0	7dní	Z	PT

Characteristics of the courses of this group of Study Plan: Code=BI-PT.2015 Name=Compulsory Physical Education of Bachelor Program Informatics, in Czech, Version 2015

TV1	Physical Education	Z	0
TVV	Physical education	Z	0
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0

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: BI-PV-HU.2015

Name of the group: Compulsory Elective Humanity Courses of Bachelor Study Program Informatics, in Czech,

Version 2015

Requirement credits in the group: In this group you have to gain at least 2 credits (at most 6)

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

Credits in the group: 2

Note on the group:

Faculty guarantees the availability of these modules.

1000 011 010	Name of the course / Name of the group of courses					
Code	(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
BI-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	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 Jan Fiala	ZK	2	2+0	Z,L	VH
BI-EHD	Introduction to European Economic History Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	3	2P+1C	Z,L	VH
FI-KSA	Cultural and Social Anthropology Jakub Šenovský	ZK	2	2P	L,Z	VH
BI-KSA	Cultural and Social Anthropology Alena Libánská, Tomáš Houdek, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	Z,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=BI-PV-HU.2015 Name=Compulsory Elective Humanity Courses of Bachelor Study Program Informatics, in Czech, Version 2015

FI-FIL	Philosophy	ZK	2
see A0B16			
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
This course is pre	esented in Czech.		'
FI-HTE	History of Technology and Economics	ZK	2
The course introde	duces the scientific disciplines of history and technology , economic and social history of the Czech lands and Czechoslovakia in c	omparison with the	development of
the European regi	gion 19 to 21 century.		
FI-HPZ	Humanities subject from a study abroad	Z	3
A "Humanities sub	ibject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module	that is required in	the curriculum.
The substitution is	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
BI-EHD	Introduction to European Economic History	Z,ZK	3
This course is pre	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
This course is pre		ZK	2
FI-KSA	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		_
FI-KSA The one-semester	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Cultural and Social Anthropology	versity of the world	- examples from
FI-KSA The one-semester anthropological re	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the div	versity of the world	- examples from
FI-KSA The one-semester anthropological re	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT.	versity of the world	- examples from
FI-KSA The one-semester anthropological re shown. The course BI-KSA	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, the social exclusion is a scientific discipline dealing with the diverse course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the social exclusion is a scientific discipline dealing with the diverse course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the social exclusion is a scientific discipline dealing with the diverse course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the scientific discipline dealing with the diverse course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the scientific discipline dealing with the diverse course aims to acquaint students with the diverse course aims to acquaint students are considered at the scientific discipline dealing with the diverse course aims to acquaint students are considered at the scientific discipline dealing with the diverse course are considered at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the diverse course at the scientific discipline dealing with the divers	versity of the world nealth, history, deat	examples from th, etc) will be
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FI-KSA The one-semester anthropological re shown. The course BI-KSA The one-semester anthropological re	cultural and Social Anthropology esearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse are interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse are the properties of th	rersity of the world nealth, history, deat	examples from th, etc) will be 2 - examples from
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FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course	Cultural and Social Anthropology er course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is presented in Czech. Introduction to Linguistics for Computer	rersity of the world nealth, history, deat ZK rersity of the world nealth, history, deat	- examples from th, etc) will be 2 - examples from th, etc) will be
FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course FI-ULI	Cultural and Social Anthropology er course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diverse aims to acquaint students with the basics of social exclusion, migration, globalization, , material culture, language, the is presented in Czech. Introduction to Linguistics for Computer	rersity of the world nealth, history, deat ZK rersity of the world nealth, history, deat	- examples from th, etc) will be 2 - examples from th, etc) will be
FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course FI-ULI This course is pre FI-GNO	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is presented in Czech. Introduction to Linguistics for Computer essented in Czech.	zersity of the world nealth, history, deaf	- examples from th, etc) will be 2 - examples from th, etc) will be 2
FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course FI-ULI This course is pre FI-GNO P edm t studenty	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is presented in Czech. Introduction to Linguistics for Computer essented in Czech. Introduction to Gnoseology	zersity of the world nealth, history, deaf	- examples from th, etc) will be 2 - examples from th, etc) will be 2 Rozborem d jin
FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course FI-ULI This course is pre FI-GNO Pedm t studenty modernismu a my	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, the is presented in Czech. Introduction to Linguistics for Computer essented in Czech. Introduction to Gnoseology by uvádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory,	zK zersity of the world nealth, history, deaf ZK zersity of the world nealth, history, deaf ZK ZK v dou a um ním. F	- examples from th, etc) will be 2 - examples from th, etc) will be 2 Rozborem d jin nanismy tv r ích
FI-KSA The one-semester anthropological reshown. The course BI-KSA The one-semester anthropological reshown. The course FI-ULI This course is preFI-GNO Pedm t studenty modernismu a my proces. V návazn	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, it is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, material culture, language, it is est is presented in Czech. Introduction to Linguistics for Computer essented in Czech. Introduction to Gnoseology y uvádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, yšlenkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um	zK zersity of the world health, history, deaf zK zersity of the world health, history, deaf zK zK zK zK zK v dou a um ním. Fin ní odhaleny mech	- examples from th, etc) will be 2 - examples from th, etc) will be 2 Rozborem d jin nanismy tv r ích ní. Samostatnou

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

The role of the block: V

Code of the group: BI-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: Volitelné předměty, které nejsou povinnými v programu ani žádného oboru či

	zaměření					
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-ALO	Algebra and Logic Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era Lud k Ku era (Gar.)	Z,ZK	4	2P+1C	L	V
BI-A2L	English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	L	V
BI-APJ	Aplication Programming in Java Ji í Dan ek	Z,ZK	4	2P+1R+1C	Z	V
NI-AFP	Applied Functional Programming Marek Suchánek, Robert Pergl, Daniel N mec Robert Pergl Robert Pergl (Gar.)	KZ	5	2P+1C	L	V
BIE-ZUM	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-BLE	Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.)	Z,ZK	4	2P+2C	L	V
NI-DSP	Database Systems in Practes Tomáš Vichta Tomáš Vichta (Gar.)	Z,ZK	4	2P+1C	L	V
BI-STO	Storage and Filesystems	Z,ZK	4	2P+2C	L,Z	V
NI-DZO	Digital Image Processing	Z,ZK	4	2P+1C	L	V
NI-DDM	Distributed Data Mining Tomáš Borovi ka	KZ	4	3C	L	V
BI-EP1	Effective programming 1 Martin Ka er Martin Ka er (Gar.)	Z	4	2P+2C	Z	V

BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-EJA	Enterprise Java Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-FMU	Financial and Management Accounting David Buchtela David Buchtela (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-HAM	HW accelerated network traffic monitoring Karel Hynek, Tomáš ejka Tomáš ejka (Gar.)	KZ	4	2P+1C	L	V
BI-ARD	Interactive applications on Arduino Ji í Cvr ek, Robert Hülle, Vojt ch Miškovský, Jan ezní ek Robert Hülle Robert Hülle (Gar.)	KZ	4	3C	L	V
NI-IAM	Internet and Multimedia Ji (Melnikov	Z,ZK	4	2P+1C	L	V
BIE-IMA2	Introduction to Mathematics 2 Karel Klouda	Z	2	1C	Z	V
BI-CS2	C# language and data access Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	0P+3C	Z	V
BI-CS3	Language C# - design of web applications Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	3C	Z	V
BI-SQL.1	Language SQL, advanced Michal Valenta Michal Valenta (Gar.)	KZ	4	3C	L	V
BI-QAP	Quantum algorithms and programming Tomáš Kalvoda, Ivo Petr Ivo Petr (Gar.)	KZ	5	1P+2C	Z	V
NI-LSM	Statistical Modelling Lab Kamil Dedecius Kamil Dedecius (Gar.)	KZ	5	3C	L	V
NI-MPL	Managerial Psychology Jan Fiala Jan Fiala (Gar.)	ZK	2	2P	Z,L	V
NI-MSI	Mathematical Structures in Computer Science Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MIT	Mikrotik technologies Jan Fesl Jan Fesl (Gar.)	KZ	3	1P+2C	Z	V
NI-MOP	Modern Object-Oriented Programming in Pharo Marek Skotnica, Jan Blizni enko Robert Pergl Robert Pergl (Gar.)	KZ	4	3C	Z	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MMP	Multimedia team project Zde ka echová Zde ka echová Zde ka echová (Gar.)	KZ	4	3C	Z,L	V
NI-OLI	Linux Drivers Jaroslav Borecký, Miroslav Skrbek Jaroslav Borecký Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ACM	Programming Practices 1 Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	V
BI-ACM2	Programming Practices 2 Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	Z	V
BI-ACM3	Programming Practices 3 Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	V
BI-ACM4	Programming Practices 4 Tomáš Valla, Ond ej Suchý Tomáš Valla Ond ej Suchý (Gar.)	KZ	5	4C	Z	V
BI-AND.21	Programming for the Android Operating System Jan Mottl, Jan Vep ek, Marek Kodr Jan Mottl Marek Kodr (Gar.)	KZ	4	3C	L	V
BI-CS1	Programming in C# Pavel Št pán, Helena Wallenfelsová Helena Wallenfelsová Pavel Št pán (Gar.)	KZ	4	3C	L,Z	V
BI-PJV	Programming in Java Miroslav Balík, Jan Blizni enko, Ji í Borský, Jan Zimolka Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PJS.1	JavaScript Programming Old ich Malec	KZ	4	3C	L	V
ві-кот	Programing in Kotlin Ji í Dan ek Ji í Dan ek Ji í Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
NI-PSL	Programming in Scala Ji í Dan ek Ji í Dan ek Ji í Dan ek (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-PMA	Programming in Mathematica Zden k Buk Zden k Buk Zden k Buk (Gar.)	Z,ZK	4	2P+2C	Z	V
BI-PHP.1	Programing in PHP	KZ	4	3C	Z	V
BI-PS2	Programming in shell 2 Lukáš Ba inka	Z,ZK	4	2P+2C	L	V
NI-PDD	Data Preprocessing Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-PKM	Introduction to mathematics Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z	4		Z	V
NI-REV	Reverse Engineering Ji í Dostál, Josef Kokeš, Róbert Lórencz Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Computer Engineering Seminar I Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V

BI-SCE2	Computer Engineering Seminar II Hana Kubátová Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V
BI-ST1	Network Technology 1 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST2	Network Technology 2 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	3C	L	V
BI-ST3	Network Technology 3 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST4	Network Technology 4 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	L	V
BI-SOJ	Machine Oriented Languages	Z,ZK	4	2P+2C	L	V
BI-SVZ	Machine vision and image processing Lukáš Brchl, Marcel Ji ina, Jakub Novák Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	L,Z	V
NI-SYP	Parsing and Compilers Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-GIT	Version control system GIT Petr Pulc	KZ	2	16P	Z,L	V
TV1	Physical Education	Z	0	0+2	Z	V
TVV	Physical education	Z	0	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TV2	Physical Education	Z	0	0+2	L	V
TV2K1	Physical Education 2	Z	1		L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V
TVKLV	Physical Education Course	Z	0	7dní	L	V
BI-TS1	Theoretical Seminar I Dušan Knop, Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BI-TS2	Theoretical Seminar II Tomáš Valla, Ond ej Suchý Tomáš Valla Ond ej Suchý (Gar.)	Z	4	2C	L	V
BI-TS3	Theoretical Seminar III Tomáš Valla, Ond ej Suchý, Ond ej Guth Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BI-TS4	Theoretical Seminar IV Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	L	V
BI-TDA	Test driven architecture Marek Hakala	KZ	4	2P+1C	Z,L	V
NI-TSP	Testing and Reliability Petr Fišer Martin Da hel Petr Fišer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-CCN	Compiler Construction Christoph Kirsch Christoph Kirsch (Gar.)	Z,ZK	5	3P	L	V
BI-TEX	TeX and Typography Petr Olšák Petr Olšák Petr Olšák (Gar.)	Z,ZK	4	2P+1C	L	V
BI-ULI	Introduction to Linux Zden k Muziká, Jan Ž árek, Dana ermáková, Petr Zemánek Zden k Muziká Zden k Muziká (Gar.)	Z	2	4D	Z	V
BI-OPT	Introduction to Optical Networks Pavel Tvrdík	Z,ZK	4	2P+1C	Z	V
NI-VCC	Virtualization and Cloud Computing Tomáš Vondra, Jan Fesl Tomáš Vondra Tomáš Vondra (Gar.)	Z,ZK	5	2P+1C	L	V
BI-VHS	Virtual game worlds Radek Richtr Radek Richtr (Gar.)	ZK	4	2P+2C	Z	V
BI-VR1	Virtual reality I Petr Klán, Petr Pauš Petr Klán Petr Klán (Gar.)	KZ	4	2P+2C	L,Z	V
BI-VR2	Virtual reality II Petr Klán Petr Klán Petr Klán (Gar.)	KZ	3	1P+2C	L	V
BI-VAK.21	Selected Applications of Combinatorics Tomáš Valla Tomáš Valla (Gar.)	Z	3	2R	L	V
BI-VMM	Selected Mathematical Methods Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	4	2P+2C	L	V
NI-VYC	Computability Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ZS10	Bachelor internship abroad for 10 credits Zden k Muziká Zden k Muziká (Gar.)	Z	10		Z,L	V
BI-ZS20	Bachelor internship abroad for 20 credits Zden k Muziká Zden k Muziká (Gar.)	Z	20		Z,L	V
BI-ZS30	Bachelor internship abroad for 30 credits Zden k Muziká Zden k Muziká (Gar.)	Z	30		Z,L	V
BI-ZIVS	Intelligent Embedded System Fundamentals Miroslav Skrbek Miroslav Skrbek (Gar.)	KZ	4	1P+3C	Z	V
BI-ZPI	Process engineering Robert Pergl Robert Pergl Robert Pergl (Gar.)	KZ	4	1P+2C	L	V
BI-ZNF	PHP Framework Nette - basics Ji í Chludil	KZ	3	2P+1C	L	V

BI-ZRS	Basics of System Control Kate ina Hyniová	Z,ZK	4	2P+2C	Z	V
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4	2C	Z	V
BI-ZWU	Rostislav Babá ek, Igor Rosocha Martin P Ipitel Martin P Ipitel (Gar.) Introduction to Web and User Interfaces Lukáš Ba inka Lukáš Ba inka Jakub Klímek (Gar.) Z,ZK 4		2P+2C	L	V	
BI-3DT.1	3D Printing Miroslav Hron ok, Tomáš Sýkora Tomáš Sýkora Miroslav Hron ok (Gar.)	KZ	4	3C	L	V
	of the courses of this group of Study Plan: Code=BI-V.2017 Name=P	urely Electiv	ve Course	es of Bac	helor Pr	ogramme
I, Version 2017	ID. : LEL «				7	
ΓV1	Physical Education				Z	0
TVV	Physical education				Z	0
TVV0	Physical education				Z	0
TV2	Physical Education				Z	0
TVKLV	Physical Education Course				Z	0
TVKZV	Physical Education Course				Z	0
BI-ALO	Algebra and Logic			Z	z,zk	4
	and deepens the study of topics touched upon in the basic course in logic.			,		
BI-AVI.21	Algorithms visually				z,zk	4
•	ents other algorithm courses at FIT. It brings knowledge about particular important algorithms fr			-		
	in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualizatio	n bz Algovision (www.algovisi	on.org <htt< td=""><td>p://www.alg</td><td>ovision.org&g</td></htt<>	p://www.alg	ovision.org&g
	ding the principles of algorithms easy.				7	2
BI-A2L	English language, preparation for the B2 level exam	urco orodit A ==	domio Ashi	(oment st	Z	2 luo to: Tako a
	ourse corresponds to the preparation for the English exam at the B2 level. Requirements for co guage instructionMeet the requirements for writing assignments - Summary, Abstract, Argum					
	s rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). F	-				
lass of the term.	oraco docar 70%. 00% and 000 in 2011 toda modulo 01% iz 2% in over (no whiten party. 1	toquironionio wi	ii bo opooiiio	a by marriae	au todoriore	daning aro in
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-	nted in Czech. Advanced technologies in Java.			2	-,21	7
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riis course is preser	ited in Gzech. Functional programming represents one of the traditional programming paradigi					
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of economic operations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of management accounting are base of

Business Inteligence moduls in Business information systems.

BI-HAM	HW accelerated network traffic monitoring	KZ	4
	students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. T	_	
	datory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network t		
- · · · · -	ir practical abilities in this field.	ianic on a narawa	ire and software
BI-ARD	Interactive applications on Arduino	KZ	4
	for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple appl		
kits and control varied p	peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded	d systems, i.e. to s	ee the results
	PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore	e is suitable even	for Web and
Software Engineering s			
NI-IAM	Internet and Multimedia	Z,ZK	4
	rcused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes ac als (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practic		
•	ns. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the		
	of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording		
for audience.			
BIE-IMA2	Introduction to Mathematics 2	Z	2
	ttend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they a	re able to apply th	em in particular
examples.			
BI-CS2	C# language and data access	KZ	4
	ata access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Mic d to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current ter	•	
•	and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL	•	
	ther objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data	,	
(ORM). This part of the	course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Mo	odel, Storage Mod	el and Mapping
(XML description).			
BI-CS3	Language C# - design of web applications	KZ	4
	oduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overvie	ew of the developn	nent possibilities
	Il learn to create WebAPI and to use it by client programs.	177	
BI-SQL.1	Language SQL, advanced Language SQL, advanced Language botained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In	KZ	4
	es, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the po		
	clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan	•	
will be discussed. Lectu	res will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Orac	acle DBMS and pa	artially on
PostgreSQL.			
BI-QAP	Quantum algorithms and programming	KZ	5
Course aims at giving st			
	tudents hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanic		- 1
are based, and algorithm	ms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developments	opment kit Qiskit,	which is based
are based, and algorithment on Python language. Kr	ms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developments of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VM	opment kit Qiskit,	which is based
are based, and algorithmon Python language. Kr might be an advantage.	ms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developments of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VN No previous knowledge of physics is assumed.	opment kit Qiskit, MM and experienc	which is based e with Python
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are based, and algorith on Python language. Kr might be an advantage. NI-LSM The subject is oriented available information an At this point, the subject NI-MPL NI-MSI Mathematical semantical Introduction to category BI-MPP.21 The course is focused of includes both PC side a drivers, simple application and the properties of the NI-MOP Object-oriented program is used to build complex of object systems in monaddition to deepening of technologies in terms of BI-MVT.21 The goal of the course in high resolution displays and procedural visualization. BI-MMP This course is presente NI-OLI The Linux operating systems are the variability of the course of the NI-OLI The Linux operating systems are the variability of the course of the course of the NI-OLI The Linux operating systems are the variability of the course of the variability of the varia	ms showing advantages and limitations of quantum computing. During tutorials students work in open-source software develoweledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VN No previous knowledge of physics is assumed. Statistical Modelling Lab on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is d its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, it is on the border of own research and may result in the topic of final work (diploma or bachelor thesis). Managerial Psychology Mathematical Structures in Computer Science so forgramming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scottheory. Methods of interfacing peripheral devices In methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on University and Providers (ISPs). The students gain experience with implementation of relevant parts of University and APIs of selected devices. Mikrotik technologies The subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are corrowed to the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are based on the and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary compute data-link, network and transport layer of the OSI model. Modern Object-Oriented Programming in Pharo In ming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, who modern applications. In this course, we build on the knowledge acquired in the course Bi-OoP and aim to further deepen the serion providers (ISPs). The subject requires the previous knowledge of elementary compute story	Example of the second of the s	which is based the with Python 5 ve use of the heir properties. 2 4 a calculus. 5 SB). The course is and Windows 3 7 the small and for wireless links obts like protocols 4 tural abstraction and implementation of interest. In projects and OO for Consortium. 5 risualization on is, namely fractal 4 4 4 Sors and FPGAs

BI-ACM This course is preser	Programming Practices 1	KZ	5
BI-ACM2	Programming Practices 2	KZ	5
This course is preser BI-ACM3	Programming Practices 3	KZ	5
This course is preser BI-ACM4	nted in Czech. Programming Practices 4	KZ	5
This course is preser		12	5
SI-AND.21 This course is preser	Programming for the Android Operating System	KZ	4
BI-CS1	Programming in C#	KZ	4
-	e is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamenta ps, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class de		
	is, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugg		•
vell as work with files		— — • •	
BI-PJV This course is preser	Programming in Java nted in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-PJS.1	JavaScript Programming	KZ	4
=	se is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development		
ecommended for stu of study.	dents of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register f	or this course in th	eir 4th semest
BI-KOT	Programing in Kotlin	Z,ZK	4
	atically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advantage and a street of the control of the co		
	Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of er-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	a modern, object	runctional way
VI-PSL	Programming in Scala	Z,ZK	4
	s the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language fea		-
idvance standard libi Scalaz, etc.	ary. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks	and libraries e.g. F	Play, Cassand
BI-PMA	Programming in Mathematica	Z,ZK	4
	ing with modern technical and scientific software. Students will learn how to use different programming styles (functional program	amming, rule-base	d programmir
etc.), how to create d	ynamic interactive applications and visualisations, data processing and presentations.	KZ	4
	Programing in PHP in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices		•
development in PHP.	The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register		
	e in their 3rd semester of study.	7.71/	
BI-PS2 Students gain a gene	Programming in shell 2 eral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In ad	Z,ZK	4 deeper insigh
	other particular scripting languages and will get practical experience with shell script programming.		pg
NI-PDD	Data Preprocessing	Z,ZK	5
•	pare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various date learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characte	•	o ,
pages.		g-	
BI-PKM	Introduction to mathematics	Z	4
Γhis course is preser	Reverse Engineering	Z,ZK	5
	uainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens		
	Il understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is de-		
• •	n C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be o gging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compu		
	seminars, where students will solve practically oriented tasks from the real world.	ioi maiwaro coone	. 1110 10000 01
BI-SCE1	Computer Engineering Seminar I	Z	4
	outer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistan idually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of		
	of students within the subject. Each student or group or students solves some interesting topic with the selected supervisor. Fart of offersional literature and/or work in K. N laboratories. The capacity of the subject is limited by the possibilities of the seminar teal.	· ·	
semester.			
BI-SCE2	Computer Engineering Seminar II	Z	4 ttaaka Studan
	outer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistan idually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of		
•	ofessional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	chers. The topics a	are new for ea
semester.	Natural Tachnology 1	7	2
BI-ST1 The subject is oriente	Network Technology 1 and to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredit	Z ed under the Cisc	3 o Netacad -
CCNA1 - R&S I	ntroduction to Networks.		
BI-ST2	Network Technology 2	Z	3
This course is preser	Network Technology 3	Z	3
	LINELWOLD DECLINICATION OF		3
BI-ST3	enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented duri	ng BI-ST1 and BI-	ST2 courses w
BI-ST3 Students will further	enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented duri in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pre	-	

BI-ST4	Network Technology 4	Z	3
	ance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switchi her extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased eff		-
•	ly, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a complete	*	•
	ss) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and swit		
-	ncy procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitig	ation ways while r	maintaining the
network running.			
	Machine Oriented Languages	Z,ZK	4
	rill gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optima I of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie	•	
	ised during reverse engineering, optimization, and evaluation of code security.	w linked to higher	lever lariguages.
	Machine vision and image processing	Z,ZK	5
	coming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate	l '	_
introduces students to d	fferent types of camera systems and a variety of methods for image and video processing. The course is focused on practical	use of camera sys	stems for solving
· · · · · · · · · · · · · · · · · · ·	t the graduates may encounter.		
	Parsing and Compilers	Z,ZK	5
· ·	the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of troduced to special applications of parsers, such as incremental and parallel parsing.	or various variants	and applications
BI-GIT	Version control system GIT	KZ	2
l l	ted to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and principles.		
	details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git server		
TV2K1	Physical Education 2	Z	1
BI-TS1	Theoretical Seminar I	Z	4
	tended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class		-
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	s a work with scie	ntific papers and
BI-TS2	The capacity is limited by the the potentials of the teachers of the seminar. Theoretical Seminar II	7	4
,	itended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class	Z ssical reading gro	
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		-
-	. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS3	Theoretical Seminar III	Z	4
	tended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class		· .
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	s a work with scie	ntific papers and
BI-TS4	The capacity is limited by the the potentials of the teachers of the seminar. Theoretical Seminar IV	Z	4
	tended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class		-
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		· .
•	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	s a work with scie	ntific papers and
other scholarly literature	. The capacity is limited by the the potentials of the teachers of the seminar.		ntific papers and
other scholarly literature	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture	KZ	4
other scholarly literature BI-TDA The course is focused o	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture n practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a	KZ are well known in	4 the DevOps
other scholarly literature BI-TDA The course is focused o world. This course has a	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture n practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur	KZ are well known in in the semester pr	4 the DevOps
other scholarly literature BI-TDA The course is focused o world. This course has a NI-TSP	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture n practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in Testing and Reliability	KZ are well known in in the semester pr Z,ZK	4 the DevOps oject.
other scholarly literature BI-TDA The course is focused o world. This course has a NI-TSP Students will gain knowl	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture n practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur	KZ are well known in in the semester pr Z,ZK prepare a test set	4 the DevOps oject. 5 with the help of
other scholarly literature BI-TDA The course is focused o world. This course has a NI-TSP Students will gain knowl the intuitive path sensitize	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture In practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in Testing and Reliability Testing and Reliability Edge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to	KZ are well known in in the semester pr Z,ZK prepare a test set	4 the DevOps oject. 5 with the help of
other scholarly literature BI-TDA The course is focused o world. This course has a NI-TSP Students will gain knowl the intuitive path sensitiz will be able to compute, BI-CCN	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture In practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in Testing and Reliability edge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to eation and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with analyze, and control the reliability and availability of the designed circuits. Compiler Construction	KZ are well known in in the semester pr Z,ZK prepare a test set a built-in-self-test of	4 the DevOps oject. 5 with the help of equipment. They
other scholarly literature BI-TDA The course is focused o world. This course has a NI-TSP Students will gain knowl the intuitive path sensitiz will be able to compute, BI-CCN This is an introductory of	The capacity is limited by the the potentials of the teachers of the seminar. Test driven architecture In practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in Testing and Reliability edge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to eation and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with analyze, and control the reliability and availability of the designed circuits. Compiler Construction lass on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles.	KZ are well known in in the semester pr Z,ZK prepare a test set a built-in-self-test of Z,ZK s of compilers for	4 the DevOps oject. 5 with the help of equipment. They
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BI-VR1	Virtual reality I	KZ	4
ntroduction to Virtual R	leality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirement	s of virtual worlds	communication.
	the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves c	omputational think	king, empathy
and shared social activ		1/7	
BI-VR2	Virtual reality II	KZ	3
	rse Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The condition in various social metavarse and dealths angines.	objective is to deve	elop applications
	nd gamification in various social metaverse and desktop engines.	7	
BI-VAK.21	Selected Applications of Combinatorics	Z	3
	oduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some be		
• •	to theory. Together, we will first refear the basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms and introduce some basic knowledge needed to design and analyze algorithms are also also also also also also also also		
	pe solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optim		
	olutions to the studied problems with a special focus on the effective use of existing tools.		
BI-VMM	Selected Mathematical Methods	Z,ZK	4
	metric properties of linear spaces with inner product. Next, we introduce and analyze the discrete Fourier transform (DFT) an		
	fferential calculus of functions involving multiple variables. We present methods for the localization of extreme values of functi	· ·	
ormed linear spaces a	and quadratic forms. In addition, we introduce the least square method. The last part of the course is devoted to optimization as	nd duality. The line	ar programming
and the Simplex metho	d is analyzed in more detail.		
VI-VYC	Computability	Z,ZK	4
Classical theory of recu	rsive functions and effective computability.		
BI-ZS10	Bachelor internship abroad for 10 credits	Z	10
Each student can once	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	n. Before the
nternship the Dean of	the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes	sional content and	extent of the
	urses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits	•	
	ign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided	d into two subjects	if the internship
exceeds the academic			
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or		
-	the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
	rrses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits ign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided	•	
exceeds the academic		a into two subjects	ii tile iiiterrisiiip
BI-ZS30	Bachelor internship abroad for 30 credits	Z	30
	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	. – .	
	the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
-	urses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits		
employment with a fore	ign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided	d into two subjects	if the internship
exceeds the academic	year's dead-line.		
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
ntelligent embedded sy	ystem fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim	of the course is to	teach students
nodern humanoid robo	t control and development of applications in a graphical development environment. Lectures provide fundamentals of motion o	control, sensor rea	ding, application
nterfaces, robot naviga	tion and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to g	et practical experi	ence with these
echnologies.			
BI-ZPI	Process engineering	KZ	4
Students will learn fund	amentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	of process modell	ing and they wil
	d notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of		-
	process engineering for information systems development is discussed as well as its importance in the overall context of info	ormation and busi	ness strategy of
n enterprise.		· '	
BI-ZNF	PHP Framework Nette - basics	KZ	3
_	asics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czecl	h popular framewo	rk. The resulting
	e for the efficient creation of a web backend in PHP language.	, ,	
BI-ZRS	Basics of System Control	Z,ZK	4
=	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	-	=
	and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript	•	
	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of ci	• .	•
	dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial systems.		
control loops, issues of and digital controllers a		ılal illiplementatioi	i oi continuous
		V 7	1
31-108 This course is presente	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
his course is presente		7 71/	
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
his course is presente		1/7	4
3I-3DT.1	3D Printing	KZ	4

Code of the group: BI-TI-VO.2017

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

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Všechny povinné předměty oborů a zaměření s výjimkou tohoto 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
BI-ADU.1	Unix Administration Zden k Muziká	Z,ZK	5	2P+2C	L	V
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-BEK	Secure Code Róbert Lórencz	Z,ZK	5	2P+2C	L	V
BI-BIG	DB Technologies for Big Data Josef Gattermayer, Jan Matoušek, Monika Borkovcová Jan Matoušek Monika Borkovcová (Gar.)	KZ	4	2P+2C	z	V
BI-HWB	Hardware Security Ji í Bu ek, Filip Kodýtek, Róbert Lórencz Ji í Bu ek Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-JPO	Computer Units Alois Pluhá ek	Z,ZK	5	2P+2C	Z	V
BI-KOM	Conceptual Modelling Marek Suchánek, Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MGA	Multimedia and Graphics Applications Ji i Chludil	Z,ZK	5	2P+2C	Z	V
BI-PGR.1	Computer graphics programming	Z,ZK	5	2P+2C	L	V
BI-PNO	Practical Digital Design Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	V
BI-PRP	Law and business Zden k Ku era, Martin Samek Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	V
BI-PGA	Programming of graphic applications Radek Richtr, Ji i Chludil Radek Richtr Radek Richtr (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PYT	Python Programming	Z,ZK	4	2P+2C	L	V
BI-SI2.3	Software Engineering 2 Martin Hlavatý Zden k Rybola Martin Hlavatý (Gar.)	Z,ZK	3	2P	Z	V
BI-SP1.21	Team Software Project 1 Radek Richtr, Marek Suchánek, Michal Valenta, Ji í Chludil, Ji í Mlejnek, Ji í Hunka, Zden k Rybola, Ji í Borský, Jan Matoušek, Zden k Rybola Ji í Mlejnek (Gar.)	KZ	5	2C	L	V
BI-SP1	Team Software Project 1 Ji í Mlejnek	KZ	4	2C	L	V
BI-SP2	Team Software Project 2 Ji í Mlejnek	KZ	6	2C	Z	V
BI-SP2.1	Team Software Project 2 Marek Suchánek, Ji í Chludil, Robert Pergl, Marek Skotnica, Ji í Mlejnek, Ji í Hunka, Zden k Rybola, Ji í Borský Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	4	2C	Z	V
BI-SSB	System and Network Security Ji i Dostál Ji i Dostál Ji i Dostál (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-SRC	Real-time systems Jaroslav Borecký, Hana Kubátová Jaroslav Borecký Hana Kubátová (Gar.)	KZ	4	2P+2C	Z	V
BI-TJV	Java Technology Ond ej Guth	Z,ZK	4	2P+2C	Z	V
BI-XML	XML Technology Jan Mokrý	Z,ZK	4	2P+2C	L,Z	V
BI-TIS	Information Systems Design Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-TUR	User Interface Design Jan Schmidt	Z,ZK	4	2P+2C	L	V
BI-TWA.1	Web Application Design Filip Glazar, David Bernhauer Filip Glazar David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-VES	Embedded Systems Miroslav Skrbek	Z,ZK	5	2P+2C	L	V
BI-VWM	Searching the Web and Multimedia Databases Tomáš Skopal	Z,ZK	5	2P+1C	L	V
BI-ZRS	Basics of System Control Kate ina Hyniová	Z,ZK	4	2P+2C	Z	V
BI-ZUM	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ZNS	Knowledge-based Systems Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	Z	V

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

BI-PRP	Law and business	Z,ZK	4
This course is presente	d in Czech.	•	

BI-ZRS	Basics of System Control	Z,ZK	4
_	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will found physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript		-
0 0	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of co	,	,
	dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give		
control loops, issues of and digital controllers a	stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industi nd PLC control.	riai impiementatioi	n of continuous
BI-ADU.1	Unix Administration	Z,ZK	5
	ternal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T	-	
	nistrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rigil		=
specific examples from	twork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the k practice.	mowleage from the	e lectures on
BI-ADW.1	Windows Administration	Z,ZK	4
	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	, ,	
BI-BEK	Secure Code	Z,ZK	5
	now to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting	-	-
- ·	actical experience with running programs with reduced privileges and methods of specifying these privileges, since not every . Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir	· -	
	systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	-	
BI-BIG	DB Technologies for Big Data	KZ	4
This course is presente	d in Czech.		
BI-HWB	Hardware Security	Z,ZK	5
	nardware resources used to ensure security of computer systems including embedded ones. The students become familiar w the security features of modern processors, and storage media protection through encryption. They will gain knowledge abo		•
· · · · ·	attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card		
=	ulti-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.	a tooorogyorat	g uppcucc
BI-JPO	Computer Units	Z,ZK	5
-	pasic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in deta		
	er units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using app	•	•
·	ganization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, inclund serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of co	-	
•	e architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micr		•
	dware design kits (FPGA).		
BI-KOM	Conceptual Modelling	Z,ZK	5
	on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key		
	correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological s In how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data repre	_	
	enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEN		=
	se is designed with the respect to continuation in software implementations.		
BI-MGA	Multimedia and Graphics Applications	Z,ZK	5
	d with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for w		
• •	will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to n to use multimedia transmission and representation systems, including real-time multimedia processing. They understand th	• •	•
,	cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.	ic principle of ope	iation and asc
BI-PGR.1	Computer graphics programming	Z,ZK	5
Students are able to pro	ogram a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add t		eometric details
,	surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in		
	netric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid PU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfa		•
BI-PNO	Practical Digital Design	KZ	5
_	protection Digital Design we of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand		_
•	hnologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern,		
tools.			
BI-PGA	Programming of graphic applications	Z,ZK	5
This course is presente			
BI-PYT	Python Programming	Z,ZK	4
The course is taught in		7 71/	3
BI-SI2.3 This course is presente	Software Engineering 2 d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	3
BI-SP1.21	Team Software Project 1	KZ	5
	n experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in th	1	
concurrently and that te	aches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The te	acher, in the role	of the team and
	consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software	artefact will be fu	rther developed
and finished in the BIE-		l/7	A
BI-SP1 Students gain hands-or	Team Software Project 1 resperience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	KZ ne BEI-SWI cours	4 e that runs
-	rexperience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the acknowledge of the processary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in		
	ts with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be		
in the BEI-SP2 course.			
			

BI-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. BI-SP2.1 ΚZ Team Software Project 2 4 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). BI-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 **BI-SRC** Real-time systems ΚZ 4 Students obtain the basic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues. Thereticla knowledges from lectures will be experimentally verified on the practical labs of the Department of Digital Design. This subject is mainly based on embedded R-T systems, therefore the used design kits are the same Java Technology Z,ZK 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. XML Technology Students learn to make and validate XML documents (XML Schema, Relax, Schematron) and learn standard methods of their processing (SAX, DOM). An emphasis will be given to language XPath which enables addressing of parts of XML documents and its usage in different XML technologies. Students will also learn basics of XSLT programming. XSLT and XPath programming will be based on version 2.0. Students will gain a broad overview of XML technologies. Information Systems Design 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,\overline{ZK} **BI-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. BI-TWA.1 Web Application Design Z,ZK The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some properties of language describing the structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications, which will be demonstrated in modern libraries facilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony 2, Doctrine 2. Developments on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS. **BI-VES 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 Z,ZK Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storage of documents. In particular, students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from web pages. They get detailed knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web search engines for the mentioned data types (documents) Artificial Intelligence Fundamentals BI-ZUM Z,ZK Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical tasks from the areas of state space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithms and the neural networks, will be presented as well. BI-7NS Knowledge-based Systems Z,ZK Students will become familiar with the systems based on knowledge (knowledge-based systems), which are systems that usetechniques of artificial intelligence to solve problems that require human judgment, learning and reasoning from findingsand actions. The course introduces students to the philosophy and architecture of knowledge-based systems to support decision-makingand planning. The course assumes knowledge of set theory, probability theory, artificial neural networks, and evolutionary algorithms.

List of courses of this pass:

Code	Name of the course	Completion	Credits
BI-3DT.1	3D Printing	KZ	4
BI-A2L	English language, preparation for the B2 level exam	Z	2
The content of the	course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement	students are due	to: -Take an
active part in the	language instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both the	e midterm and the	final term
tests with the succe	ess rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by indi	vidual teachers du	ring the first
	class of the term.		
BI-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	automata, regular	expressions
and regular gramm	ars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships between fo	rmal languages an	d automata.
Knowledge acqui	red through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation,	and design of digit	al circuits.
BI-ACM	Programming Practices 1	KZ	5
	This course is presented in Czech.	'	l

	Programming Practices 2 This course is presented in Czech.	KZ	5
BI-ACM3	Programming Practices 3	KZ	5
BI-ACM4	This course is presented in Czech. Programming Practices 4	KZ	5
DI 4 DI 1	This course is presented in Czech.	7 71	
BI-ADU.1	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, f		
	ory, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kno specific examples from practice.		
BI-ADW.1	Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-AG1	Algorithms and Graphs 1	Z,ZK	6
	rs the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur		-
•	rledge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the light frithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asym		omplexity of
BI-AG2	Algorithms and Graphs 2	Z,ZK	5
	nted in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsory of	,	-
•	structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English versic		
BI-ALO	Algebra and Logic The course extends and deepens the study of topics touched upon in the basic course in logic.	Z,ZK	4
BI-AND.21	Programming for the Android Operating System	KZ	4
BI-ANG	This course is presented in Czech. 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	3	1
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-APJ	Aplication Programming in Java This course is presented in Czech. Advanced technologies in Java.	Z,ZK	4
BI-APS.1	Architectures of Computer Systems	Z,ZK	5
Students will lear	n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec	ial emphasis is g	iven on the
pipelined instruction	n processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the princ	iples of instructio	n processi
ot only in scalar pr	ocessors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of the	sequential model	of progran
he course further	alabaratas the principles and grabitactures of abarad momery multiprocessor and multipore gyatams and the momery apharance and		
THE COURSE PURITIES	elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence and	consistency in s	uch system
BI-ARD The subject is desig kits and control va	Interactive applications on Arduino ned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application ried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded systems.	KZ ons for modern prostems, i.e. to see	4 rogrammale the result
BI-ARD The subject is designed kits and control vand on displation of the bi-AVI.21	Interactive applications on Arduino Interactive applications Interactive appl	KZ ons for modern pr /stems, i.e. to see s suitable even fo	4 rogrammate the result or Web and
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BI-ARD The subject is designed kits and control vant only on displation BI-AVI.21 The course complete converge presented the subject to the s	Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application in the properties of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore in Software Engineering students. Algorithms visually Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive application in the principles of algorithms from different fields of the computer science and the principles of algorithms easy.	KZ ons for modern pi /stems, i.e. to see s suitable even fo Z,ZK ience that extend ;;http://www.algov	4 rogrammabe the result or Web and 4 substantia ision.org&g
BI-ARD The subject is designed is designed by the subject is designed by the subject is designed by the subject in the subject is designed by the subject in the subject in the subject is designed by the subject in the subject in the subject is designed by the subject in the subject is designed by the subject in the subject in the subject is designed by the subject in the subject in the subject is designed by the subject in the subject in the subject is designed by the subject in the subject is designed by the subject in the subject in the subject in the subject is designed by the subject in the subj	Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application in the properties of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore in Software Engineering students. Algorithms visually Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive applications on Arduino Interactive application in the performance application in the principles of algorithms will learn how to design simple application in the principles of algorithms easy. Bachelor Thesis	KZ ons for modern pi //stems, i.e. to see s suitable even fo Z,ZK ience that extend ;;http://www.algov	4 rogrammate the result or Web and substantial ision.org&c
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BI-ARD The subject is designed is the subject is designed in the subject is designed in the subject is designed in the subject in the sudents will leave the sudents will leave the sudents administrator priving security and the sudents understand hash functions BI-BIG BI-BLE The course extending animation. It of the subject is designed in the subject is subject to the subject in the subject is subject to the subject to	Interactive applications on Arduino Independent of students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applicate pride peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sy of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore is Software Engineering students. Algorithms visually ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so and in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&list) that make understanding the principles of algorithms easy. Bachelor Thesis Secure Code arm 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 ileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing of database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the Security d the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric at the mathematical fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptosymboles for Big Data This course is presented in Czech. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those in fiffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph	KZ ons for modern pr ystems, i.e. to see s suitable even for Z,ZK eience that extend ;http://www.algov Z Z,ZK miliar with the thr program needs t data and the rela e defense agains Z,ZK and asymmetric or ystems for compu	4 rogrammate the result or Web and substantial ision.org&g 14 5 eat modeli or run with tionships of them. 6 yptosystem after system 4 4 raphics and course.
BI-ARD The subject is designed is the subject is designed is and control various only on displate the course complete in the course complete in the students will leave the course security and complete in the course country and complete in the course in the students understanding the student	Interactive applications on Arduino med for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application price of peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sy by of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore in Software Engineering students. Algorithms visually Ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so add in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&list) that make understanding the principles of algorithms easy. Bachelor Thesis Secure Code arm how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fagain 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 Security In the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric at the mathematical fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptographic primitives and systems that are based on these primitives. DB Technologies for Big Data This course is presented in Czech. Blender ds knowledge of opensource program Blender from Bl-MGA (Multimedia and Graphics Applications) course. It is intended for those in fifters a complete and practically oriented introduction to Blender environment. Students	KZ ons for modern pr ystems, i.e. to see s suitable even for Z,ZK elence that extend ;http://www.algov Z Z,ZK miliar with the thr program needs t data and the rela e defense agains Z,ZK and asymmetric or ystems for compu	4 rogrammate the result or Web and substantial ision.org&g 14 5 eat modeli or run with tionships of them. 6 yptosystem uter system 4 4 raphics and course. 2
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BI-ARD The subject is desig kits and control va not only on displated by the course completed by the course country and course courity and course by the course extension by the course extension by the course extension by the course course course by the course get the cransistors, gates, course course, c	Interactive applications on Arduino Ined for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application price peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sy by of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore in Software Engineering students. Algorithms visually Ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so and in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&ling that make understanding the principles of algorithms easy. Bachelor Thesis Secure Code Arm 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 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 Security de the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric at They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptosy. DB Technologies for Big Data This course is presented in Czech. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those in fifers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph Bachelor project Di	KZ ons for modern prostems, i.e. to see s suitable even for the second of the second o	4 rogrammate the result or Web and 4 substantial ision.org&c 14 5 eat modeli or run with tionships of them. 6 yptosystem atter system 4 4 raphics and course. 2 5 tionality of digital modeli
BI-ARD The subject is designed kits and control vanot only on display and only only only only only only only only	Interactive applications on Arduino need for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application or price peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sy by of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore is Software Engineering students. Algorithms visually ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer sold in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&lithat make understanding the principles of algorithms easy. Bachelor Thesis Secure Code arm how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fargain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every lieges. 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 mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric a Security of the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric a They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptography are able to use properly and securely cryptographic primitives and systems that are based on these primitives. Bender Bender Bender Bachelor project Digital and Analog Circuits fundamental understanding of technologies und	KZ ons for modern prostems, i.e. to see s suitable even for the second of the second o	4 rogrammate the result or Web and 4 substantial ision.org&c 14 5 eat modeli or run with the tionships of the them. 6 yptosystem uter system 4 4 raphics and course. 2 5 tionality of digital modeli 5 students to
BI-ARD The subject is designed kits and control vanot only on display and only only only only only only only only	Interactive applications on Arduino need for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applicative pried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sy by of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore is Software Engineering students. Algorithms visually ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so do in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&lithat make understanding the principles of algorithms easy. Bachelor Thesis Secure Code 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 gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every lieges. 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 Mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric a. They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptosy. They are able to use properly and securely cryptographic primitives and systems that are based on these primitives. DB Technologies for Big Data This course is presented in Czech. Blender ds knowledge of opensource program Blender from Bl-MG4 (Multimedia and Graphics Applications) course. It is intended for those in Blender environment. Students may continue to Bl-PGA (Progr	KZ ons for modern prostems, i.e. to see s suitable even for the second of the second o	4 rogrammate the result or Web and 4 substantial ision.org&c 14 5 eat modeli or run with the tionships of the them. 6 yptosystem uter system 4 4 raphics and course. 2 5 tionality of digital modeli 5 students to

BI-CS2	C# language and data access	KZ	4
	and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros		
	ts used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current tech rrying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (I	-	II.
·	rying and updating data, integrated directly with the INET platform languages, which enable LINQ use with objects, AML and SQL (i .). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data (
	of the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Mode		, ,
((XML description).	,	
BI-CS3	Language C# - design of web applications	KZ	4
	e introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overview	1	nt possibilities
	on thisplatform. They will learn to create WebAPI and to use it by client programs.	•	
BI-DAN	Taxes for non-Economists	Z,ZK	4
Taxes, including so	cial insurance contributions, are obligatory payments paid by people or institutions to public budgets. This is the way how a significant	portion of GDP is	redistributed.
	rns who pays which taxes or who bears the tax burden. The course introduces students to the tax theory and policy fundamentals and	=	
of income, consur	nption, and wealth. The course provides practical information on calculations of tax liabilities of both citizens and institutions as well a	as information abo	ut important
DI DDO	taxpayers' formal duties towards public administration.	7.71	
BI-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	=	
	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.		
BI-DPR	Document., Presentation, Rhetorics	KZ	4
This subject is aime	ed to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create and professional communication and writing of the scientific texts (bachelor's and diploma thesis).	repare interactive	presentations
	and presenting before an audience. Students will also learn to write technical reports and scientific texts.		
BI-EHD	Introduction to European Economic History	Z,ZK	3
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-EJA	Enterprise Java	Z,ZK	4
The course is on a	advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information sy	stems which are	connected to
DI EMD	a database and are accessed through the web interface.	1/7	
BI-EMP	Economics and Management Principles med to fundamental problems of business economy. The course makes students familiar with a life cycle of business, specifically with	KZ	4 foundation
	into state economic environment (CR), management of property and capital structure, business transaction records keeping during a		II.
omorphico paumg	between business production and costs, evaluation of enterprise financial health and business rehabilitation or termination		04, 4 10.41.01.
BI-EP1	Effective programming 1	Z	4
	The course is taught in Czech.	1	'
BI-EP2	Efficient Programming 2	KZ	4
Continuation of E	fficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving indivi	dual problems are	discussed,
	with the aim to choose the best one and avoid implementation errors.		
BI-FMU	Financial and Management Accounting	Z,ZK	5
	rse is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the pa		- '
•	ounts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modification		
or economic ope	rations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage Business Inteligence moduls in Business information systems.	ment accounting	are base or
BI-FTR.1	Financial Markets	Z,ZK	5
DI-I TIX.I	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZIX	1 3
BI-GIT	Version control system GIT	KZ	2
	troduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pract	1	1
	mplementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git		, ,
BI-HAM	HW accelerated network traffic monitoring	KZ	4
This course intro	duces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The	ne monitoring and	analysis of
network traffic are	mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a s	source of informat	ion and data
for analysis). The g	poals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traff	fic on a hardware	and software
	level and to develop their practical abilities in this field.		
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
Dilling	This course is presented in Czech.	7 711	
BI-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 attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card ter		
	and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of	•	, ,,
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
	This course is presented in Czech.	_	1
BI-JPO	Computer Units	Z,ZK	5
	their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail of		
organization of con	nputer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using appropriate units and using a propriate units and units and using a propriate units and using a p	oriate codes for im	plementation
	ne organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including	_	
•	lel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of comm		
ule environment ar	nd the architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micropro and programmable hardware design kits (FPGA).	ogrammed proces	oou Sittiuiator
	and programmable natuware design kits (FFOA).		

BI-KOM	Conceptual Modelling	Z,ZK	5
	Conceptual Modelling I on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key ter	•	_
otation. Next, they lea	correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological struct irn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO manual representations are represented to the processes of the DEMO manual representations are represented to the representation of the processes.	ation in the Intern	et. They also
	will be taught. The course is designed with the respect to continuation in software implementations.		1
BI-KOT	Programing in Kotlin	Z,ZK	4
	atically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advan Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a n with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	nodern, object-fur	
BI-KSA	Cultural and Social Anthropology	ZK	2
he one-semester cou	rse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity ch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health	of the world - ex	amples from
BI-LIN	shown. The course is presented in Czech. Linear Algebra	Z,ZK	7
mong components ar	Desch. Students understand the theoretical foundation of algebra and mathematical principles of linear models of systems aroung e only linear. They know the basic methods for operating with matrices and linear spaces. They are able to perform matrix operation In apply these mathematical principles to solving problems in 2D or 3D analytic geometry. They understand the error-detecting an	ns and solve syste	ems of linear
BI-MEK	Macroeconomic Context of Domestic and World Economy This course is presented in Czech.	Z,ZK	4
BI-MGA	Multimedia and Graphics Applications	Z,ZK	5
	nted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for work	•	1
	will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to graphics.	•	
-	arn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the p		on and use
	raphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating		
BI-MIK	Fundamentals of Microeconomics This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-MIT	Mikrotik technologies	KZ	3
	of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are com The providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the me		
nd how to administrate	e and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer ne	tworks concepts l	ke protocols
DIMIO	and technologies of the data-link, network and transport layer of the OSI model.	7 71/	
BI-MLO	Mathematical Logic The course seminary is taught in Czech.	Z,ZK	5
BI-MMP	Multimedia team project This course is presented in Czech.	KZ	4
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
he course is focused	on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universal and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USB	l serial bus (USB)	The course
	drivers, simple application development, and APIs of selected devices.		
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
	e is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augm is (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentione		
		3	
RI-OOP	and procedural visualization, scientific data visualization, and 3D model scanning.		1
BI-OOP Object-oriented prog	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together	Z,ZK	4
Object-oriented prog	Object-Oriented Programming	Z,ZK by message pass	ing. In this
Object-oriented prog course we look at son	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together ne of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development handing, refactoring and design patterns. Introduction to Optical Networks	Z,ZK by message passoment including to	ing. In this esting, error
Object-oriented prog course we look at son BI-OPT Students get basic ove	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together ne of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software develop handing, refactoring and design patterns. Introduction to Optical Networks rview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possi	Z,ZK by message passoment including to Z,ZK ble problems with	ing. In this esting, error
Object-oriented prog course we look at son BI-OPT Students get basic ove of optical network ted	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together ne of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software develop handing, refactoring and design patterns. Introduction to Optical Networks rview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possischnology and on their solutions. The course will include the history of optical communications, an overview of passive components	Z,ZK by message passoment including to Z,ZK ble problems with (optical fibres, m	ing. In this esting, error 4 deploymentultiplexors,
Object-oriented prog course we look at son BI-OPT Students get basic ove of optical network ted dispersion compensate the most up-to-date to	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together ne of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software develop handing, refactoring and design patterns. Introduction to Optical Networks rview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possi chnology and on their solutions. The course will include the history of optical communications, an overview of passive components ors, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system pics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters. S	Z,ZK by message passoment including to Z,ZK ble problems with (optical fibres, m ns). The course w the accurate time	deployment ultiplexors, ill also cover on Internet,
Object-oriented prog course we look at son BI-OPT Students get basic ove of optical network tec dispersion compensate he most up-to-date to ultrastable frequency	Object-Oriented Programming ramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together ne of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software develop handing, refactoring and design patterns. Introduction to Optical Networks rview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possi chnology and on their solutions. The course will include the history of optical communications, an overview of passive components ors, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system pics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters. S from practice.	Z,ZK by message pass pment including to Z,ZK ble problems with (optical fibres, m ns). The course w the accurate time Students will solve	deployment ultiplexors, ill also cover on Internet, e real tasks
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BI-PGR.1	Computer graphics programming	Z,ZK	5
	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		
	geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid func		
	for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surface:		
BI-PHP.1	Programing in PHP lught in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a	KZ	4
	PHP. The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register f		
dovolopinom in i	register for this course in their 3rd semester of study.	or bie 1707 a. i. iiic	y onoula
BI-PJP	Programming Languages and Compilers	Z,ZK	5
	asic methods of implementation of common high-level programming languages. They get experience with the design and implementati	•	
for a simple progra	amming language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that has	a certain syntax in	nto a target
form and write a co	impiler 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	er programs
	for parsing and processing text in a language defined by a LL(1) grammar.		
BI-PJS.1	JavaScript Programming	KZ	4
=	course is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development	· · · · · · · · · · · · · · · · · · ·	
recommended for s	tudents of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for the	ils course in their 4	th semester
DI D IV	of study.	7 71/	4
BI-PJV	Programming in Java This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-PKM		Z	4
DI-FKIVI	Introduction to mathematics This course is presented in Czech.	۷	4
BI-PMA	Programming in Mathematica	Z,ZK	4
	rrogramming in Mathernatica rrking with modern technical and scientific software. Students will learn how to use different programming styles (functional programm		-
Otadorito Will Do Wo	etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.	iiig, raio bacca pi	ogrammig,
BI-PNO	Practical Digital Design	KZ	5
	erview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the		_
_	on technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern, in		
	tools.		
BI-PPA	Programming Paradigms	Z,ZK	5
	with basic paradigms 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. The		
on lambda calculu	s and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr	eam programming	languages
DI DDD	such as C++ and Java.	7 71/	4
BI-PRP	Law and business This course is presented in Czech.	Z,ZK	4
BI-PRR	Project management	KZ	4
DI-I IXIX	This course is presented in Czech.	NΔ	4
BI-PS1	Programming in Shell 1	KZ	5
_	knowledgeable users of common Unix-like operating systems. They understand the fundamental principles of the operating systems		_
	hts, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of the shell, b		
	process various text data.		
BI-PS2	Programming in shell 2	Z,ZK	4
Students gain a ge	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In addition	on, they gain a dee	eper insight
	into shell and some other particular scripting languages and will get practical experience with shell script programming.		
BI-PSI	Computer Networks	Z,ZK	5
	nd the basic common techniques, protocols, technologies, and algorithms necessary to communicate in computer networks. The topic		
2nd to 4th layer of	of the ISO OSI model. They also get a basic understanding of communication media, security, and network administration. Students v network application and configure a simple network.	vill be able to write	a simple
BI-PST		Z,ZK	5
	Probability and Statistics arn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable		
	ndom variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction		
	nown distributional parameters from random sample characteristics. They will also be introduced to the methods of determining the st		
	more random variables.	·	
BI-PYT	Python Programming	Z,ZK	4
'	The course is taught in Czech.		l
BI-QAP	Quantum algorithms and programming	KZ	5
Course aims at givi	ng students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, o	n which quantum t	echnologies
_	porithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software development of the computing of the co		
on Python langua	ge. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VMN	I and experience w	ith Python
DI OAD	might be an advantage. No previous knowledge of physics is assumed.	7 71/	_
BI-SAP	Computer Structure and Architecture	Z,ZK	6
	ind basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inpu s, students gain practical experience with the design and implementation of the logic of a simple processor using modern digital desi	· · · · · · · · · · · · · · · · · · ·	-
	s, students gain practical experience with the design and implementation of the logic of a simple processor using modern digital design of digital computer construction principles, how a computer performs its operations, what is machine code, and what are its connect	-	
230ag0	languages.	ggp.05	,
BI-SCE1	Computer Engineering Seminar I	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to	failures and attacl	ks. Students
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
articles and other p	professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher	s. The topics are n	ew for each
	semester.		

BI-SCE2	Computer Engineering Seminar II	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
• • •	professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester.	•	
BI-SEP	World Economy and Business	Z,ZK	4
	sented in Czech. The course introduces students of technical university to the international business. It does that predominantly by co	· -	
	world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as nomic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of di readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		
BI-SI1.2	Software Engineering I	Z,ZK	5
	he methods of analysis and design of large software systems, which are typically designed and implemented in teams. They get prac		
	and design of a large-scale software project that is to be developed within the concurrent BI-SP1 module. They get skill to use CASE solving software-related problems. They get overview of object-oriented analysis, design, architecture, validation, verification, and tes		modelling
BI-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).	, ,	
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	irse will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal us ration of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view lir	•	
	This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	med to mg.re. level.	anguagee.
BI-SP1	Team Software Project 1	KZ	4
_	ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the hat teaches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in the		
=	onsults with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be f		
	in the BEI-SP2 course.		
BI-SP1.21	Team Software Project 1	KZ	. 5
	ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the nat teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teach		
	ularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software art		
	and finished in the BIE-SP2 course.		
BI-SP2	Team Software Project 2	KZ	6
-	ls-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result the functionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 peo		
	ject leader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution. T	-	
	rrently will provide the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the		
BI-SP2.1	Team Software Project 2 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	KZ	4
BI-SQL.1	Language SQL, advanced	KZ	4
Module is based on	knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In page 1	rticular stored prog	ram unites,
	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan ar		
	d. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Oracle DBMS.	•	~ I
	PostgreSQL.		
BI-SRC	Real-time systems	KZ	4
	e basic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues. Thereticla kn fied on the practical labs of the Department of Digital Design. This subject is mainly based on embedded R-T systems, therefore the	ŭ	
experimentally veri	as in BI-VES subject and FPGA.	acca accigii illo ait	
BI-SSB	System and Network Security	Z,ZK	5
BI-ST1	This course is focused on selected areas of computer networks and computer systems in terms of cyber security Network Technology 1	Ζ	3
_	iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredited	_	
	CCNA1 - R&S Introduction to Networks.		
BI-ST2	Network Technology 2 This course is presented in Czech.	Z	3
BI-ST3	Network Technology 3	Z	3
	r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during B		
get further extend	ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, predi simple topology, security, etc.	ctability, extension t	beyond a
BI-ST4	Network Technology 4	Z	3
	er enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switching		
_	ot further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased effici- topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completely		
	e Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and switch		
recoveries, and en	nergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation	on ways while maint	aining the
BI-STO	network running. Storage and Filesystems	Z,ZK	4
	rn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archi	l ' l	
	load balancing and high availability.		٠
BI-SVZ	Machine vision and image processing	Z,ZK	5
=	are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate in s to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical use	_	
ouuoes siuueilis	problems of practice that the graduates may encounter.	or camera systems	.o. solving

BI-TDA Test driven architecture The course is focused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that are we	KZ	4 evOns
world. This course has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is to learn by examples that occur is the course is the c		
BI-TEX TeX and Typography This course is presented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the cour rules.	Z,ZK	4 ographic
BI-TIS Information Systems Design	Z,ZK	5
Students know various types of ISs and their practical implementation aspects and are able to match the needs of different market segments (customers) w technologies (databases, programming languages, GUI etc.).	vith applications of	f existing
BI-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. To build the three and more layers enterprise systems. The student practically exercises all communication interfaces for each layers (JDBC, RestWeb ser		
course end is student able to create three layers enterprise application.		7.4.4.10
BI-TS1 Theoretical Seminar I	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a work		
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	with scientific pa	pers and
BI-TS2 Theoretical Seminar II	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a work		
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	with scientific pa	pers and
BI-TS3 Theoretical Seminar III	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re		
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a work other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	with scientific pa	pers and
BI-TS4 Theoretical Seminar IV	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re		
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a work other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	with scientific pa	pers and
BI-TUR User Interface Design	Z.ZK	4
Students have a basic overview of the methods for designing and testing common user interfaces. They have experience to solve the problems where softw	are and other pro	ducts do
not communicate with the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gain a that bring users into the development process to ensure optimal communication with a user.	in overview of the	methods
BI-TWA.1 Web Application Design	Z,ZK	5
The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some properties of		-
structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications, whic modern libraries facilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony 2, I		
on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS.	Docume 2. Develo	phileilis
BI-ULI Introduction to Linux	Z	2
Students become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become familiar and tacks in use of a University of the Command line and become familiar with the particular and the properties of the University of the Command line and become familiar with the command line and become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become familiar with the basics of the Linux operating system using e-learning form.		nmands
and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (termin BI-VAK.21 Selected Applications of Combinatorics	Z	3
The course aims to introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the basic	ı	-
ssue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic dat		
with the active participation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) informa will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimizatior		
also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.		
BI-VES 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 p peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	processors, their in	itegrated
BI-VHS Virtual game worlds	ZK	4
The course leads students to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current students	-	
complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. The course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.		owed by
BI-VMM Selected Mathematical Methods We start reviewing geometric properties of linear spaces with inner product. Next, we introduce and analyze the discrete Fourier transform (DFT) and its fa	Z,ZK	4 \(FET\)
Further we deal with differential calculus of functions involving multiple variables. We present methods for the localization of extreme values of functions. For	=	
normed linear spaces and quadratic forms. In addition, we introduce the least square method. The last part of the course is devoted to optimization and duality	ty. The linear prog	ramming
and the Simplex method is analyzed in more detail. BI-VR1 Virtual reality I	KZ	4
BI-VR1 Virtual reality I ntroduction to Virtual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of virtual reality.		
The course focuses on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves compute and shared social activities.		
BI-VR2 Virtual reality II	KZ	3
Continuation of the course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The objective	e is to develop app	olications
for computer science and gamification in various social metaverse and desktop engines. BI-VWM Searching the Web and Multimedia Databases	Z,ZK	5
Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storage of	· · · · · · · · · · · · · · · · · · ·	
students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from web		
knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web search data types (documents).	engines for the m	entioned
data typoo (dobamond).		

BI-VZD Data Mining Z,ZK 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). BI-XML XML Technology Students learn to make and validate XML documents (XML Schema, Relax, Schematron) and learn standard methods of their processing (SAX, DOM). An emphasis will be given to language XPath which enables addressing of parts of XML documents and its usage in different XML technologies. Students will also learn basics of XSLT programming. XSLT and XPath programming will be based on version 2.0. Students will gain a broad overview of XML technologies. Elements of Discrete Mathematics BI-ZDM 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. Intelligent Embedded System Fundamentals Intelligent embedded system fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim of the course is to teach students modern humanoid robot control and development of applications in a graphical development environment. Lectures provide fundamentals of motion control, sensor reading, application interfaces, robot navigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get practical experience with these technologies. BI-ZMA Elements of Calculus Z,ZK 6 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. PHP Framework Nette - basics **BI-ZNF** ΚZ 3 Students will gain the basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech popular framework. The resulting knowledge should serve for the efficient creation of a web backend in PHP language. Knowledge-based Systems Students will become familiar with the systems based on knowledge (knowledge-based systems), which are systems that usetechniques of artificial intelligence to solve problems that require human judgment, learning and reasoning from findingsand actions. The course introduces students to the philosophy and architecture of knowledge-based systems to support decision-makingand planning. The course assumes knowledge of set theory, probability theory, artificial neural networks, and evolutionary algorithms. BI-7PI Process engineering Students will learn fundamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles of process modelling and they will learn basics of the used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of business processes using modern CASE tools. The role of process engineering for information systems development is discussed as well as its importance in the overall context of information and business strategy of an enterprise. Basics of System Control The course gives an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focus our attention particularly on control of engineering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description methods of system models, basic linear dynamic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creating a description of the system model, the basic linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also given to sensors and actuators in control loops, issues of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial implementation of continuous and digital controllers and PLC control. BI-ZS10 Bachelor internship abroad for 10 credits 7 10 Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or research institution. Before the internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and extent of the internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 weeks of full-time employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects if the internship exceeds the academic year's dead-line. BI-ZS20 Bachelor internship abroad for 20 credits Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or research institution. Before the internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and extent of the internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 weeks of full-time employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects if the internship exceeds the academic year's dead-line. BI-ZS30 Bachelor internship abroad for 30 credits Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or research institution. Before the internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and extent of the internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 weeks of full-time employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects if the internship exceeds the academic year's dead-line. BI-ZUM Artificial Intelligence Fundamentals Z,ZK 4 Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical tasks from the areas of state space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithms and the neural networks, will be presented as well. BI-ZWU Introduction to Web and User Interfaces Z,ZK 4 This course is presented in Czech. Ζ **BIE-EEC** English language external certificate 4 The BIE-ECC course can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in English comparable to or exceeding the B2 level of the Common European Framework of Reference for Languages. Introduction to Mathematics 2 Students refresh and extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are able to apply them in particular examples

BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	luced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classic		
space search, mult	i-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm	s and the neural n	etworks, will
	be presented as well.		
FI-FIL	Philosophy	ZK	2
	see A0B16	<u> </u>	
FI-GNO	Introduction to Gnoseology	ZK	2
· ·	uvádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do		-
	elenkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní c	•	•
1 *	osti na teorii pírodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém pehledu nastín na hlediska este		
kapitolou jsou mod	ely spojitých p írodních soustav a systém , v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje.	P earn tp eanasi	a garantuje
FI-HPZ	Ing. Ivo Janoušek CSc.	7	2
	Humanities subject from a study abroad bject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	_	3
A Humaniles suc	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	i is required in the	curriculum.
FI-HTE	History of Technology and Economics	ZK	2
	ces the scientific disciplines of history and technology , economic and social history of the Czech lands and Czechoslovakia in compa		
The course introdu	the European region 19 to 21 century.	anson with the dev	Ciopiniciti di
FI-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 diversit		1
	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	-	•
	shown. The course is an interesting alternative to other humanities, taught at FIT.	.,, ,,, .	,
FI-MPL	Managerial Psychology	ZK	2
FI-ULI	Introduction to Linguistics for Computer	ZK	2
FI-OLI	This course is presented in Czech.	LIX.	
FI-VEZ		Z	4
	economic-managerial course from a study abroad ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that		1
A Humanities suc	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	i is required in the	curricularii.
NI-AFP	Applied Functional Programming	KZ	5
	ented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional p		_
· ·	s and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, master		-
	necessary competence of a software engineer: the theory and especially the practice.	g pg	
NI-DDM	Distributed Data Mining	KZ	4
	n state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands o		1
	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations a		
	approaches to parallelize other algorithms. The course is prezented in czech language.		
NI-DSP	Database Systems in Practes	Z,ZK	4
	This course is presented in Czech.		'
NI-DZO	Digital Image Processing	Z,ZK	4
This course prese	ents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical alg	orithms that are b	oth easy to
implement and hav	e an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is als	so valuable outside	the domain
	processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR		
	abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray converses to the converse of t		
	gid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ac		
NI-IAM	Internet and Multimedia	Z,ZK	4
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	_	
	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical under the control of t		
	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effi-		
the quality and late	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording th for audience.	e scene up to the p	presentation
NILLOM	-	V7	E
NI-LSM	Statistical Modelling Lab ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p	KZ	5
	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, an		
available informati	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi	•	properties.
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	ogramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where		· ·
	plex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills	=	
	in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development n		
	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work of		
technologies in ter	rms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involven	nent in the Pharo C	Consortium.
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	emantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scot	'	
	Introduction to category theory.		
NI-OLI	Linux Drivers	Z,ZK	4
The Linux operating	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po		and FPGAs
increase the vari	ability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver development	nt for master's stud	lents. The
l co	urse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practic	al experience.	

	Data Preprocessing	Z,ZK	5
Students learn to	prepare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data s	ources, such as ir	mages, texts,
time series, etc.,	and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characteris	tics from images	or from web
	pages.		_
NI-PSL	Programming in Scala	Z,ZK	4
The course introd	uces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature	es - e.g.pattern m	atching and
advance standard	library. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and Scalaz, etc.	l libraries e.g. Play	, Cassandra,
NI-REV	Reverse Engineering	Z,ZK	5
Students will get a	cquainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens before	ore and after the r	nain function
is called. Student	s will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dedica	ated to reverse en	gineering of
applications wr	itten in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be de	edicated to debug	gers: how
debuggers and d	ebugging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the computer	malware scene. 7	The focus of
	the course is on the seminars, where students will solve practically oriented tasks from the real world.		
NI-SYP	Parsing and Compilers	Z,ZK	5
The module builds	upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of various properties of the control of the	rious variants and	applications
	of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
NI-TSP	Testing and Reliability	Z,ZK	5
Students will gain	knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prej	oare a test set wit	h the help of
•	knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu		
•			
•	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu		
the intuitive path s	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits.	ilt-in-self-test equi	ipment. They
NI-VCC Students will ga acquainted with v	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie	Z,ZK organizations. The	5 ney will get optimize the
NI-VCC Students will ga acquainted with v	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effecti	Z,ZK organizations. The only operate and over technology too	5 sey will get optimize the day for the
NI-VCC Students will ga acquainted with v	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irrualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effection of supplies computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in	Z,ZK organizations. The only operate and over technology too	5 sey will get optimize the day for the
NI-VCC Students will ga acquainted with v performance paranagement of co	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effect omplex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in and development tools (Continuous integration and development).	Z,ZK organizations. The antly operate and ove technology too the use of model	5 sey will get optimize the day for the rn integration
NI-VCC Students will ga acquainted with v	rensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with but will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effect omplex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in and development tools (Continuous integration and development). Computability	Z,ZK organizations. The only operate and over technology too	5 sey will get optimize the day for the
NI-VCC Students will ga acquainted with v performance paranagement of co	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and irtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effect omplex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in and development tools (Continuous integration and development).	Z,ZK organizations. The antly operate and ove technology too the use of model	5 sey will get optimize the day for the rn integration
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