Study plan

Name of study plan: Bachelor branch Information Systems and Management, 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: 153

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

Note on the plan: Tato verze studijního plánu je ur ena pro ro níky, které 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

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

	individuálně podle pokynů z katedry So	ftwarového 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 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 Ond ej Guth	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	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+20	L	PP

3I-PS1	Programming in Shell 1 Zden k Muziká	KZ	5	2P+2C	Z	PP
3I-SI1.2	Software Engineering I Ji í Mlejnek, 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	Z,ZK	5	2P+2C	Z	PP
BI-ZMA	Elements of Calculus /// / / / / / / / / / / / / / / / / /	Z,ZK	6	3P+2C	Z	PP
nformatics, Preser	the courses of this group of Study Plan: Code=BI-PP.2015 nted in Czech, Version 2015 Algorithms and Graphs 1	Name=Compulsory	Course		ZK	dy Progran
develops the knowledge	isics of efficient algorithm design, data structures, and graph theory, belonging to from the course BI-DML.21, in which students acquire the knowledge and skills so follows up knowledge from BI-MA1.21, the practical usage of asymptotic mat	in combinatorics necessary	for evalua	ating the time a		
	Automata and Grammars	anomatics, in particular, the	doymptotic		ZK	6
	to basic theoretical and implementation principles of the following topics: construction anslation finite automata, construction and use of pushdown automata, hierarchy				_	•
	ugh the module is applicable in designs of algorithms for searching in text, data		•			
	Bachelor Thesis				Z	14
BI-BPR	Bachelor project				Z	2
The state of the s	Security				ZK	6
	mathematical fundamentals of cryptography and have an overview of current crypto		-		-	
•	also learn the fundamentals of secure programming and IT security, the fundam perly and securely cryptographic primitives and systems that are based on these		sing moderi	n cryptosysten	ns for comp	puter systems
	Digital and Analog Circuits	, priminivos.		7	ZK	5
	ental understanding of technologies underlying electronic digital systems. They use	understand the basic theore	etical mode	,	1	-
ransistors, gates, circuits	s, and conductors. They are able to design simple circuits and evaluate circuit pa					-
f electronic devices.						
	Database Systems					
	to the database engine architecture and typical user roles. They are briefly introduced	duced to various database	models Th		ZK	6 databases
	to the database engine architecture and typical user roles. They are briefly introd			ey learn to des	sign small	databases
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including integrity constricts theoretical foundation rocessing, controlling particles in relational databases with primiting database applications of the subject is aimed to the individual presenting before an individual	aints) using a conceptual model and implement them in a relational database entithe relational database model. They learn the principles of normalizing a relational arallel user access to a single data source, as well as recovering a database engith respect to speed of access to large quantities of data. This introductory-level ications, distributed database systems, data stores. Document., Presentation, Rhetorics e professional communication and writing of the scientific texts (bachelor's and dip audience. Students will also learn to write technical reports and scientific texts. Linear Algebra zech. Students understand the theoretical foundation of algebra and mathematically linear. They know the basic methods for operating with matrices and linear sty these mathematical principles to solving problems in 2D or 3D analytic geomethatematical Logic aught in Czech. Operating Systems classical theory of operating systems (OS) in addition to the knowledge gained areads implementations. They understand the problems of race conditions, three emory, principles and architectures of disks, RAID and file systems. They are abcomputer Networks basic common techniques, protocols, technologies, and algorithms necessary to OSI model. They also get a basic understanding of communication media, seconfigure a simple network. Probability and Statistics e basics of probabilistic thinking, the ability to synthesize prior and posterior inforvariable distributions and solve applied probabilistic problems in informatics and listributional parameters from random sample characteristics. They will also be informatically algorithms for solving basic problems and write them in the C languancept of recursion. They learn to analyse simple cases of algorithm complexity. Programming and Algorithmics 2 ments of object-oriented programming and are able to use them for specifying a not linked structures. They learn these skills using the programming language C++.	agine. They get a hands-on al database schema. They up gine from a failure. They are course does not cover: Additional thesis). Students will I call principles of linear mode paces. They are able to pertry. They understand the end of the computer of the computer of the computer of the computer science. Using the theorem of the computer science. Using the computer science. Using the computer science. Using the computer science of the methods of the computer science of the methods of the computer science. Using the computer science of the methods of the methods of the computer science of the methods o	experience and experience and extend experience and experience are proposed as a price of the control of the co	ey learn to deserve with the SQL the fundament roduced to special of databases of d	sign small of language, all concepts ecial ways of systems, do to systems, and to systems, do	databases as well as wit s of transactio of storing data ebugging and 4 e presentation 7 dependencie stems of linea odes. 5 ledge of OS es of the 5 focused on the e a simple ble to perform lence of two of 6 , expressions manipulating 7 le array, set, are introduce

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

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

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

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 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.

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 25

The role of the block: PO

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

Name of the group: Compulsory Courses of Bachelor Branch Information Systems and Management, in

Czech, Version 2015

Requirement credits in the group: In this group you have to gain 25 credits

Requirement courses in the group: In this group you have to complete at least 6 courses

Credits in the group: 25 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
BI-KOM	Conceptual Modelling Robert Pergl	Z,ZK	5	2P+2C	Z	РО
BI-PAI	Law and Informatics Zden k Ku era	ZK	3	2P	Z	РО
BI-PRP	Law and business	Z,ZK	4	2P+1R	L	РО
BI-SI2.3	Software Engineering 2 Martin Hlavatý Zden k Rybola Martin Hlavatý (Gar.)	Z,ZK	3	2P	Z	РО
BI-TIS	Information Systems Design	Z,ZK	5	2P+1C	Z	РО
BI-ZNS	Knowledge-based Systems Marcel Ji ina	Z,ZK	5	2P+2C	Z	РО

Characteristics of the courses of this group of Study Plan: Code=BI-PO-ISM.2015 Name=Compulsory Courses of Bachelor Branch Information Systems and Management, in Czech, Version 2015

BI-KOM | Conceptual Modelling | Z,ZK | 5
The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key terms in a domain, the ability to categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the OntoUML notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data representation in the Internet. They also learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO method and the BPMN notation will be taught. The course is designed with the respect to continuation in software implementations.

will be taught. The cour	se is designed with the respect to continuation in software implementations.						
BI-PAI	Law and Informatics	ZK	3				
This course is presente	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).						
BI-PRP	Law and business	Z,ZK	4				
This course is presente	d in Czech.		'				
BI-SI2.3	Software Engineering 2	Z,ZK	3				
This course is presente	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		'				
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) with applications of existing							
technologies (databases, programming languages, GUI etc.).							

BI-ZNS | Knowledge-based Systems | Z,ZK | 5
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.

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	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-EMP	Economics and Management Principles David Buchtela	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

ΚZ

4

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-PVE-ISM.2015

Name of the group: Economical Courses of Bachelor Branch Information Systems and Management, in

Czech, version 2015

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 9)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 2)

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
FI-VEZ	economic-managerial course from a study abroad Miroslav Balík	Z	4	0+0	Z,L	VE
BI-FMU	Financial and Management Accounting David Buchtela	Z,ZK	5	2P+2C	Z	VE
BI-FTR.1	Financial Markets Pavla Vozárová	Z,ZK	5	2P+2C	L	VE
BI-SEP	World Economy and Business Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	VE

Characteristics of the courses of this group of Study Plan: Code=BI-PVE-ISM.2015 Name=Economical Courses of Bachelor Branch Information Systems and Management, in Czech, version 2015

FI-VEZ	economic-managerial course from a study abroad	Z	4			
A "Humanities subject 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 approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.						

BI-FMU Financial and Management Accounting

Z,ZK |

The aim of the course is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the particular accounting operations, operations in accounts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modification of bookkeeping, description 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 Intelligence moduls in Business information systems.

Dusiness intell	gence modula in business information systems.					
BI-FTR.1	Financial Markets	Z,ZK	5			
This course is	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).					
BI-SEP	World Economy and Business	7 7K	4			

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.

Name of the block: Povinná zkouška z angli tiny

Minimal number of credits of the block: 2

The role of the block: PJ

Code of the group: BI-ZKA

Name of the group: English Language, Internal Certifica

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

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

Credits in the group: 2

Note on the group:

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

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

	<u> </u>						
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2				
BIE-EEC	English language external certificate	Z	4				
The BIE-ECC course c	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.							
BI-ANG	English Language, Internal Certificate	ZK	2				
Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-ANG							

Name of the block: 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: The student is obliged to successfully complete two courses of this group. Guarantor: prof. Ing. Róbert Lórencz, CSc., email: robert.lorencz@fit.cvut.cz

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their Code Completion Credits Scope Semester Role members) Tutors, authors and guarantors (gar.) TV1 Ζ 0 0+2Ζ **Physical Education** PT **Physical Education** TVK1 Ζ 1 L,Z PT Luboš Neuman Ji í Drnek (Gar.) TVV Ζ 0 Z,L 0+2PT Physical education TVV0 Ζ 0 0+2 Z,L РΤ **Physical education** Z TV2 0+2 0 L **Physical Education** РΤ **TVKZV** Ζ 0 7dní Ζ РΤ **Physical Education Course TVKLV** Ζ 7dní **Physical Education Course**

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
TVK1	Physical Education	Z	1
TVV	Physical education	Z	0
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0

TVKZV	Physical Education Course	Z	0
TVKLV	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.

riote on the grou	p	•				
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
FI-FIL	Philosophy Peter Zamarovský Peter Zamarovský (Gar.)	ZK	2	2P	Z,L	VH
ВІ-НМІ	History of Mathematics and Informatics Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	L	VH
FI-HTE	History of Technology and Economics Jan Mikeš, Marcela Efmertová Marcela Efmertová 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 (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

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 prese	ented in Czech.	<u> </u>	
FI-HTE	History of Technology and Economics	ZK	2
The course introduc	es the scientific disciplines of history and technology , economic and social history of the Czech lands and Czechoslovakia in c	omparison with the d	levelopment of
the European regio	n 19 to 21 century .		
FI-HPZ	Humanities subject from a study abroad	Z	3
A "Humanities subje	ect that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module	that is required in the	e curriculum.
The substitution is a	pproved 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 prese	ented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
FI-KSA	Cultural and Social Anthropology	ZK	2
The one-semester	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the div	ersity of the world - ϵ	examples from
anthropological res	earch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, h	ealth, history, death,	, etc) will be
shown. The course	is an interesting alternative to other humanities, taught at FIT.		
BI-KSA	Cultural and Social Anthropology	ZK	2
The one-semester	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the div	ersity of the world - e	examples from
	earch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, h	ealth, history, death,	, etc) will be
	is presented in Czech.		
FI-ULI	Introduction to Linguistics for Computer	ZK	2

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-PRO_MG

Name of the group: Elective Courses, Suitable for those who intend to apply for Master's program at FIT

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

Credits in the group: 0

Note on the group: Courses in this group are recommended for students who intend to enroll to master

program at FIT.

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	V

Characteristics of the courses of this group of Study Plan: Code=BI-V-PRO_MG Name=Elective Courses, Suitable for those who intend to apply for Master's program at FIT

BI-AG2 Algorithms and Graphs 2 Z,ZK 5
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 structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English version of the course see BIE-AG2.

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	٧
BI-APJ	Aplication Programming in Java Ji í Dan ek	Z,ZK	4	2P+1R+1C	; Z	٧
NI-AFP	Applied Functional Programming Robert Pergl, Marek Suchánek, Daniel N mec Robert Pergl Robert Pergl (Gar.)	KZ	5	2P+1C	L	V
BIE-ZUM	Artificial Intelligence Fundamentals Pavel Surynek	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 Martin Ka er (Gar.)	Z	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-EJA	Enterprise Java Ji í Dan ek	Z,ZK	4	2P+2C	L	V
BI-FMU	Financial and Management Accounting David Buchtela	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 í 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 Ivo Petr, Tomáš Kalvoda Ivo Petr Ivo Petr (Gar.)	KZ	5	1P+2C	Z	V
NI-LSM	Statistical Modelling Lab Kamil Dedecius 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	Z,ZK	4	2P+1C	L	V
BI-MPP.21	Methods of interfacing peripheral devices 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 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 Tomás Valla	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
BI-KOT	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 Dan ek Ji Dan ek Ji 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,L	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 (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-PKM	Introduction to mathematics Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z	4		Z	٧
NI-REV	Reverse Engineering Josef Kokeš Josef Kokeš (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 (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 Marcel Ji ina	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
TVKLV	Physical Education Course	Z	0	7dní	L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	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 Dušan Knop, 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 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	٧
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 Tyrdík	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	٧
BI-VHS	Virtual game worlds Radek Richtr	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 Michal Opler Michal Opler (Gar.)	Z	3	2R	L	V
BI-VMM	Selected Mathematical Methods Marzieh Forough 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 (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 Rostislav Babá ek, Igor Rosocha Martin P Ipitel Martin P Ipitel (Gar.)	KZ	4	2C	Z	V
BI-ZWU	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

Characteristics of the courses of this group of Study Plan: Code=BI-V.2017 Name=Purely Elective Courses of Bachelor Programme BI, Version 2017

BI-FMU Financial and Management Accounting Z,ZK 5

The aim of the course is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the particular accounting operations, operations in accounts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modification of bookkeeping, description 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 Intelligence moduls in Business information systems.

TV1	Physical Education	Z	0
TVV	Physical Education Physical education	Z	0
TVV0			
	Physical education	Z	0
TV2	Physical Education	Z	0
TVKZV	Physical Education Course	Z	0
TVKLV	Physical Education Course	Z	0
BI-ALO	Algebra and Logic	Z,ZK	4
The course extends	and deepens the study of topics touched upon in the basic course in logic.		
BI-AVI.21	Algorithms visually	Z,ZK	4
•	nents other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the compu		
• •	d in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision	.org <http: td="" www.alg<=""><td>jovision.org></td></http:>	jovision.org>
	nding the principles of algorithms easy.		
BI-A2L	English language, preparation for the B2 level exam	Z	2
	ourse corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achiever Iguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in bo		
•	ss rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by		
class of the term.	so tate oct at 1976. Go 70 and over in Bo 111 toole means of the EXVIIII of the Whiteh party. Requirements will be specified by	y marriada todonore	o daring the ini
BI-APJ	Aplication Programming in Java	Z,ZK	4
	inted in Czech. Advanced technologies in Java.	2,21	7
NI-AFP	Applied Functional Programming	KZ	5
	inted in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel function		_
	nd the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, ma		
· · · · · · · · · · · · · · · · · · ·	nce of a software engineer: the theory and especially the practice.	3 - 1 - 3	
BIE-ZUM	Artificial Intelligence Fundamentals	Z.ZK	4
_	iced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the cl	1 , 1	e areas of stat
	agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algo-		
be presented as well			
BI-BLE	Blender	Z,ZK	4
The course extends	knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for the	se interested in 3D (graphics and
animation. It offers a	complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming grap	hics applications) co	urse.
NI-DSP	Database Systems in Practes	Z,ZK	4
This course is prese	nted in Czech.		
BI-STO	Storage and Filesystems	Z,ZK	4
	Storage and Filesystems n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and	1 '	4 storage scaling
The student will lear load balancing and l	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and high availability.	l archiving, as so as	
The student will lear	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and	1 '	4 storage scaling 4
The student will lear load balancing and I	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and high availability.	Z,ZK	4
The student will lear load balancing and load balancing and load NI-DZO This course present implement and have	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and high availability. Digital Image Processing s a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practica an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that	Z,ZK al algorithms that are t is also valuable out:	4 both easy to side the domai
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The student will lear load balancing and load balancing and load NI-DZO This course present implement and have of digital image proof frequency domain, a	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and high availability. Digital Image Processing s a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that sessing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HI abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray	Z,ZK al algorithms that are t is also valuable out: DR compression, developments of the conversion, context	4 both easy to side the domaiblurring in tenhancement
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The student will lear load balancing and load balancing and load NI-DZO This course present implement and have of digital image proof frequency domain, a interactive as-rigid-at NI-DDM	n principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and high availability. Digital Image Processing s a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that essing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HI abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, Distributed Data Mining	Z,ZK al algorithms that are t is also valuable out: DR compression, de- or conversion, context adding depth, alpha	4 both easy to side the domai-blurring in tenhancement matting.
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The student will lear load balancing and load balancing broad balancing load	Digital Image Processing s a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practica an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that ressing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HI abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray is-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, Distributed Data Mining State-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hat nework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementative other algorithms. The course is prezented in czech language. Effective programming 1 tin Czech. Efficient Programming 2 cient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving in	Z,ZK al algorithms that are t is also valuable out: DR compression, de- v conversion, context adding depth, alpha KZ unds on experience w ons and will be capa	4 e both easy to side the domain-blurring in a tenhancement matting. 4 with large scale ble to propose
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The student will lear load balancing and load balancing between the source of digital image proof frequency domain, a interactive as-rigid-as load balance of the source focuses on so data processing frar approaches to parall BI-EP1 The course is taugh BI-EP2 Continuation of Efficient the source of the source o	Digital Image Processing s a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practica an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that design. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HI abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray is possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, Distributed Data Mining state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hat nework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementatic lelize other algorithms. The course is prezented in czech language. Effective programming 1 t in Czech. Efficient Programming 2 ient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving in set the best one and avoid implementation errors. Enterprise Java	Z,ZK al algorithms that are t is also valuable out: DR compression, de- v conversion, context adding depth, alpha KZ Individual problems a Z,ZK	4 e both easy to side the domain-blurring in the enhancement of matting. 4 with large scale ble to propose 4 4 re discussed,
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BI-CS2	C# language and data access	KZ	4
	ta access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micr		
	I to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current tec and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL		
	her objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data	•	
· ·	course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model First approaches.		=
(XML description).		_	
BI-CS3	Language C# - design of web applications	KZ	4
The students will be intro	duced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overview	ew of the develop	nent possibilities
on thisplatform. They wi	learn to create WebAPI and to use it by client programs.		
BI-SQL.1	Language SQL, advanced	KZ	4
	vledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In		
	s, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the poi		
	lusters, index-organized tables, and materialized views, as well as from the point of view query optimization. Execution plans	-	-
PostgreSQL.	es will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora	icie DBIVIS and pa	artially on
BI-QAP	Quantum algorithms and programming	KZ	5
	idents hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics		
	ns showing advantages and limitations of quantum computing. During tutorials students work in open-source software develo		_
on Python language. Kn	owledge 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	MM and experience	e with Python
might be an advantage.	No previous knowledge of physics is assumed.		
NI-LSM	Statistical Modelling Lab	KZ	5
-	n 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,	and analyses of t	heir properties.
	is on the border of own research and may result in the topic of final work (diploma or bachelor thesis).		
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scott	t model of lambda	a calculus.
Introduction to category		7.71/	
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5 (SD) The source
	n methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Unive Ind peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of U	·	
	in development, and APIs of selected devices.	OB devices, Lind	x and windows
BI-MIT	Mikrotik technologies	KZ	3
	ne subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are c		_
	roviders (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the	-	
and how to administrate	and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary compute	r networks conce	pts like protocols
and technologies of the	data-link, network and transport layer of the OSI model.		
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
, , , ,	ming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, whe	•	
	modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the sl	•	•
	lern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development ·ject programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to wor	needs and areas	
	semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involving the work with the possibility of cooperation with practice and related bachelor, diploma and the practice with the postgraduate our direct properties and the practice with the postgraduate our distribution with the postgraduate our direct properties and the practice with the properties of the practice of the practi		
BI-MVT.21		rk on interesting p	projects and OO
		rk on interesting person in the Pha	orojects and OO ro Consortium.
	Modern Visualisation Technologies	rk on interesting perment in the Pha	orojects and OO ro Consortium.
_		rk on interesting pement in the Pha Z,ZK gmented reality, v	orojects and OO ro Consortium. 5
high resolution displays	Modern Visualisation Technologies to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and aug	rk on interesting pement in the Pha Z,ZK gmented reality, v	orojects and OO ro Consortium. 5
high resolution displays	Modern Visualisation Technologies to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and auge.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mention	rk on interesting pement in the Pha Z,ZK gmented reality, v	orojects and OO ro Consortium. 5
high resolution displays and procedural visualiza	Modern Visualisation Technologies to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and aute.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentition, scientific data visualization, and 3D model scanning. Multimedia team project	rk on interesting pement in the Pha Z,ZK gmented reality, voned technologie	orojects and OO ro Consortium. 5 risualization on s, namely fractal
high resolution displays and procedural visualiza	Modern Visualisation Technologies to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and aute.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentition, scientific data visualization, and 3D model scanning. Multimedia team project	rk on interesting pement in the Pha Z,ZK gmented reality, voned technologie	orojects and OO ro Consortium. 5 risualization on s, namely fractal
high resolution displays and procedural visualizated BI-MMP This course is presented NI-OLI The Linux operating sys	Modern Visualisation Technologies to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and auge.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mention, scientific data visualization, and 3D model scanning. Multimedia team project In Czech. Linux Drivers em is an important operating system for personal computer and also for embedded systems. Systems on chip and combining	rk on interesting rement in the Pha Z,ZK gmented reality, voned technologie KZ Z,ZK g powerful proces	orojects and OO ro Consortium. 5 risualization on s, namely fractal 4 4 sors and FPGAs
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BI-PJS.1	JavaScript Programming	KZ	4
	is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development		
	ents of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for	or this course in th	eir 4th semester
of study.			
BI-KOT	Programing in Kotlin	Z,ZK	4
	cally-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of adv		
	iva compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	a modern, object	-runctional way
NI-PSL	Programming in Scala	Z,ZK	4
	ן רוסקומוווווווון ווו סכמומ the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feat		
	y. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks		- 1
Scalaz, etc.	,,,,,,,,,,,,,,,,,	g	,,,
BI-PMA	Programming in Mathematica	Z,ZK	4
Students will be working	g with modern technical and scientific software. Students will learn how to use different programming styles (functional progra	· '	ed programming,
etc.), how to create dyn	amic interactive applications and visualisations, data processing and presentations.		
BI-PHP.1	Programing in PHP	KZ	4
The course is taught in	Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a	and will use tool t	nat eases
development in PHP. Th	ne course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register	for BIE-TWA.1. Th	ney should
register for this course i	n their 3rd semester of study.		
BI-PS2	Programming in shell 2	Z,ZK	4
Students gain a general	l overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In add	dition, they gain a	deeper insight
	er particular scripting languages and will get practical experience with shell script programming.		
NI-PDD	Data Preprocessing	Z,ZK	5
	re raw data for further processing and analysis. They learn what algorithms can be used to extract information from various da		-
	arn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of character	istics from image	s or from web
pages.			_
BI-PKM	Introduction to mathematics	Z	4
This course is presente			
NI-REV	Reverse Engineering	Z,ZK	5
	inted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens		
	inderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dec		
• •	C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be d ing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the comput	-	, ,
	nings, where students will solve practically oriented tasks from the real world.	or marware scene	The locus of
BI-SCE1	Computer Engineering Seminar I	Z	4
	ter Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance.	_	-
•	ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of t		
• •	ssional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teach	=	
semester.			
BI-SCE2	Computer Engineering Seminar II	Z	4
	er Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistanc		
	ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of t		
· ·	ssional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teach	thers. The topics a	are new for each
semester.			
BI-ST1	Network Technology 1	Z	3
•	to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite	ed under the Cisc	o Netacad -
CCNA1 - R&S Intro		-	
BI-ST2	Network Technology 2	Z	3
This course is presented		7	
BI-ST3	Network Technology 3	Z	ST2 courses will
	nance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented durir the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pre	-	
simple topology, securit		alotability, exterior	on beyond a
BI-ST4	Network Technology 4	Z	3
	hance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switchin		
	her extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased eff		-
beyond a simple topolog	gy, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completel	y other type of ne	twork (Non
Broadcast Multiple Acce	ess) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and swit	ch firmware, perfo	orm password
recoveries, and emerge	ency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigate	ation ways while r	naintaining the
network running.			
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optima	•	
· · · · · · · · · · · · · · · · · · ·	n of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view	w iinked to higher	ievel languages.
	used during reverse engineering, optimization, and evaluation of code security.		
BI-SVZ	Machine vision and image processing	Z,ZK	5
	ecoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate	-	
	lifferent types of camera systems and a variety of methods for image and video processing. The course is focused on practical at the graduates may encounter.	use oi camera sys	sterns for solving
NI-SYP		7 7V	5
	Parsing and Compilers the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of	Z,ZK	
•	ntroduced to special applications of parsers, such as incremental and parallel parsing.	anous variants	and applications
1 3 3 3 1	to control to the con		

BI-GIT	Version control system GIT	KZ	2
	ced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pra		rticular system
	n details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git server	1	
BI-TS1	Theoretical Seminar I have to come in deeper contact with contemporary theoretical computer science. It is mostly a class	Z	4
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		•
	e. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS2	Theoretical Seminar II	Z	4
Theoretical seminar is in	ntended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class	sical reading grou	ıp. The students
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	a work with scier	tific papers and
	e. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS3	Theoretical Seminar III	_ Z	4
	ntended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a clas and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		•
· · · · · · · · · · · · · · · · · · ·	e. The capacity is limited by the the potentials of the teachers of the seminar.	a work with scier	itilic papers and
BI-TS4	Theoretical Seminar IV	Z	4
_	ntended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a clas	_	ip. The students
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 with scier	tific papers and
other scholarly literature	e. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TDA	Test driven architecture	KZ	4
	in practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that a		· ·
	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		-
NI-TSP	Testing and Reliability	Z,ZK	5
	ledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to p zation 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.	built-iii-seii-test e	quipment. They
BI-CCN	Compiler Construction	Z,ZK	5
	lass on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles		-
understand the design a	and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching theme	of the class.	
BI-TEX	TeX and Typography	Z,ZK	4
This course is presented	d in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the	ne course focuses	on typographic
rules.			
BI-ULI	Introduction to Linux	Z	. 2
	ar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become	e familiar with bas	ic commands
BI-OPT	x-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (terminal).	Z,ZK	4
	Introduction to Optical Networks view of optical networks view of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on po		
_	ology and on their solutions. The course will include the history of optical communications, an overview of passive componen		
dispersion compensato	rs, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission sys	stems). The cours	e will also cover
the most up-to-date top	cs presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such	as the accurate ti	me on Internet,
· · · · · · · · · · · · · · · · · · ·	ansfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters	. Students will sol	ve real tasks
from practice.	V. C. C. 101 10 C.	7.71/	
NI-VCC	Virtualization and Cloud Computing ledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and	Z,ZK	5
	ration principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to effic	-	
•	s of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effecti		
	computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skill		-
and development tools	Continuous integration and development).		
BI-VHS	Virtual game worlds	ZK	4
	ats to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current s	•	
· · · · · · · · · · · · · · · · · · ·	eory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world.		e followed by
the course Mi-PVR with	the took of converting according and their dynamics into a fully virtual anyironment suitable for VD devices	The course can b	o lonowed by
	the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.	,	
BI-VR1	Virtual reality I	KZ	4
BI-VR1 Introduction to Virtual R	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements	KZ s of virtual worlds	4 communication.
BI-VR1 Introduction to Virtual R	Virtual reality I cality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves continuously.	KZ s of virtual worlds	4 communication.
BI-VR1 Introduction to Virtual R The course focuses on	Virtual reality I cality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves continuously.	KZ s of virtual worlds	4 communication.
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves coties.	KZ s of virtual worlds omputational think	4 communication. ing, empathy
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2 Continuation of the cour	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves coties. Virtual reality II	KZ s of virtual worlds omputational think	4 communication. ing, empathy
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2 Continuation of the cour for computer science ar BI-VAK.21	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves conties. Virtual reality II se Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The old gamification in various social metaverse and desktop engines. Selected Applications of Combinatorics	KZ s of virtual worlds emputational think KZ bjective is to deve	4 communication. ing, empathy 3 lop applications
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2 Continuation of the cour for computer science ar BI-VAK.21 The course aims to intro	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves conties. Virtual reality II se Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The old gamification in various social metaverse and desktop engines. Selected Applications of Combinatorics duce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the	KZ s of virtual worlds emputational think KZ bjective is to deve	4 communication. ing, empathy 3 lop applications 3 ve approach the
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2 Continuation of the cour for computer science ar BI-VAK.21 The course aims to intro issue from applications	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves conties. Virtual reality II see Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The old gamification in various social metaverse and desktop engines. Selected Applications of Combinatorics oduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the totheory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basics.	KZ s of virtual worlds emputational think KZ bjective is to deve	4 communication. ing, empathy 3 lop applications ye approach the s. Furthermore,
BI-VR1 Introduction to Virtual R The course focuses on and shared social activi BI-VR2 Continuation of the cour for computer science ar BI-VAK.21 The course aims to intro issue from applications with the active participa	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves conties. Virtual reality II see Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The old gamification in various social metaverse and desktop engines. Selected Applications of Combinatorics oduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the totheory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some batton of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) in	KZ s of virtual worlds emputational think KZ bjective is to deve	4 communication. ing, empathy 3 lop applications ye approach the s. Furthermore, from which we
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BI-VR1 Introduction to Virtual R The course focuses on and shared social activity BI-VR2 Continuation of the cour for computer science ar BI-VAK.21 The course aims to intro issue from applications with the active participa will select problems to be also try to implement so BI-VMM The lecture begins with properties. Further, we the linear programming NI-VYC	Virtual reality I eality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves contests. Virtual reality II see Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The old gamification in various social metaverse and desktop engines. Selected Applications of Combinatorics soluce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the totheory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some beto first of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) in the solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimically the studied problems with a special focus on the effective use of existing tools. Selected Mathematical Methods an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then an introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting examples.	KZ s of virtual worlds computational think KZ bjective is to deve Z e basic courses, vasic data structure informatics. Areas ization and more. Z,ZK address Fourier se wavelet transform	4 communication. ing, empathy 3 lop applications 3 we approach the is. Furthermore, from which we Students will 4 eries and their in. We examine

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	r research institution	on. 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 profes	ssional content and	d extent of the
internship. Auxiliary co	urses 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 v	veeks of full-time
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 divide	d into two subjects	s if the internship
exceeds the academic	year's dead-line.		
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
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	r research institution	n. 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 profes	ssional content and	d extent of the
internship. Auxiliary co	urses 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 v	veeks of full-time
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 divide	d into two subjects	s if the internship
exceeds the academic	year's dead-line.		
BI-ZS30	Bachelor internship abroad for 30 credits	Z	30
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	n. 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 profes	ssional content and	d extent of the
internship. Auxiliary co	urses 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 v	veeks of full-time
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 divide	d into two subjects	s if the internship
exceeds the academic	year's dead-line.		
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
Intelligent embedded s	stem fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim	of the course is to	o teach students
modern humanoid robo	t control and development of applications in a graphical development environment. Lectures provide fundamentals of motion	control, sensor rea	ding, application
	ıtion and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to ξ	get practical experi	ience with these
technologies.			
BI-ZPI	Process engineering	KZ	4
Students will learn fund	lamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	of process model	ling and they will
	d notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of	•	•
	f process engineering for information systems development is discussed as well as its importance in the overall context of inf	formation and busi	ness strategy of
an enterprise.			
BI-ZNF	PHP Framework Nette - basics	KZ	3
Students will gain the b	asics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czec	h popular framewo	ork. The resulting
knowledge should serv	e for the efficient creation of a web backend in PHP language.		
BI-ZRS	Basics of System Control	Z,ZK	4
The course gives an in	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will fo	cus our attention	particularly on
control of engineering	and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descrip	tion methods of sy	stem models,
basic linear dynamic sy	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of c	reating a descripti	on of the system
model, the basic linear	dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give	en to sensors and	actuators in
	stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial	trial implementatio	n of continuous
and digital controllers a	ind PLC control.		
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
This course is presented		•	•
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presente	I .	1	1

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

3D Printing

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

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

Credits in the group: 0

BI-3DT.1

ΚZ

4

Note on the group): Vsechny povinne predmety ob	oru a zamere	eni s vyjii	mkou toi	noto oboru	
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and quarantors (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-AG2	Algorithms and Graphs 2 Ond ej Suchý	Z,ZK	5	2P+2C	L	V
BI-APS.1	Architectures of Computer Systems Pavel Tvrdík	Z,ZK	5	2P+2C	Z	V
BI-BEK	Secure Code Róbert Lórencz	Z,ZK	5	2P+2C	L	V
BI-BIG	DB Technologies for Big Data Jan Matoušek	KZ	4	2P+2C	Z	V
BI-HWB	Hardware Security Ji í Bu ek	Z,ZK	5	2P+2C	Z	V
BI-JPO	Computer Units Alois Pluhá ek	Z,ZK	5	2P+2C	Z	V

BI-MGA	Multimedia and Graphics Applications Ji í Chludil	Z,ZK	5	2P+2C	Z	V
BI-OOP	Object-Oriented Programming Filip K ikava	Z,ZK	4	2P+2C	Z	V
3I-PGR.1	Computer graphics programming	Z,ZK	5	2P+2C	L	V
BI-PNO	Practical Digital Design Martin Novotný	KZ	5	2P+2C	Z	٧
BI-PJP	Programming Languages and Compilers Jan Janoušek	Z,ZK	5	2P+1C	L	V
BI-PPA	Programming Paradigms Jan Janoušek	Z,ZK	5	2P+2R	Z	V
BI-PGA	Programming of graphic applications Radek Richtr	Z,ZK	5	2P+2C	Z	V
BI-PYT	Python Programming	Z,ZK	4	2P+2C	L	V
BI-SP1.21	Team Software Project 1 Michal Valenta, Ji í Chludil, Ji í Mlejnek, Radek Richtr, Marek Suchánek, 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-SP2.1	Team Software Project 2 Ji í Mlejnek	KZ	4	2C	Z	V
BI-SP2	Team Software Project 2 Ji í Mlejnek	KZ	6	2C	Z	V
BI-SSB	System and Network Security Ji í Dostál Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-SRC	Real-time systems Jaroslav Borecký	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-TUR	User Interface Design Jan Schmidt	Z,ZK	4	2P+2C	L	V
BI-TWA.1	Web Application Design Filip Glazar	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-VZD	Data Mining Karel Klouda, Ond ej Tichý, Daniel Vašata, Alexander Kovalenko Ond ej Tichý Pavel Kordík (Gar.)	Z,ZK	4	2P+2C	L,Z	V
BI-ZRS	Basics of System Control Kate ina Hyniová	Z,ZK	4	2P+2C	Z	V
BI-ZUM	Artificial Intelligence Fundamentals Pavel Surynek	Z,ZK	4	2P+2C	L	V

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

Z.ZK

BI-AG2

Algorithms and Graphs 2

BI-ZRS Basics of System Control Z,ZK 4

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.

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

BI-ADU.1 Unix Administration Z,ZK 5

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

BI-ADW.1 Windows Administration Z,ZK 4
This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).

BI-APS.1 Architectures of Computer Systems Z,ZK 5

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

BI-BEK	Secure Code	Z,ZK	5
	how to assess security risks and how to take them into account in the design phase of their own code and solutions. After gettin	-	- 1
	ractical 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 securin		
· -	systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the c	=	· ·
BI-BIG	DB Technologies for Big Data	KZ	4
This course is presented	, ,	. —	
BI-HWB	Hardware Security	Z,ZK	5
The course deals with	nardware resources used to ensure security of computer systems including embedded ones. The students become familiar wi	th the operating p	rinciples of
	the security features of modern processors, and storage media protection through encryption. They will gain knowledge about		
•	attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card nulti-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.	technology includ	ling applications
BI-JPO	Computer Units	Z,ZK	5
	posic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail	, , , , , , , , , , , , , , , , , , ,	_
•	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, include	· ·	•
correction for parallel a	nd serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of con	nmunication of the	e processor with
	e architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micro	programmed prod	cessor simulator
	dware design kits (FPGA).		
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 wo		
	will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to a not use multimedia transmission and representation systems, including real-time multimedia processing. They understand the	- '	•
	cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.	5 po.p.o o. opo.	a a
BI-OOP	Object-Oriented Programming	Z,ZK	4
	nming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		ssing. In this
course we look at some	e of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software deve	elopment including	g testing, error
handing, refactoring an	· · · · · · · · · · · · · · · · · · ·		
BI-PGR.1	Computer graphics programming	Z,ZK	5
-	ogram a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add to		
•	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 f		
	PU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surface.		•
BI-PNO	Practical Digital Design	KZ	5
	ew of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the	l l	_
_	chnologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern,		
tools.			
BI-PJP	Programming Languages and Compilers	Z,ZK	5
	methods of implementation of common high-level programming languages. They get experience with the design and implement		
· · · -	ng language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that h		_
-	ler based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages, sing text in a language defined by a LL(1) grammar.	but extends to all	otner programs
	Programming Paradigms	Z,ZK	5
	ן – rogramming Faradigms pasic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of part		
	and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming		
	d on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern main		
such as C++ and Java.			
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			
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 the eaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The tea		
•	racries students necessary techniques and principles, reams consisting of 4-6 students will work on a specific project. The tea or consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software		
and finished in the BIE	·	artolaot wiii bo lai	and developed
BI-SP1	Team Software Project 1	KZ	4
	n experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	ı	
concurrently and that to	eaches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in the	he role of the tea	m and project
	ts with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will b	e further develope	ed and finished
in the BEI-SP2 course.			
BI-SP2.1	Team Software Project 2	KZ	4
	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	V7	
BI-SP2	Team Software Project 2	KZ	6
•	n experience with the iterative development process while working on a large-scale software project. The first iteration is the res functionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 p		
	ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution.	-	
· ·	e the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the software p		
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 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 as in BI-VES subject and FPGA. BI-TJV Java Technology 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. 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. **BI-TUR** User Interface Design Z,ZK 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 5 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. **Embedded Systems** Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedded processors, their integrated peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools. **BI-VWM** 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). 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-ZUM** Artificial Intelligence Fundamentals

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

List of courses of this pass:

Completion Credite

Name of the source

be presented as well.

Codo

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 co	ourse 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 la	nguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both the	ne midterm and the	final term
tests with the succes	s 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 introduc	ced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite	automata, regular	expressions
and regular grammar	rs, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships between fo	rmal languages an	d automata
Knowledge acquire	d through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation,	and design of digi	tal circuits.
BI-ACM	Programming Practices 1	KZ	5
·	This course is presented in Czech.	'	•
BI-ACM2	Programming Practices 2	KZ	5
·	This course is presented in Czech.	•	•
BI-ACM3	Programming Practices 3	KZ	5
'	This course is presented in Czech.	'	'
BI-ACM4	Programming Practices 4	KZ	5
'	This course is presented in Czech.	ı	i
BI-ADU.1	Unix Administration	Z,ZK	5
Students will learn the	e internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They	will understand the	differences
	dministrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights,	•	•
processes, memory	y, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kno	owledge from the l	ectures on

specific examples from practice.

	Windows Administration	Z,ZK	4
DI AC1	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	7 71/	-
BI-AG1 The course cove	Algorithms and Graphs 1 rs the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur	Z,ZK	6 d partially
	vledge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the		
	rithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asym		
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 version		
BI-ALO	Algebra and Logic	Z,ZK	4
	The course extends and deepens the study of topics touched upon in the basic course in logic.	— , —-	•
BI-AND.21	Programming for the Android Operating System	KZ	4
	This course is presented in Czech.		
BI-ANG	English Language, Internal Certificate	ZK	2
BI-ANG1	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN English Language Examination without Preparatory Courses	Z,ZK	2
BI-APJ	Aplication Programming in Java	Z,ZK	4
D17410	This course is presented in Czech. Advanced technologies in Java.	۷,2۱۲	7
BI-APS.1	Architectures of Computer Systems	Z,ZK	5
	n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec		
1	n processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the princ rocessors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of the	•	
	elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence and		
BI-ARD	Interactive applications on Arduino	KZ	4
The subject is desi	pned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple application	ions for modern pro	grammable
	aried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded s	•	
not only on dispi	ay of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore Software Engineering students.	is suitable even for	vveb and
BI-AVI.21	Algorithms visually	Z.ZK	4
	ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer sc	· ' ·	•
knowledge present	ed in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&l	t;http://www.algovis	ion.org>)
51.545	that make understanding the principles of algorithms easy.		
BI-BAP	Bachelor Thesis	Z 7/4	14 5
BI-BEK The students will le	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	Z,ZK	-
	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		- 1
1	ileges. 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 th		
BI-BEZ	Security d the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric a	Z,ZK	6
	i. They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryptos		
	They are able to use properly and securely cryptographic primitives and systems that are based on these primitives.		
BI-BIG	DB Technologies for Big Data	KZ	4
DIDIE	This course is presented in Czech.	7 71/	4
BI-BLE The course exter	Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those in	Z,ZK	4
	do knowledge of openiodated program biorider from bi west (wakintedia and Graphice Applications) course. It is interioda for those in	nterested in 3D ara	nhics and
animation. it	offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph	•	
BI-BPR	offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph Bachelor project	•	
BI-BPR BI-CAO	Bachelor project Digital and Analog Circuits	nics applications) c	ourse.
BI-BPR BI-CAO Students get the	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and	z Z Z,ZK principles of functi	2 5 onality of
BI-BPR BI-CAO Students get the	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between	z Z Z,ZK principles of functi	2 5 onality of
BI-BPR BI-CAO Students get the transistors, gates,	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoeld of electronic devices.	z,ZK principles of functiveen analog and di	2 5 onality of gital modes
BI-BPR BI-CAO Students get the transistors, gates,	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between	nics applications) c Z Z,ZK principles of functiveen analog and di	ourse. 2 5 onality of gital modes
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introdunderst:	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction	z,ZK principles of functiveen analog and di Z,ZK of compilers for st	ourse. 2 5 onality of gital modes 5 udents to
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introdundersta	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C#	rics applications) of Z Z,ZK principles of functiveen analog and di Z,ZK of compilers for stitheme of the class KZ	ourse. 2 5 onality of gital modes 5 udents to s. 4
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd understand BI-CS1 The goal of the co	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental control of the class is to introduce control of the class is to introduce compilation in the overarching programming in C#	rics applications) of Z Z,ZK principles of functiveen analog and divident Z,ZK of compilers for structure of the class KZ ponstruction, types of	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables,
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd understand BI-CS1 The goal of the cooperators, array	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C#	rics applications) of Z Z,ZK principles of functiveen analog and diverse for struction, types of inition and class in	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing,
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd understand BI-CS1 The goal of the cooperators, array	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cost, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definitions.	rics applications) of Z Z,ZK principles of functiveen analog and diverse for struction, types of inition and class in	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing,
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introdundersta BI-CS1 The goal of the cooperators, array constructors, methods	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoef electronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cc, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access	arics applications) of Z Z,ZK principles of functiveen analog and diverse of the class XZ of compilers for struction, types of inition and class in and exception pro	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introdundersta BI-CS1 The goal of the cooperators, array constructors, metl	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between of electronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cc is, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros	arics applications) of Z Z,ZK principles of functiveen analog and diverse of the class XZ of compilers for struction, types of inition and class in and exception pro XZ oft platform. The st	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as 4 tudents will
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BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd underst: BI-CS1 The goal of the co operators, array constructors, metl BI-CS2 The C# language get to know object of features for que	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between of electronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cc is, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros	arics applications) of Z Z,ZK principles of functiveen analog and diverse of the class KZ principles of functiveen analog and diverse of the class KZ principles of the class in and exception pro KZ poft platform. The sinclogies such as L INQ to Objects, LI	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as 4 tudents will INQ - a set NQ to XML
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd underste BI-CS1 The goal of the co operators, array constructors, metl BI-CS2 The C# language get to know object of features for que and LINQ to SQL	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between of electronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cc is, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros is used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current techr rying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (L	arics applications) of Z Z,ZK principles of functiveen analog and diverse of the class KZ principles of functiveen analog and diverse of the class KZ principles of the class in and exception pro KZ oft platform. The sinologies such as L INQ to Objects, LI sing domain-speci	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as 4 tudents will INQ - a set NQ to XML fic objects
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introd underst: BI-CS1 The goal of the co operators, array constructors, metl BI-CS2 The C# language get to know object of features for que and LINQ to SQI (ORM). This part of	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoelectronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cc s, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class defineds, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros is used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current technorying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (L). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data update introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model (XML description).	arics applications) of Z Z,ZK principles of functiveen analog and diverse of the class KZ principles of functiveen analog and diverse of the class KZ principles of the class in and exception pro KZ postruction, types of inition and class in and exception pro KZ postruction. The sinclogies such as L INQ to Objects, LI sing domain-speci, Storage Model ar	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as 4 tudents will INQ - a set NQ to XML fic objects and Mapping
BI-BPR BI-CAO Students get the transistors, gates, BI-CCN This is an introdundersta BI-CS1 The goal of the cooperators, array constructors, metl BI-CS2 The C# language get to know object of features for que and LINQ to SQI (ORM). This part of BI-CS3	Bachelor project Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and circuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences betwoef electronic devices. Compiler Construction uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching Programming in C# urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cost, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class definods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging well as work with files are emphasized. C# language and data access and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros are used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current techn rying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (L). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data uf the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model	arics applications) of Z Z,ZK principles of functiveen analog and diveen analog and exception, types of inition and class in and exception pro KZ oft platform. The standogies such as L INQ to Objects, LI sing domain-speci , Storage Model ar	ourse. 2 5 onality of gital modes 5 udents to s. 4 of variables, stancing, cessing, as 4 tudents will INQ - a set NQ to XML fic objects and Mapping

BI-DBS	Database Systems	Z,ZK	6
	roduced 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		
	dation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda	· ·	
	of data. This introduced to access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to		•
in relational datab	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of datal optimizing database applications, distributed database systems, data stores.	base systems, deb	ugging and
DI DDD		KZ	4
BI-DPR	Document., Presentation, Rhetorics and to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create and pr	l	ļ -
This subject is aime	and presenting before an audience. Students will also learn to write technical reports and scientific texts.	epare interactive p	reseritations
BI-EHD	Introduction to European Economic History	Z,ZK	3
טו-בווט	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		3
BI-EJA	Enterprise Java	Z,ZK	4
	ETREFPHSE JAVA advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information sys		1
The course is on a	a database and are accessed through the web interface.	sterns writer are co	onnected to
BI-EMP	Economics and Management Principles	KZ	4
	ned to fundamental problems of business economy. The course makes students familiar with a life cycle of business, specifically with	1	· ·
	into state economic environment (CR), management of property and capital structure, business transaction records keeping during all	· ·	
criterprise putting	between business production and costs, evaluation of enterprise financial health and business rehabilitation or termination		a, a rolation
BI-EP1	Effective programming 1	Z	4
DI-LI I	The course is taught in Czech.	_	-
BI-EP2	Efficient Programming 2	KZ	4
	fficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving indivi-	l	
Continuation of L	with the aim to choose the best one and avoid implementation errors.	duai problems are	uiscusseu,
BI-FMU	Financial and Management Accounting	Z,ZK	5
	rinaricial and invariagement Accounting irse 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		
	rations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage		
or coorionnic ope	Business Intelligence moduls in Business information systems.	ment accounting a	ic base of
BI-FTR.1	Financial Markets	Z,ZK	5
DI-FIK.I	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		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	l	_
	mplementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git s		-
BI-HAM	HW accelerated network traffic monitoring	KZ	4
	duces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The	l .	
	mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a s	_	=
	poals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traff		
, ,	level and to develop their practical abilities in this field.		
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
D 1 1	This course is presented in Czech.	_,,	
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 wit		-
	ules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about vi		-
	nnel attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card tec		
, and the second	and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of	ciphers.	
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
	This course is presented in Czech.	ı	_
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 v		ucture and
organization of con	nputer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using approp	riate codes for imp	lementation
of multiplication. Th	ne organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including	g codes for error d	etection and
correction for paral	lel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of comm	unication of the pro	cessor with
the 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	ogrammed process	or simulator
	and programmable hardware design kits (FPGA).		
BI-KOM	Conceptual Modelling	Z,ZK	5
The course is focu	ised on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key te	rms in a domain, t	he ability to
	ecify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological struc	•	
-	y learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent		=
learn the foundatio	ns of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO n	nethod and the BP	MN notation
511/0=	will be taught. The course is designed with the respect to continuation in software implementations.		
BI-KOT	Programing in Kotlin	Z,ZK	4
	n, statically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advar		
i ne ianguage is fu	ully Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a requirement of a requirement of projects that preserve existing parts written in Java, and continue with the development of a requirement of projects that preserve existing parts written in Java, and continue with the development of a requirement of a requirement of projects that preserve existing parts written in Java, and continue with the development of a requirement of a req		ctional way
D. 166 .	with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages)		_
BI-KSA	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity	=	-
anthropological res	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healtl	n, nistory, death, e	ıc) Will be
	shown. The course is presented in Czech.		

BI-LIN	Linear Algebra	Z,ZK	7
_	ht in Czech. Students understand the theoretical foundation of algebra and mathematical principles of linear models of systems aroun s are only linear. They know the basic methods for operating with matrices and linear spaces. They are able to perform matrix operatio		
	ey can apply these mathematical principles to solving problems in 2D or 3D analytic geometry. They understand the error-detecting a	=	
BI-MGA	Multimedia and Graphics Applications	Z,ZK	5
	uainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for wor		
	ation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to gra y learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the p	-	
-	of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating		on and use
BI-MIT	Mikrotik technologies	KZ	3
	on of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are con		
	vice providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the metrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer ne	•	
and 110 11 to damino	and technologies of the data-link, network and transport layer of the OSI model.		p. 0.000.0
BI-MLO	Mathematical Logic	Z,ZK	5
	The course seminary is taught in Czech.		
BI-MMP	Multimedia team project This course is presented in Czech.	KZ	4
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
	sed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universal states of a state of the search o		
includes both PC s	side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USE drivers, simple application development, and APIs of selected devices.	devices, Linux an	ia windows
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
The goal of the co	urse is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augm	ented reality, visua	
high resolution disp	plays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentione	d technologies, na	mely fractal
BI-OOP	and procedural visualization, scientific data visualization, and 3D model scanning. Object-Oriented Programming	Z,ZK	4
	programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		
course we look at	some of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development of the main principles of object-oriented programming and design.	pment including te	sting, error
DI ODT	handing, refactoring and design patterns.	7 71/	4
BI-OPT Students get basic	Introduction to Optical Networks overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on poss	Z,ZK	4 deployment
_	s technology and on their solutions. The course will include the history of optical communications, an overview of passive components	-	
	sators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system	•	
· · · · · · · · · · · · · · · · · · ·	e topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as incy transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters.		
umadiable moque	from practice.	studente wiii cerve	roar taono
BI-OSY	Operating Systems	Z,ZK	5
	and the classical theory of operating systems (OS) in addition to the knowledge gained in the module "Programming in Shell 1". They ses and threads implementations. They understand the problems of race conditions, thread scheduling, resource allocation and dead	-	-
	nt of virtual memory, principles and architectures of disks, RAID and file systems. They are able to design and implement simple mult		
BI-PA1	Programming and Algorithmics 1	Z,ZK	6
_	ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, structure of the control of		
statements, functi	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searchi with linked lists.	ng, sorting, and ma	anipulating
BI-PA2	Programming and Algorithmics 2	Z,ZK	7
Students know th	e instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, c	ueue, enlargeable	array, set,
table).They can imp	plement linked structures. They learn these skills using the programming language C++. Although this is not a module of programming in	n C++, students are	e introduced
BI-PAI	with all C++ features needed to achieve the main objective (operator overloading, templates). Law and Informatics	ZK	3
Dilini	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	210	
BI-PGA	Programming of graphic applications This course is presented in Czech only.	Z,ZK	5
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 fund 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	KZ	4
	aught 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 f	or BIE-TWA.1. The	y should
BI-PJP	register for this course in their 3rd semester of study. Programming Languages and Compilers	Z,ZK	5
	programming Languages and compilers are compilers as it methods of implementation of common high-level programming languages. They get experience with the design and implementat		
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 ir	nto a target
form and write a co	empiler based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages, but	extends to all other	er programs
BI-PJS.1	for parsing and processing text in a language defined by a LL(1) grammar. 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	students 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	is course in their 4	th semester
	of study.		

BI-PMA provides the content of the c	BI-PJV	Programming in Java	Z,ZK	4
BI-PNA Programming in Mathematica Experimental to the working with modern identical and scientific software scientific scientific software scientific software scientific scien	BI-PKM		Z	4
iterate with the within great in concern inchronal and a scientific software. Students will sann how to use different programming programming, nutrieoses of the protection of the programming and the process of the contemporary digital design for war also are practical sell to use print process design scientificates. They understand the basis of the VPLD length of the programming and the process of the contemporary digital design for war also are practical sells to use print process design scientificates. They understand the basis of the VPLD length of the programming programming programming the programming programming the programming programming programming the programming		· · · · · · · · · · · · · · · · · · ·	·	
esc), how to create dynamic interactive applications and visualisations, data processing and presentations. Programming Practical Digital Design or incommendation of the commencer of grips and seal to a consequence of the commencer of grips and seal to sea experience design to the contemporary digital seal process of the VRLD and SIC Suddents demonstrate practical used to use experience design to the project sing modern, industry standard CAB design of the project sing modern, industry standard CAB design of the project sing modern, industry standard CAB design of the project sing modern, industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry standard CAB design of the project sing modern industry. BI-PRI Law and business 1. Law and business 2. Z.Z.K 4. 4. 4. The course is presented in Cabe. BI-PRI Programming in Shell 1. As well as the project sing modern industry in the project sing of the programming in Shell 1. As well as the programming in Shell 2. Z.Z.K 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.				4
BI-PNO Procreaming in the contemporary digital design flow and design particle safets to use predictions distinguished to the procreaming intermediation technologies PPOA and ASIC. Suckern's demonstrating inscided use of the design stochniques in the measure procleas state of the design stochniques in the measure procleas state of the design stochniques in the measure procleas state of the design stochniques in the measure procleas state of the ASIC. Suckern's demonstrating proclearly in the state of the design state of the design stochniques in the measure procleas in the state of the ASIC. Suckern's demonstrating proclearly in the state of the ASIC. Suckern's demonstrating procleas in the state of the ASIC. Suckern's demonstrating procleas in the ASIC. Suckern's demonstrating and the State procleas are explained in details. Logic programming in terroduction is another way of dedicarative programming. The principles are demonstrated as another way of dedicarative programming. The principles are demonstrated as another way of dedicarative programming. The principles are demonstrated as another way of dedicarative programming. The principles are demonstrated as another way of dedicarative programming. The principles are demonstrated as another way of dedicarative programming the principles are demonstrated as another way of dedicarative programming the programming in the ASIC. So the ASI	tudents will be workir		ning, rule-based p	rogrammin
series get an overview of the contemporary digital design flow and team practical sales to use eynochronous design becompact. The value of the production of displacementation sectoriogies PPCA and ASIC. Students demonstrate practical use of the design sectoring as in the module project sing modern, involution-standard CAD public tools. BL-PPA Programming production of the section of the section of the design sectoring as in the module project sing modern, involving-standard CAD public tools. BL-PPA And a security of the section of the s	BI-PNO		KZ	5
BI-PPA Programing Paradigms BI-PPA Programing Paradigms Programing paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of particulars approximates, moderate and the basic programming approximations including their basic execution models, benefits, and limitations of particulars approximates mandle calculus and on Lisp (Racket) and Protog programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages. The modern of the programming appears and programming in Shell 1 EMP-PSI Developed the service of the shell, basic commands, and the process various studies. Programming in Shell 2 Programming in Shell 1 BI-PS2 Programming in Shell 2 Programming in Shell 2 Programming in Shell 3 BI-PS3 The shell and some other particular scripting languages in the systems, processes are designed as a programming and programming appears on the shell, basic commands, and the process various text data. BI-PS1 The shell and some other particular scripting languages and will get practical supprison with shell script programming. BI-PS1 The shell and some other particular scripting languages and will get practical supprison with shell script programming. BI-PS1 The shell and some other particular scripting languages and will get practical supprison to shell programming. BI-PS1 The shell and shell	l l	· · · · · · · · · · · · · · · · · · ·	1	1
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BI-TS2 Theoretical Seminar II Ζ Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical reading group. The students 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 with scientific papers and other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. BI-TS3 Z Theoretical Seminar III 4 Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical reading group. The students 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 with scientific papers and other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. BI-TS4 Theoretical Seminar IV Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical reading group. The students 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 with scientific papers and other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. **BI-TUR** User Interface Design Z.ZK 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. 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-ULI Introduction to Linux 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 with basic commands and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (terminal) BI-VAK.21 Selected Applications of Combinatorics The course aims to introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the basic courses, we approach the issue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic data structures. Furthermore, with the active participation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) informatics. Areas from which we will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimization and more. Students will 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 processors, their integrated peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools. Virtual game worlds 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 knowledge is furthermore 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 can be followed by the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices Selected Mathematical Methods The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then address Fourier series and their properties. Further, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the wavelet transform. We examine the linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting examples. Virtual reality I Introduction to Virtual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of virtual worlds communication. The course focuses on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves computational thinking, empathy and shared social activities. BI-VR2 Virtual reality II Continuation of the course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The objective is to develop applications for computer science and gamification in various social metaverse and desktop engines. BI-VWM Searching the Web and Multimedia Databases 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). BI-VZD Data Mining Students are introduced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, multidimensional data visualization, statistical techniques of data transformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships between model bias and variance, and know the fundamentals of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic data mining tools to common problems (classification, regression, clustering). BI-XML XML Technology Z,ZK 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. 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-ZIVS Intelligent Embedded System Fundamentals ΚZ 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
	knowledge and understanding of the fundamentals of classical calculus so that they are able to apply mathematical way of thinking and	,	1
	echniques. They get skills to practically handle functions of one variable in solving the problems in informatics. They understand the link		
	sums of sequences. They are able to estimate lower or upper bounds of values of real functions and to handle simple asymptotic expi		3
BI-ZNF	PHP Framework Nette - basics	KZ	3
	the basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech population.		-
· ·	knowledge should serve for the efficient creation of a web backend in PHP language.		
BI-ZNS	Knowledge-based Systems	Z,ZK	5
	me familiar with the systems based on knowledge (knowledge-based systems), which are systems that usetechniques of artificial intelli		oroblems th
equire human jud	gment, learning and reasoning from findingsand actions. The course introduces students to the philosophy and architecture of knowledge	ge-based syste	ns to supp
de	cision-makingand planning. The course assumes knowledge of set theory, probability theory, artificial neural networks, and evolutionary	y algorithms.	
BI-ZPI	Process engineering	KZ	4
	fundamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles of process.	_	-
	used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of busing	-	_
ASE tools. The ro	ole of process engineering for information systems development is discussed as well as its importance in the overall context of information	ion and busine	ss strategy
DI ZDC	an enterprise.	7 71/	1
BI-ZRS	Basics of System Control an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focus	Z,ZK	4
_	ering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description	-	-
_	ic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creatin	-	
=	linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also given to		-
	les of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial in		
	and digital controllers and PLC control.		
BI-ZS10	Bachelor internship abroad for 10 credits	Z	10
Each student car	n once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or rese	earch institution	. Before the
nternship the De	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession	al content and	extent of the
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mployment with a	of 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 internsl
DI 7000	exceeds the academic year's dead-line.		
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
	n once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or rese		
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession		
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FI-VEZ	economic-managerial course from a study abroad	Z	4
A "Humanities sub	bject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that is	s required in the	curriculum.
	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.		
NI-AFP	Applied Functional Programming	ΚZ	5
	sented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional pro		_
the rise nowadays	s and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, masterin necessary competence of a software engineer: the theory and especially the practice.	ig this paradigm	becomes a
NI DDM		KZ	4
NI-DDM	Distributed Data Mining n state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands on		1
	ristate-or-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands on amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations and	-	-
data processing in	approaches to parallelize other algorithms. The course is prezented in czech language.	a wiii be capabit	o to proposo
NI-DSP	Database Systems in Practes	Z,ZK	4
MI-DOI	This course is presented in Czech.	2,21	4
NI-DZO	Digital Image Processing	Z,ZK	4
	ents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical algor	•	
=	re an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is also		-
•	processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR co		
frequency domain,	, abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray conver	rsion, context er	nhancement
interactive as-ri	igid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, add	ling depth, alpha	a matting.
NI-IAM	Internet and Multimedia	Z,ZK	4
The NI-IAM cours	s is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acqui	isition of AV sigr	nals (input),
presentation of AV	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical use	e case scenario	s of real-time
audiovisual transn	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effec	t of various com	nponents on
the quality and late	ency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the	scene up to the	presentation
	for audience.		
NI-LSM	Statistical Modelling Lab	KZ	5
	lented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is put		
available informati	ion and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, and a	•	r properties.
	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesis)		
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 its	-	
	nplex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills o		piementation
	in modern pure object system Phare (https://phare.org). The source feetings on individual approach to students, their development no		finterest In
	in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development nee	eds and areas of	
addition to deepen	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work on	eds and areas of interesting project	ects and OO
addition to deepen technologies in ter	ning object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work on rms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involveme	eds and areas of n interesting project ent in the Pharo	ects and OO Consortium.
addition to deepen technologies in ter NI-MPL	ning object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work on rms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involveme Managerial Psychology	eds and areas of n interesting project ent in the Pharo ZK	ects and OO Consortium.
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TV1	Physical Education	Z	0
TV2	Physical Education	Z	0
TVK1	Physical Education	Z	1
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
TVV	Physical education	Z	0
TVV0	Physical education	Z	0

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