Study plan

Name of study plan: Bachelor branch Web and Software Engineering, spec. Software Engineering, 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: 160 Elective courses credits: 20 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 Softv	varového 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 Alena Libánská, Ond ej Guth, Petra Pavlí ková, Dana Vynikarová Ond ej Guth Dana Vynikarová (Gar.)	KZ	4	2P+2C	Z,L	PP
BI-LIN	Linear Algebra Daniel Dombek Daniel Dombek (Gar.)	Z,ZK	7	4P+2C	L	PP
BI-MLO	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+1C	Z	PP
BI-OSY	Operating Systems Ladislav Vagner	Z,ZK	5	2P+1R+1L	L	PP
BI-PSI	Computer Networks Jan Fesl	Z,ZK	5	2P+1R+1C	L	PP
BI-PST	Probability and Statistics Petr Novák	Z,ZK	5	2P+1R+1C	Z	PP
BI-PA1	Programming and Algorithmics 1 Ladislav Vagner	Z,ZK	6	2P+2R+2C	; Z	PP

BI-PA2	Programming and Algorithmics 2 Ladislav Vagner	Z,ZK	7	2P+1R+2C	L	PP
BI-PS1	Programming in Shell 1 Zden k Muziká	KZ	5	2P+2C	Z	PP
BI-SI1.2	Software Engineering I Ji í Mlejnek, Zden k Rybola Zden k Rybola Ji í Mlejnek (Gar.)	Z,ZK	5	2P+1C	Z,L	PP
BI-SAP	Computer Structure and Architecture Hana Kubátová	Z,ZK	6	2P+1R+2C	L	PP
BI-ZDM	Elements of Discrete Mathematics Ji ina Scholtzová, Jan Legerský Ji ina Scholtzová Josef Kolá (Gar.)	Z,ZK	5	2P+2C	Z	PP
BI-ZMA	Elements of Calculus Ivo Petr Ivo Petr Tomáš Kalvoda (Gar.)	Z,ZK	6	3P+2C	Z	PP

	of the courses of this group of Study Plan: Code=BI-PP.2015 Name=Compulsory Courses of sented in Czech, Version 2015	of Bachelor Stud	dy Program
		7.71/	
BI-AG1	Algorithms and Graphs 1	Z,ZK	6
	e basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing		
	dge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating se also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic no		complexity of
BI-AAG		Z,ZK	6
	Automata and Grammars end to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of	1 '	_
	s, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships betwe	_	
1 0	through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translat		
BI-BAP	Bachelor Thesis	Z	14
BI-BPR	Bachelor project	Z	2
BI-BEZ	Security	Z,ZK	6
and hash functions. T	the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symm They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cr properly and securely cryptographic primitives and systems that are based on these primitives.	=	
BI-CAO	Digital and Analog Circuits	Z,ZK	5
Students get the fund	lamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models a	and principles of funct	ionality of
transistors, gates, cir-	cuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the difference	s between analog and	d digital modes
of electronic devices.			
BI-DBS	Database Systems	Z,ZK	6
Students are introduc	ed to the database engine architecture and typical user roles. They are briefly introduced to various database models. They l	earn to design small	databases
, , ,	nstraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience wit		
	ion - the relational database model. They learn the principles of normalizing a relational database schema. They understand the	•	
l ·	g parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introdu		_
	es with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of	database systems, de	ebugging and
	applications, distributed database systems, data stores.		
BI-DPR	Document., Presentation, Rhetorics	KZ	4
I	to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create a	and prepare interactive	e presentations
	e an audience. Students will also learn to write technical reports and scientific texts.		
BI-LIN	Linear Algebra	Z,ZK	7
_	in Czech. Students understand the theoretical foundation of algebra and mathematical principles of linear models of systems		-
l - ·	are only linear. They know the basic methods for operating with matrices and linear spaces. They are able to perform matrix op	· ·	
	apply these mathematical principles to solving problems in 2D or 3D analytic geometry. They understand the error-detecting a		
BI-MLO	Mathematical Logic	Z,ZK	5
The course seminary	-		
BI-OSY	Operating Systems	Z,ZK	5
	the classical theory of operating systems (OS) in addition to the knowledge gained in the module "Programming in Shell 1".		-
	nd threads implementations. They understand the problems of race conditions, thread scheduling, resource allocation and de		es of the
	al memory, principles and architectures of disks, RAID and file systems. They are able to design and implement simple multitle		
BI-PSI	Computer Networks	Z,ZK	5
	the basic common techniques, protocols, technologies, and algorithms necessary to communicate in computer networks. The		
1	e ISO OSI model. They also get a basic understanding of communication media, security, and network administration. Studen	its will be able to write	e a simple
	nd configure a simple network.		
BI-PST	Probability and Statistics	Z,ZK	5
	In the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random va	-	
	om variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical in	•	•
	wn distributional parameters from random sample characteristics. They will also be introduced to the methods of determining	the statistical depend	lence of two or
more random variable			-
BI-PA1	Programming and Algorithmics 1	Z,ZK	6
_	lity to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple		-
	s, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for se	arching, sorting, and	manipulating
with linked lists.			
BI-PA2	Programming and Algorithmics 2	Z,ZK	7
	struments of object-oriented programming and are able to use them for specifying and implementing abstract data types (sta		' -
table). They can imple	ement linked structures. They learn these skills using the programming language C++. Although this is not a module of programm	ming in C++, students	are introduced

with all C++ features needed to achieve the main objective (operator overloading, templates).

BI-PS1 Programming in Shell 1

ΚZ

5

Students become knowledgeable users of common Unix-like operating systems. They understand the fundamental principles of the operating systems (file systems, processes and threads, access rights, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of the shell, basic commands, and filters to process various text data.

BI-SI1.2 Software Engineering I

Z,ZK

5

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

BI-SAP Computer Structure and Architecture

7 7K

6

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

BI-ZDM Elements of Discrete Mathematics

Z.ZK

5

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

BI-ZMA Elements of Calculus

Z,ZK

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: Povinné p edm ty zam ení

Minimal number of credits of the block: 32

The role of the block: PZ

Code of the group: BI-PZ-WSI-SI.2015

Name of the group: Compulsory Courses of Bachelor Specialization Software Engineering, in Czech, Version

2015

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

Requirement courses in the group: In this group you have to complete 8 courses

Credits in the group: 32 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-KOM	Conceptual Modelling Marek Suchánek, Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	PZ
BI-OOP	Object-Oriented Programming Filip K ikava Filip K ikava (Gar.)	Z,ZK	4	2P+2C	Z	PZ
BI-PAI	Law and Informatics Zden k Ku era	ZK	3	2P	Z	PZ
BI-PPA	Programming Paradigms Jan Janoušek	Z,ZK	5	2P+2R	Z	PZ
BI-SI2.3	Software Engineering 2 Martin Hlavatý Zden k Rybola Martin Hlavatý (Gar.)	Z,ZK	3	2P	Z	PZ
BI-SP1	Team Software Project 1 Ji í Mlejnek	KZ	4	2C	L	PZ
BI-SP2.1	Team Software Project 2 Marek Suchánek, Ji í Chludil, Robert Pergl, Marek Skotnica, Ji í Mlejnek, Ji í Hunka, Zden k Rybola, Ji í Borský Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	4	2C	Z	PZ
BI-TJV	Java Technology Ond ej Guth	Z,ZK	4	2P+2C	Z	PZ

Characteristics of the courses of this group of Study Plan: Code=BI-PZ-WSI-SI.2015 Name=Compulsory Courses of Bachelor Specialization Software Engineering, in Czech, Version 2015

BI-KOM Conceptual Modelling

The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key terms in a domain, the ability to categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the OntoUML

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.

BI-OOP Object-Oriented Programming

Z,ZK

1

Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together by message passing. In this course we look at some of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development including testing, error handing, refactoring and design patterns.

BI-PAI Law and Informatics

ZK

3

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

DI DDA	Dragramming Davidisma	7 71/	-
BI-PPA	Programming Paradigms	Z,ZK	5
	basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of par		
programming paradign	n and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming	. The principles a	re demonstrated
on lambda calculus an	d on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mair	stream programn	ning languages
such as C++ and Java			
BI-SI2.3	Software Engineering 2	Z,ZK	3
This course is present	ed in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	'	
BI-SP1	Team Software Project 1	KZ	4
Students gain hands-o	n experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	ne BEI-SWI cours	e that runs
concurrently and that t	eaches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in	the role of the tea	m and project
leader, regularly consu	Its with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be	e further develop	ed and finished
in the BEI-SP2 course		·	
BI-SP2.1	Team Software Project 2	KZ	4
This course is present	ed in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-TJV	Java Technology	Z,ZK	4
The subject goal is to i	ntroduce the programming language Java. The student gains practical experiences for smaller enterprise application program	ming. This subjec	t presents how
to build the three and r	nore layers enterprise systems. The student practically exercises all communication interfaces for each layers (JDBC, RestWe	b services, JNDI	etc.). At the

Name of the block: Compulsory elective economic-management courses

Minimal number of credits of the block: 4

The role of the block: VE

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

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

Czech, Ver. 2015

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

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

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-DAN	Taxes for non-Economists Savina Finardi, Tereza Ji íková Tereza Ji íková Savina Finardi (Gar.)	Z,ZK	4	2P+2C	Z	VE
FI-VEZ	economic-managerial course from a study abroad Miroslav Balík	Z	4	0+0	Z,L	VE
BI-FTR.1	Financial Markets Pavla Vozárová	Z,ZK	5	2P+2C	L	VE
BI-MEK	Macroeconomic Context of Domestic and World Economy Ivo Straka Ivo Straka (Gar.)	Z,ZK	4	2P+2C	Z	VE
BI-PRP	Law and business Zden k Ku era, Martin Samek Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	VE
BI-PRR	Project management David Pešek	KZ	4	2P+2C	Z	VE
BI-SEP	World Economy and Business Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	VE
BI-MIK	Fundamentals of Microeconomics Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	VE

Characteristics of the courses of this group of Study Plan: Code=BI-PV-EM.2015 Name=Compulsory Elective Economical Courses of Bc. Program Informatics, Presented in Czech, Ver. 2015

BI-DAN	Taxes for non-Economists	Z,ZK	4
Taxes, including social in	surance contributions, are obligatory payments paid by people or institutions to public budgets. This is the way how a significa	ant portion of GDF	is redistributed.
This course concerns w	ho pays which taxes or who bears the tax burden. The course introduces students to the tax theory and policy fundamentals a	and shows how the	ey affect taxation
of income, consumption	, and wealth. The course provides practical information on calculations of tax liabilities of both citizens and institutions as we	II as information a	bout important
taxpayers' formal duties	towards public administration.		
FI-VEZ	economic-managerial course from a study abroad	Z	4
A "Humanities subject the	at has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module t	hat is required in	the curriculum.
The substitution is appre	oved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.		
BI-FTR.1	Financial Markets	Z,ZK	5
This course is presented	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	'	
BI-MEK	Macroeconomic Context of Domestic and World Economy	Z,ZK	4
This course is presented	d in Czech.		
BI-PRP	Law and business	Z,ZK	4
This course is presented	d in Czech.		
BI-PRR	Project management	KZ	4
This course is presented	d in Czech.	'	

BI-SEP World Economy and Business

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

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

Minimal number of credits of the block: 4

Z,ZK

Name of the block: Povinné ekonomické

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

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

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, Petra Pavlí ková David Buchtela David Buchtela (Gar.)	KZ	4	2P+2C	Z,L	PE

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

Economics and Management Principles 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: 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.

	The student must pred vidstill zhoushou absolvevat z	apootovoa p	iociiii.			
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ANG1	English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová (Gar.)	Z,ZK	2		L	PJ
BIE-EEC	English language external certificate Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	4		L	PJ
BI-ANG	English Language, Internal Certificate Kate ina Valentová Kate ina Valentová (Gar.)	ZK	2		Z,L	PJ

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

BI-ANG1	Z,ZK	2					
BIE-EEC	Z	4					
The BIE-ECC course ca	BIE-EEC English language external certificate Z 4 The BIE-ECC course can be recognized for any active semester after the submission of a certificate that demonstrates their proficiency in English comparable to or exceeding						
the B2 level of the Com	mon European Framework of Reference for Languages.						
BI-ANG	English Language, Internal Certificate	ZK	2				
Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-ANG							

Name of the block: Povinná t lesná výchova, sportovní kurzy

Minimal number of credits of the block: 0

The role of the block: PT

Code of the group: BI-PT.2015

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

2015

Requirement credits in the group:

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

Credits in the group: 0 Note on the group:

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

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

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

Name of the block: Compulsory elective humanities courses

Minimal number of credits of the block: 2

The role of the block: VH

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

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

Version 2015

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

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

Credits in the group: 2

Note on the group:

Faculty guarantees the availability of these modules.

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
BI-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	L	VH
FI-HTE	History of Technology and Economics Jan Mikeš, Marcela Efmertová Jan Mikeš Jan Mikeš (Gar.)	ZK	2	2+0	Z,L	VH
FI-HPZ	Humanities subject from a study abroad Miroslav Balík	Z	3	0+0	Z,L	VH
FI-MPL	Managerial Psychology Jan Fiala	ZK	2	2+0	Z,L	VH
BI-EHD	Introduction to European Economic History Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	3	2P+1C	Z,L	VH
FI-KSA	Cultural and Social Anthropology Jakub Šenovský	ZK	2	2P	L,Z	VH

BI-KSA	Cultural and Social Anthropology Alena Libánská, Tomáš Houdek, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	Z,L	VH
FI-ULI	Introduction to Linguistics for Computer Václav Cvr ek	ZK	2	2P	L	VH
FI-GNO	Introduction to Gnoseology	ZK	2	2+0	L	VH

Characteristics of the courses of this group of Study Plan: Code=BI-PV-HU.2015 Name=Compulsory Elective Humanity Courses of Bachelor Study Program Informatics, in Czech, Version 2015

FI-FIL	Philosophy	ZK	2
see A0B16			
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
This course is pre	esented in Czech.	,	
FI-HTE	History of Technology and Economics	ZK	2
The course introd	duces the scientific disciplines of history and technology, economic and social history of the Czech lands and Czechosl	lovakia in comparison with the	development of
the European regi	gion 19 to 21 century.		
FI-HPZ	Humanities subject from a study abroad	Z	3
	ubject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humaniti is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	ies Module that is required in t	he curriculum.
FI-MPL	Managerial Psychology	ZK	2
BI-EHD	Introduction to European Economic History	Z,ZK	3
This course is pre	esented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
FI-KSA	Cultural and Social Anthropology	ZK	2
FI-KSA The one-semeste anthropological re	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing vesearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, I	with the diversity of the world -	examples fron
FI-KSA The one-semeste anthropological re shown. The course	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing vesearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, lese is an interesting alternative to other humanities, taught at FIT.	with the diversity of the world -	examples from
FI-KSA The one-semeste anthropological re shown. The cours	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing vesearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, I	with the diversity of the world - language, health, history, deat	examples from h, etc) will be
FI-KSA The one-semeste anthropological re shown. The cours BI-KSA The one-semeste	Cultural and Social Anthropology er course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing vesearch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, lese is an interesting alternative to other humanities, taught at FIT. Cultural and Social Anthropology	with the diversity of the world - language, health, history, deat ZK with the diversity of the world -	examples from h, etc) will be 2
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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.

	p 9					
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	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: Volitelné předměty, které nejsou povinnými v programu ani žádného oboru či zaměření

BI-AVI.21 Algorithms visually Lud k Ku era Lud k Ku era (Gar.) BI-AZL English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.) BI-APJ Aplication Programming in Java Ji í Dan ek Applied Functional Programming Marek Suchánek, Robert Pergl, Daniel N mec Robert Pergl Robert Pergl BIE-ZUM Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.) BI-BLE Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.) NI-DSP Database Systems in Practes Tomáš Vichta Tomáš Vichta (Gar.) BI-STO Storage and Filesystems Z,ZK 4 2P+2C L NI-DZO Digital Image Processing Z,ZK 4 2P+2C L BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EJA Enterprise Java Z,ZK 4 2P+2C L RI-EJA Enterprise Java Z,ZK 4 2P+2C L RI-EJA Enterprise Java	Emester Role L V L V L V L V L V L V L V L V L V L
BI-ALO Algebra and Logic Jan Stary Jan Stary Jan Starý (Gar.) BI-AVI.21 Algorithms visually Lud k Ku era Lud k Ku era (Gar.) BI-A2L English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.) BI-APJ Application Programming in Java Ji í Dan ek Applied Functional Programming Marek Suchánek, Robert Pergl, Daniel N mec Robert Pergl Robert Pergl BIE-ZUM Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.) BI-BLE Blender Lukáš Ba inka Lukáš Ba inka (Gar.) NI-DSP Database Systems in Practes Tomáš Vichta Tomáš Vichta Tomáš Vichta (Gar.) NI-DZO Digital Image Processing NI-DDM Distributed Data Mining Tomáš Borovi ka BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EIA Enterprise Java	L V L V L V L V L V L V L V L V
BI-AVI.21 Algorithms visually Lud k Ku era Lud k Ku era Lud k Ku era (Gar.) BI-A2L English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.) Z 2 2C L BI-APJ Aplication Programming in Java Ji i Dan ek Applied Functional Programming Marek Suchánek, Robert Pergl, Daniel N mec Robert Pergl Robert Pergl (Gar.) BIE-ZUM Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.) BI-BLE Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.) NI-DSP Database Systems in Practes Tomáš Vichta Tomáš Vichta (Gar.) BI-STO Storage and Filesystems Z,ZK 4 2P+2C L BI-DDM Distributed Data Mining Tomáš Borovi ka BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EJA Enterprise Java	L V Z V L V L V L V L V L V L V
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NI-AFP Applied Functional Programming Marek Suchänek, Robert Pergl, Daniel N mec Robert Pergl Robert Pergl (Gar.) BIE-ZUM Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.) BI-BLE Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.) NI-DSP Database Systems in Practes Tomáš Vichta Tomáš Vichta Tomáš Vichta (Gar.) Storage and Filesystems Z,ZK 4 2P+2C L NI-DZO Digital Image Processing NI-DDM Distributed Data Mining Tomáš Borovi ka BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EP2 Enterprise Java Z,ZK A 2P+2C L ATRINO ENTRO KZ 4 2P+2C L ATRINO ENTRO KZ 4 2P+2C L ATRINO ENTRO ENTRO KZ 4 2P+2C L ATRINO ENTRO ENTRO KZ 4 2P+2C L ATRINO ENTRO EN	L V L V L V L,Z V L V Z V L V
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BI-STO Storage and Filesystems Z,ZK 4 2P+2C L, NI-DZO Digital Image Processing NI-DDM Distributed Data Mining Tomáš Borovi ka BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EP2 Efficient Programming 2 Martin Ka er Martin Ka er Martin Ka er (Gar.) BI-EJA Enterprise Java	L,Z V L V Z V L V
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BI-EP1 Effective programming 1 Martin Ka er Martin Ka er (Gar.) BI-EP2 Efficient Programming 2 Martin Ka er Martin Ka er Martin Ka er (Gar.) Efficient Rea er Martin Ka er (Gar.) Enterprise Java 7.7K 4. 2P+2C L RI-F.IA	Z v
BI-E-1A Martin Ka er Martin Ka er Martin Ka er (Gar.) Efficient Programming 2 Martin Ka er Martin Ka er (Gar.) KZ 4 2P+2C BI-E-1A Enterprise Java 7 7K 4 2P+2C	L V
Martin Ka er Martin Ka er (Gar.) BI-F.IA Enterprise Java 7 7K 4 2P+2C	
	L v
Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	
BI-FMU Financial and Management Accounting David Buchtela David Buchtela (Gar.) Z,ZK 5 2P+2C 2	Z v
LIM appalanted naturally troffic manifering	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	L v
NI-IAM Internet and Multimedia Z,ZK 4 2P+1C L	L v
BIE-IMA2 Introduction to Mathematics 2 Z 2 1C Z	Z v
BI-CS2 C# language and data access Pavel Št pán Pavel Št pán (Gar.) KZ 4 0P+3C Z	Z v
	Z v
BI-SQL.1 Language SQL, advanced Michal Valenta Michal Valenta (Gar.) KZ 4 3C	L v
BI-QAP Quantum algorithms and programming Tomáš Kalvoda, Ivo Petr Ivo Petr (Gar.) KZ 5 1P+2C	Z v
NI-LSM Statistical Modelling Lab Kamil Dedecius Kamil Dedecius (Gar.) KZ 5 3C	L v
NI-MPL Managerial Psychology Jan Fiala Jan Fiala (Gar.) ZK 2 2P Z	Z,L v
NI-MSI Mathematical Structures in Computer Science Z,ZK 4 2P+1C L	L v
Mathada of interfesion positivas designs	Z v
BI-MIT Mikrotik technologies Jan Fesl Jan Fesl (Gar.) KZ 3 1P+2C	Z v
	Z v
Madam Visualisation Tabus Issies	Z V
	Z,L v
NI-OLI Linux Drivers Jaroslav Borecký, Miroslav Skrbek Jaroslav Borecký Miroslav Skrbek (Gar.) Z,ZK 4 2P+2C L	L v
Programming Prostings 1	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 í Dan ek Ji í Dan ek Ji í Dan ek (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-PMA	Programming in Mathematica	Z,ZK	4	2P+2C	Z	V
BI-PHP.1	Zden k Buk Zden k Buk (Gar.) Programing in PHP	KZ	4	3C	Z	V
BI-PS2	Programming in shell 2	Z,ZK	4	2P+2C	L	V
NI-PDD	Lukáš Ba inka Data Preprocessing	Z,ZK	5	2P+1C	Z	V
	Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.) Introduction to mathematics			27+10		
BI-PKM	Tomáš Kalvoda Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z	4		Z	V
NI-REV	Reverse Engineering Ji í Dostál, Josef Kokeš, Róbert Lórencz Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Computer Engineering Seminar I Hana Kubátová Hana Kubátová 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 Lukáš Brchl, Marcel Ji ina, Jakub Novák Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	L,Z	V
NI-SYP	Parsing and Compilers Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-GIT	Version control system GIT Petr Pulc	KZ	2	16P	Z,L	V
TV1	Physical Education	Z	0	0+2	Z	V
TVV	Physical education	Z	0	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TV2	Physical Education	Z	0	0+2	L	V
TV2K1	Physical Education 2	Z	1		L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V
TVKLV	Physical Education Course	 Z	0	7dní	L	V
BI-TS1	Theoretical Seminar I Dušan Knop, Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.)		4	2C	Z	V
BI-TS2	Theoretical Seminar II	Z	4	2C	L	V
BI-TS3	Tomáš Valla, Ond ej Suchý Tomáš Valla Ond ej Suchý (Gar.) Theoretical Seminar III Tomáš Valla, Ond ej Suchý Ond ej Cuth Tomáš Valla, Tomáš Valla (Car.)	Z	4	2C	Z	V
BI-TS4	Tomáš Valla, Ond ej Suchý, Ond ej Guth Tomáš Valla Tomáš Valla (Gar.) Theoretical Seminar IV Tomáš Valla, Ond ej Suchý Tomáš Valla, Tomáš Valla (Gar.)	Z	4	2C	L	V
BI-TDA	Tomáš Valla, Ond ej Suchý Tomáš Valla Tomáš Valla (Gar.) Test driven architecture	KZ	4	2P+1C	Z,L	V
NI-TSP	Marek Hakala Testing and Reliability Deta 5 is a Martin Reliability	Z,ZK	5	2P+2C	Z	V
BI-CCN	Petr Fišer Martin Da hel Petr Fišer (Gar.) Compiler Construction	Z,ZK	5	3P	_	\/
DI-CON	Christoph Kirsch Christoph Kirsch (Gar.)	<u>ک,۲۸</u>	<u> </u>	ىر م	L	V

BI-TEX	TeX and Typography Petr Olšák Petr Olšák Petr Olšák (Gar.)	Z,ZK	4	2P+1C	L	V
BI-ULI	Introduction to Linux Zden k Muziká, Jan Ž árek, Dana ermáková, Petr Zemánek Zden k Muziká Zden k Muziká (Gar.)	Z	2	4D	Z	V
BI-OPT	Introduction to Optical Networks Pavel Tvrdík	Z,ZK	4	2P+1C	Z	V
NI-VCC	Virtualization and Cloud Computing Tomáš Vondra, Jan Fesl Tomáš Vondra Tomáš Vondra (Gar.)	Z,ZK	5	2P+1C	L	V
BI-VHS	Virtual game worlds Radek Richtr Radek Richtr (Gar.)	ZK	4	2P+2C	Z	V
BI-VR1	Virtual reality I Petr Klán, Petr Pauš Petr Klán Petr Klán (Gar.)	KZ	4	2P+2C	L,Z	V
BI-VR2	Virtual reality II Petr Klán Petr Klán Petr Klán (Gar.)	KZ	3	1P+2C	L	V
BI-VAK.21	Selected Applications of Combinatorics Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	Z	3	2R	L	V
BI-VMM	Selected Mathematical Methods Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	4	2P+2C	L	V
NI-VYC	Computability Jan Starý Jan Starý 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

TV1	Physical Education	Z	0
TVV	Physical education	Z	0
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
BI-ALO	Algebra and Logic	Z,ZK	4
The course extends a	nd deepens the study of topics touched upon in the basic course in logic.		
BI-AVI.21	Algorithms visually	Z,ZK	4

The course complements other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer science that extend substantially knowledge presented 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://www.algovision.org>) that make understanding the principles of algorithms easy.

BI-A2L English language, preparation for the B2 level exam Z 2

The content of the course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement - students are due to: -Take an active part in the language instruction. -Meet the requirements for writing assignments - Summary, Abstract, Argumentation Paper. -Succeed in both the midterm and the final term tests with the success rate set at 70%. -80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by individual teachers during the first class of the term.

BI-APJ Aplication Programming in Java
This course is presented in Czech. Advanced technologies in Java.

NI-AFP Applied Functional Programming

KZ 5

This course is presented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional programming languages are on the rise nowadays and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mastering this paradigm becomes a necessary competence of a software engineer: the theory and especially the practice.

BIE-ZUM Artificial Intelligence Fundamentals Z,ZK 4
Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical tasks from the areas of state

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

BI-BLE	Blender	Z,ZK	4
	wledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those		
	mplete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graphics	T	
NI-DSP This course is presented	Database Systems in Practes	Z,ZK	4
BI-STO	Storage and Filesystems	Z,ZK	4
	inciples and current solutions of storage systems architecture. The module explains principles of data store, protection, and an		-
load balancing and high		3,	3,
NI-DZO	Digital Image Processing	Z,ZK	4
•	comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical al	•	
•	interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is		
	ing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR raction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray co	•	ŭ
	ossible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ad		
NI-DDM	Distributed Data Mining	KZ	4
Course focuses on state	e-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands	s on experience v	vith large scale
•	ork Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations	and will be capa	ble to propose
	e other algorithms. The course is prezented in czech language.		
BI-EP1	Effective programming 1	Z	4
The course is taught in BI-EP2	Efficient Programming 2	KZ	4
	Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving indiv	1	
	he best one and avoid implementation errors.	viduai probiomo d	io diocaccoa,
BI-EJA	Enterprise Java	Z,ZK	4
The course is on advan-	ced technologies in the Java programming language. The focus is on technologies for development of enterprise information s		e connected to
a database and are acc	essed through the web interface.		
BI-FMU	Financial and Management Accounting	Z,ZK	5
	explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the		
•	and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modificat based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage	•	
•	oduls in Business information systems.	oment accounting	are bace or
BI-HAM	HW accelerated network traffic monitoring	KZ	4
	students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The	he monitoring and	l analysis of
	latory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a		
	of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network tra-	affic on a hardwa	re and software
BI-ARD	ir practical abilities in this field.	KZ	4
	Interactive applications on Arduino for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applic	r\Z	4
		cations for modern	nrogrammable
Kils and control varied p			
	eripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore	systems, i.e. to se	ee the results
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NI-LSM Statistica	al Modelling Lab	KZ	5
	and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is	-	
	ng 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.
	order of own research and may result in the topic of final work (diploma or bachelor thesis).	71/	2
	rial Psychology	ZK	2
	atical Structures in Computer Science	Z,ZK	4
Introduction to category theory.	ming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Sco	tt model of lambda	a calculus.
	of interfacing peripheral devices	Z,ZK	5
	or interfacing peripheral devices or interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ		
	al devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of t		
drivers, simple application developm			
BI-MIT Mikrotik	technologies	KZ	3
The main motivation of the subject s	stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are o	commonly used by	y the small and
middle internet service providers (IS	SPs). The students learn how to use and create the architectures of the network solutions which are based on the	e metallic, optical	or wireless links
-	ally deploy them. The successful completion of this subject requires the previous knowledge of elementary computer	er networks conce	pts like protocols
-	etwork and transport layer of the OSI model.	147	
l l	Object-Oriented Programming in Pharo	KZ	4
	rently one of the most widespread paradigms of software creation, especially enterprise information systems, wh blications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the s		
	oject system Pharo (https://pharo.org). The course focuses on individual approach to students, their developmen	=	•
	mming skills, which are generally applicable in other OO languages, students will also gain the opportunity to wo		
	work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involved		-
BI-MVT.21 Modern	Visualisation Technologies	Z,ZK	5
The goal of the course is to give an	overview of modern visualization technologies and their principles, namely technologies related to virtual and au	igmented reality, v	visualization on
	and video mapping) and their applications in practice. Several lectures deal with the content creation for the ment	ioned technologie	s, namely fractal
and procedural visualization, scienti	fic data visualization, and 3D model scanning.		
	dia team project	KZ	4
This course is presented in Czech.			
NI-OLI Linux Dr		Z,ZK	4
	portant operating system for personal computer and also for embedded systems. Systems on chip and combining		
	subsystems requiring specific software drivers. This course is an advanced course in the Linux driver development operating system architecture, principles of development of various types drivers, including practical experience		udents. The
	ming Practices 1	KZ	5
This course is presented in Czech.	ming Flactices 1	I\Z	5
·	ming Practices 2	KZ	5
This course is presented in Czech.	g 1 14011000 E		Ü
BI-ACM3 Program	ming Practices 3	KZ	5
This course is presented in Czech.	ŭ		
BI-ACM4 Program	ming Practices 4	KZ	5
This course is presented in Czech.		'	
BI-AND.21 Program	ming for the Android Operating System	KZ	4
This course is presented in Czech.			
, ,	ming in C#	KZ	4
_	ee .NET Framework as a multi-language development platform. Then, programming language C#, its fundamenta		
' ' ' ' ' '	and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class de static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugg		٠,
well as work with files are emphasiz		ing and exception	processing, as
	ming in Java	Z,ZK	4
	However, there is an English variant in the program Informatics (B1801 / 4753).	۷,۷۱۲	7
	pt Programming	KZ	4
	uction to Javascript programming. Students will learn also best practices and will use tool that eases developmen		
<u>-</u>	/SI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register f	· · · · · · · · · · · · · · · · · · ·	
of study.			
BI-KOT Program	ing in Kotlin	Z,ZK	4
Kotlin is a modern, statically-styled	object-functional language that exploits the extensive Java language ecosystem while delivering a number of adv	anced language	constructions.
	t and allows for mixed projects that preserve existing parts written in Java, and continue with the development of	a modern, object	-functional way
·	ast but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).		
, , ,	ming in Scala	Z,ZK	4
	programming language Scala which exploits object-functional paradigm. Scala comprises advance language feat		
Scalaz, etc.	oles to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks	and libraries e.g. i	Play, Cassandra,
	ming in Mathematica	Z,ZK	4
, ,	ming in Mathematica In technical and scientific software. Students will learn how to use different programming styles (functional progra		
<u> </u>	tive applications and visualisations, data processing and presentations.	iiiig, ruie-base	- programming,
	ing in PHP	KZ	4
	n goal of the course is an introduction to PHP - language and technology. Students will learn also best practices		· ·
<u>-</u>	recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register		
register for this course in their 3rd s			•
BI-PS2 Program	ming in shell 2	Z,ZK	4
, ,	f available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In ad		deeper insight
into shell and some other particular	scripting languages and will get practical experience with shell script programming.		

NI-PDD Data Preprocessing	Z,ZK	5
Students learn to prepare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data for further processing and analysis. They learn what algorithms can be used to extract information from various data for further processing and analysis. They learn what algorithms can be used to extract information from various data for further processing and analysis. They learn what algorithms can be used to extract information from various data for further processing and analysis.		-
time series, etc., and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characte pages.	ensucs from image	s or from web
BI-PKM Introduction to mathematics	Z	4
This course is presented in Czech.		
NI-REV Reverse Engineering	Z,ZK	5
Students will get acquainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens		
is called. Students will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is de		
applications written in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be debuggers and debugging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compu	-	
the course is on the seminars, where students will solve practically oriented tasks from the real world.		
BI-SCE1 Computer Engineering Seminar I	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistan		
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	=	
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea semester.	criers. The topics a	are new ior each
BI-SCE2 Computer Engineering Seminar II	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistan	ce to failures and a	attacks. Students
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	=	
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	chers. The topics a	are new for each
BI-ST1 Network Technology 1	Z	3
The subject is oriented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredit		_
CCNA1 - R&S Introduction to Networks.		
BI-ST2 Network Technology 2	Z	3
This course is presented in Czech.		
BI-ST3 Network Technology 3	Z	3
Students will further enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented duri	-	
get further extended in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pre simple topology, security, etc.	edictability, extensi	on beyond a
BI-ST4 Network Technology 4	7	3
Students will further enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switch	ing presented duri	_
BI-ST2 courses got further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased ef	ficiency, predictab	ility, extension
beyond a simple topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a complete		
Broadcast Multiple Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and swi recoveries, and emergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitig		•
network running.	gation ways write i	namaming the
BI-SOJ Machine Oriented Languages	Z,ZK	4
Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal	al use of microprod	
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie		cessor's features
This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	ew linked to higher	
		level languages.
BI-SVZ Machine vision and image processing	Z,ZK	level languages.
	Z,ZK te image information	level languages. 5 on. The course
BI-SVZ Machine vision and image processing Camera systems are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate	Z,ZK te image information	level languages. 5 on. The course
BI-SVZ Machine vision and image processing Camera systems are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluation introduces students to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical problems of practice that the graduates may encounter. NI-SYP Parsing and Compilers	Z,ZK te image information use of camera system Z,ZK	5 on. The course stems for solving
BI-SVZ Machine vision and image processing Camera systems are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate introduces students to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical problems of practice that the graduates may encounter. NI-SYP Parsing and Compilers The module builds upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge	Z,ZK te image information use of camera system Z,ZK	5 on. The course stems for solving
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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.	i buiit-in-seii-test e	quipment. They
BI-CCN	Compiler Construction	Z,ZK	5
	class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles	, , , , , , , , , , , , , , , , , , ,	-
	and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching theme	•	
BI-TEX	TeX and Typography	Z.ZK	4
	d in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of t	, , I	on typographic
rules.			
BI-ULI	Introduction to Linux	Z	2
Students become famil	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
· · · · · · · · · · · · · · · · · · ·	ix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (terminal).		
BI-OPT	Introduction to Optical Networks	Z,ZK	4
=	view of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on processing the control of th	· ·	
	iology and on their solutions. The course will include the history of optical communications, an overview of passive componen rs, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission sys		
	is, and others), and an overview of active components (optical switches and amplifiers, high-speed conferent transmission sys- ics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such	•	
	ansfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters		
from practice.			
NI-VCC	Virtualization and Cloud Computing	Z,ZK	5
	ledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and	d organizations. Th	ney will get
acquainted with virtuali	zation principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to effi	iciently operate an	d optimize the
•	s of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effect	•	
- ·	x computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skil	lls in the use of mo	dern integration
	(Continuous integration and development).		
BI-VHS	Virtual game worlds	ZK	4
	nts to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current s	_	
	neory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. I the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.	. The course can b	le followed by
BI-VR1	Virtual reality I	KZ	4
	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 on		
and shared social activ		•	0, ,
BI-VR2	Virtual reality II	KZ	3
Continuation of the cou	rse Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The o	bjective is to deve	lop applications
for computer science as	nd gamification in various social metaverse and desktop engines.		
	a gammeation in various social metaverse and desktop engines.		
BI-VAK.21	Selected Applications of Combinatorics	Z	3
BI-VAK.21 The course aims to intre	Selected Applications of Combinatorics oduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the		ve approach the
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BI-ZPI	Process engineering	KZ	4			
Students will learn fund	amentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	of process modell	ing and they will			
learn basics of the used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of business processes using modern						
CASE tools. The role of	process engineering for information systems development is discussed as well as its importance in the overall context of info	ormation and busi	ness strategy of			
an enterprise.						
BI-ZNF	PHP Framework Nette - basics	KZ	3			
Students will gain the ba	sics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech	n popular framewo	ork. The resulting			
knowledge should serve	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 inte	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	cus our attention p	particularly on			
control of engineering a	nd physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript	ion methods of sy	stem models,			
basic linear dynamic sys	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of ci	eating a description	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	n 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 industr	ial implementation	n of continuous			
and digital controllers a	nd PLC control.					
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4			
This course is presented	This course is presented in Czech.					
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4			
This course is presented	d in Czech.	'				
BI-3DT.1	3D Printing	KZ	4			

Code of the group: BI-WSI-SI-VO.2017

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

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

Credits in the group: 0

Note on the group		rů a zaměřer	ní s výjim	nkou toh	oto zaměř	ení
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADU.1	Unix Administration Zden k Muziká	Z,ZK	5	2P+2C	L	V
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-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 Josef Gattermayer, Jan Matoušek, Monika Borkovcová Jan Matoušek Monika Borkovcová (Gar.)	KZ	4	2P+2C	Z	V
BI-HWB	Hardware Security Ji í Bu ek, Filip Kodýtek, Róbert Lórencz Ji í Bu ek Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-JPO	Computer Units Alois Pluhá ek	Z,ZK	5	2P+2C	Z	V
BI-MGA	Multimedia and Graphics Applications Ji i Chludil	Z,ZK	5	2P+2C	Z	V
BI-PGR.1	Computer graphics programming	Z,ZK	5	2P+2C	L	V
BI-PNO	Practical Digital Design Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	V
BI-PRP	Law and business Zden k Ku era, Martin Samek Martin Samek Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	V
BI-PJP	Programming Languages and Compilers Jan Janoušek	Z,ZK	5	2P+1C	L	V
BI-PGA	Programming of graphic applications Radek Richtr, Ji i Chludil Radek Richtr Radek Richtr (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PYT	Python Programming	Z,ZK	4	2P+2C	L	V
BI-SSB	System and Network Security Ji i Dostál Ji i Dostál Ji i Dostál (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-SRC	Real-time systems Jaroslav Borecký, Hana Kubátová Jaroslav Borecký Hana Kubátová (Gar.)	KZ	4	2P+2C	Z	V
BI-XML	XML Technology Jan Mokrý	Z,ZK	4	2P+2C	L,Z	V
BI-TIS	Information Systems Design Pavel Náplava Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-TUR	User Interface Design Jan Schmidt	Z,ZK	4	2P+2C	L	V

BI-TWA.1	Web Application Design Filip Glazar, David Bernhauer Filip Glazar David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-VES	Embedded Systems Miroslav Skrbek	Z,ZK	5	2P+2C	L	V
BI-VWM	Searching the Web and Multimedia Databases Tomáš Skopal	Z,ZK	5	2P+1C	L	V
BI-VZD	Data Mining Alexander Kovalenko, Karel Klouda, Ond ej Tichý, Daniel Vašata Daniel Vašata 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	٧
BI-ZUM	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ZNS	Knowledge-based Systems Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	Z	V

BI-ZNS	Knowledge-based Systems Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	Z	V
	the courses of this group of Study Plan: Code=BI-WSI-SI-VO.2017	Name=Elec	tive Voca	tional Co	urses for	Bachelor
	WSI-SI, Version 2017				717	
BI-PRP	Law and business			2	,ZK	4
This course is presente						
BI-AG2	Algorithms and Graphs 2			I I	,ZK	5
	in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the ir	_	-	-		
	ctures and amortized complexity analysis. It also includes a very light introduction to approx	imation algorithm	ns. For Engl	ish version o	f the course	see BIE-AG2.
BI-ZRS	Basics of System Control			Z	,ZK	4
1	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolvi					-
	and physical systems. We will provide basic information from the feedback control of linear d					
1 '	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Stu			U	•	,
	dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy			_		
	stability in control systems, single and continuous adjustment of the controller parameters,	and certain aspe	cts of the in	dustrial impl	ementation o	of continuous
and digital controllers a						
BI-ADU.1	Unix Administration			Z	,ZK	5
	nternal structure of the UNIX operating system, with the administration of its basic subsystems			-		
	inistrator roles. They will get theoretical and practical knowledge of user management and a			•		
1.	twork services and remote access, and in the areas of system deployment and virtualization	n. In the labs, the	y will verify	the knowled	ge from the l	ectures on
specific examples from	practice.					
BI-ADW.1	Windows Administration			Z	,ZK	4
This course is presente	d 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	instruction	s. Special en	phasis is giv	en on the
pipelined instruction pro	ocessing and on the memory hierarchy. Students will understand the basic concepts of RISC	and CISC archite	ectures and	the principle	s of instruction	on processing
not only in scalar proce	ssors, but also in superscalar processors that can execute multiple instructions in one cycle,	while ensuring the	e correctne	ss of the seq	uential mode	l of programs.
The course further elab	orates the principles and architectures of shared memory multiprocessor and multicore syst	ems and the me	mory coher	ence and co	nsistency in s	such systems.
BI-BEK	Secure Code			Z	,ZK	5
The students will learn	how to assess security risks and how to take them into account in the design phase of their or	wn code and solu	tions. After	getting famili	ar with the th	reat modeling
	ractical experience with running programs with reduced privileges and methods of specifying					
administrator privileges	. Dangers inherent in buffer overflows will be practically demonstrated. Students will be intro	duced to the prin	ciples of se	curing data	and the relati	onships of
security and database	systems, web, remote procedure calls, and sockets in general. The module concludes with D	Denial of Service	attacks and	the defense	against ther	n.
BI-BIG	DB Technologies for Big Data				KZ	4
This course is presente	d in Czech.					
BI-HWB	Hardware Security			Z	,ZK	5
The course deals with I	nardware resources used to ensure security of computer systems including embedded ones	. The students be	ecome fami	iar with the o	perating prin	nciples of
cryptographic modules	the security features of modern processors, and storage media protection through encryptic	on. They will gain	knowledge	about vulne	rabilities of H	łW resources,
including side-channel	attacks and tampering with hardware during manufacture. Students will have an overview of c	ontact and conta	ctless smar	t card techno	logy includin	g applications
and related topics for m	nulti-factor authentication (biometrics). Students will understand the problems of effective imp	olementation of c	iphers.			
BI-JPO	Computer Units			Z	,ZK	5
Students deepen their	basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get ac	quainted in	detail with th	e internal st	ructure and
	er units and processors and their interactions with the environment, including accelerating ar					
of multiplication. The or	ganization of main memory and other internal memories (addressable, LIFO, FIFO and CAM	1) will be discusse	ed in detail,	including co	des for error	detection and
correction for parallel a	nd serial data transmissions. They will also get acquainted with the methodology of controlle	r design, with the	principles	of communic	ation of the p	rocessor with
the environment and the	e architecture of the bus system. The problems will be practically evaluated in the labs and wit	h the help of the	educational	microprogra	mmed proces	ssor simulator
and programmable har	dware design kits (FPGA).					
BI-MGA	Multimedia and Graphics Applications	<u> </u>		Z	,ZK	5
Students get acquainte	d with multimedia technologies and applications for 2D/3D bitmap and vector graphics. Duri	ng the course, cu	rrent tools	,		videos, 3D
graphics and animation	will be introduced. Students learn several basic techniques of creation and editing content in c	computer graphic	s, introducti	on to graphic	formats, and	compression
technologies. They lear	n to use multimedia transmission and representation systems, including real-time multimedi	a processing. The	ey understa	nd the princi	ple of operat	ion and use

technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the principle of operation and use of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.

Computer graphics programming

Students are able to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textures imitating geometric details and materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in computer graphics, such as graphical pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fundamentals for your professional development, e.g. for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces, and scientific visualisation.

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BI-PNO Practical Digital Design	KZ	5
Students get an overview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They und		
and implementation technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing tools.	modern, industry-standard	I CAD design
BI-PJP Programming Languages and Compilers	Z,ZK	5
Students master basic methods of implementation of common high-level programming languages. They get experience with the design and i		al compiler parts
for a simple programming language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a t	text that has a certain synta	ax into a target
form and write a compiler based on such a specification. The notion of compiler in this context is not limited to compilers of programming lar	nguages, but extends to all	other programs
for parsing and processing text in a language defined by a LL(1) grammar.		
BI-PGA Programming of graphic applications	Z,ZK	5
This course is presented in Czech only.	'	
BI-PYT Python Programming	Z,ZK	4
The course is taught in Czech.	, , ,	
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	1 , 1	
BI-SRC Real-time systems	KZ	4
Students obtain the basic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues.	Thereticla knowledges from	n 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, the	-	
as in BI-VES subject and FPGA.		
BI-XML XML Technology	Z,ZK	4
Students learn to make and validate XML documents (XML Schema, Relax, Schematron) and learn standard methods of their processing (1 '	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		_
XPath programming will be based on version 2.0. Students will gain a broad overview of XML technologies.		_
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 segment		_
technologies (databases, programming languages, GUI etc.).	, , , , , , , , , , , , , , , , , , , ,	Ü
BI-TUR User Interface Design	Z,ZK	4
Students have a basic overview of the methods for designing and testing common user interfaces. They have experience to solve the proble		•
		nei bioducis do
not communicate with the user optimally, since the needs and characteristics of users are not taken into account during product development.		-
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that bring users into the development process to ensure optimal communication with a user.	. Students gain an overviev	v of the methods
that bring users into the development process to ensure optimal communication with a user. BI-TWA.1 Web Application Design	. Students gain an overview	v of the methods
that bring users into the development process to ensure optimal communication with a user. BI-TWA.1 Web Application Design The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some	. Students gain an overview Z,ZK e properties of language de	v of the methods 5 escribing the
that bring users into the development process to ensure optimal communication with a user. BI-TWA.1 Web Application Design	Students gain an overview Z,ZK e properties of language depolications, which will be de	of the methods 5 escribing the emonstrated in
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BI-TWA.1 Web Application Design The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications. Server side will be demonstrated on PHP technology using frameword on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS. BI-VES Embedded Systems Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers apperipheral circuits, programming methods, and applications. They get practical skills with development kits and tools. BI-VWM Searching the Web and Multimedia Databases	Z,ZK e properties of language de oplications, which will be de rks Symfony 2, Doctrine 2. Z,ZK and embedded processors	5 escribing the emonstrated in Developments 5, their integrated
BI-TWA.1 Web Application Design The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications. Server side will be demonstrated on PHP technology using framework on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS. BI-VES Embedded Systems Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers appripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	Z,ZK e properties of language de oplications, which will be de rks Symfony 2, Doctrine 2. Z,ZK and embedded processors Z,ZK ous storage of documents.	5 escribing the emonstrated in Developments 5, their integrated 5 In particular,
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List of courses of this pass:

Code	Name of the course	Completion	Credits
BI-3DT.1	3D Printing	KZ	4
BI-A2L	English language, preparation for the B2 level exam	Z	2

The content of the course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement - students are due to: -Take an active part in the language instruction. -Meet the requirements for writing assignments - Summary, Abstract, Argumentation Paper. -Succeed in both the midterm and the final term tests with the success rate set at 70%. -80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by individual teachers during the first class of the term.

BI-AAG	Automata and Grammars	Z,ZK	6
	uced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite	_	
	ars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships between for ed through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation,		
BI-ACM	Programming Practices 1	KZ	5
217.0111	This course is presented in Czech.		
BI-ACM2	Programming Practices 2 This course is presented in Czech.	KZ	5
BI-ACM3	Programming Practices 3 This course is presented in Czech.	KZ	5
BI-ACM4	Programming Practices 4	KZ	5
	This course is presented in Czech.		
BI-ADU.1	Unix Administration	Z,ZK	5
	he internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They		
	administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights, i ory, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kno		- 1
	specific examples from practice.		
BI-ADW.1	Windows Administration	Z,ZK	4
DI AO4	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	7.71/	
BI-AG1	Algorithms and Graphs 1 s the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur	Z,ZK	d partially
	rie basics of emoteric algorithm design, data structures, and graph theory, belonging to the core knowledge or every computing car- riedge 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 or		
BI-ALO	structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English version Algebra and Logic	Z,ZK	4
BI-ALO	The course extends and deepens the study of topics touched upon in the basic course in logic.	۷,۷۲	+
BI-AND.21	Programming for the Android Operating System This course is presented in Czech.	KZ	4
BI-ANG	English Language, Internal Certificate	ZK	2
<u>'</u>	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN	G	
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-APJ	Aplication Programming in Java This course is presented in Czech. Advanced technologies in Java.	Z,ZK	4
BI-APS.1	Architectures of Computer Systems	Z,ZK	5
- 1	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 prince	-	
	ocessors, 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
	ned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applications of the students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applications of the students of the students will be supplied to the students of t		grammable
	ried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded sylver of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore		
BI-AVI.21	Software Engineering students. Algorithms visually	Z,ZK	4
	Algorithms visually ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer sc		
	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		- 1
	that make understanding the principles of algorithms easy.		
BI-BAP	Bachelor Thesis	Z	14
BI-BEK	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	5 at modeling
	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
administrator privi	ileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing	data and the relati	onships of
	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 methometical fundamentals of crustography and have an every few of aurrent crustographic algorithms and applications; summetries	Z,ZK	6
	d the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetric a . They also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern 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 This course is presented in Czech.	KZ	4
BI-BLE	Blender	Z,ZK	4
	ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those in	_	•
	ffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph		
BI-BPR	Bachelor project	7 7V	2
BI-CAO Students get the	Digital and Analog Circuits fundamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and	Z,ZK principles of functi	5 ionality of
-	ircuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences between	•	
	of electronic devices.		

BI-CCN			
	Compiler Construction	Z,ZK	5
	uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles of	•	
	and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching t		
BI-CS1	Programming in C#	KZ	4
-	urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental cor		
	s, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class defin		-
constructors, meth	nods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging a	ind exception pr	ocessing, as
DI 000	well as work with files are emphasized.	1/7	
BI-CS2	C# language and data access	KZ	4
	and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Microso	-	
	ts used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current techno erying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (Lli	•	
•	rying and updating data, integrated directly with the .NET platform languages, which enable Lind use with objects, AME and SQE (Lind). .). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data us	=	
	f the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model,	-	-
(Ortivi). Triis part o	(XML description).	otorage moder	and Mapping
BI-CS3	Language C# - design of web applications	KZ	4
	e introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overview of		1
	on thisplatform. They will learn to create WebAPI and to use it by client programs.		
BI-DAN	Taxes for non-Economists	Z,ZK	4
	icial insurance contributions, are obligatory payments paid by people or institutions to public budgets. This is the way how a significant po	•	1
-	rns who pays which taxes or who bears the tax burden. The course introduces students to the tax theory and policy fundamentals and sl		
of income, consun	nption, and wealth. The course provides practical information on calculations of tax liabilities of both citizens and institutions as well as	information abo	ut important
	taxpayers' formal duties towards public administration.		
BI-DBS	Database Systems	Z,ZK	6
Students are intr	oduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They learn	to design small	databases
(including integrity	constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with the S	QL language, a	s well as with
its theoretical found	dation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the fundan	nental concepts	of transaction
	Illing parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to	-	_
in relational databa	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of databases	ase systems, de	bugging and
	optimizing database applications, distributed database systems, data stores.		
BI-DPR	Document., Presentation, Rhetorics	KZ	4
This subject is aime	ed to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create and pre	pare interactive	oresentations
	and presenting before an audience. Students will also learn to write technical reports and scientific texts.		
BI-EHD	Introduction to European Economic History	Z,ZK	3
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-EJA	Enterprise Java		
	!	Z,ZK	4
The course is on a	advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information syst	,	
	advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information syst a database and are accessed through the web interface.	ems which are o	connected to
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BI-EMP This course is ain enterprise putting i BI-EP1 BI-EP2 Continuation of Eff BI-FMU The aim of the cou operations in acco of economic operations in acco of economic operations will be in even the in BI-HAM This course introduce in the interprise for analysis). The grant BI-HMI BI-HWB The course deals cryptographic model	a database and are accessed through the web interface. Economics and Management Principles	ems which are of KZ elds: enterprise accounting perion of KZ ual problems are Z,ZK icular accounting of bookkeeping ent accounting Z,ZK Eally. In this partice erver administration a hardware Z,ZK Z,ZK the operating perion of Hardware of Hardware of Hardware including perion of the problems of the probl	de discussed, de discussed, de discussed, de discussed, de discussed, description are base of 2 2 2 2 2 2 2 2 2 2 2 2 3 4 3 5 6 7 7 8 7 8 8 8 8 8 8 8 8 8

BI-JPO Computer Units Z,ZK 5 Students deepen their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail with the internal structure and organization of computer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using appropriate codes for implementation of multiplication. The organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including codes for error detection and correction for parallel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of communication of the processor with the environment and the architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational microprogrammed processor simulator and programmable hardware design kits (FPGA). **BI-KOM** Conceptual Modelling The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key terms in a domain, the ability to categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the OntoUML notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data representation in the Internet. They also learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO method and the BPMN notation will be taught. The course is designed with the respect to continuation in software implementations. **BI-KOT** Programing in Kotlin Z,ZK 4 Kotlin is a modern, statically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advanced language constructions. The language is fully Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a modern, object-functional way 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 The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity of the world - examples from anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health, history, death, etc ...) will be shown. The course is presented in Czech. **BI-LIN** Linear Algebra Z,ZK The course is taught in Czech. Students understand the theoretical foundation of algebra and mathematical principles of linear models of systems around us, where the dependencies among components are only linear. They know the basic methods for operating with matrices and linear spaces. They are able to perform matrix operations and solve systems of linear equations. They can apply these mathematical principles to solving problems in 2D or 3D analytic geometry. They understand the error-detecting and error-correcting codes. Macroeconomic Context of Domestic and World Economy BI-MEK Z,ZK This course is presented in Czech **BI-MGA** Multimedia and Graphics Applications 7 7K 5 Students get acquainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for working with images, videos, 3D graphics and animation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to graphic formats, and compression technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the principle of operation and use of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models. **BI-MIK** Fundamentals of Microeconomics Z,ZK 4 This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). **BI-MIT** Mikrotik technologies ΚZ 3 The main motivation of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are commonly used by the small and middle internet service providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the metallic, optical or wireless links and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer networks concepts like protocols and technologies of the data-link, network and transport layer of the OSI model. **BI-MLO** Mathematical Logic Z,ZK The course seminary is taught in Czech. **BI-MMP** Multimedia team project ΚZ 4 This course is presented in Czech. BI-MPP.21 Methods of interfacing peripheral devices Z,ZK 5 The course is focused on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universal serial bus (USB). The course includes both PC side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USB devices, Linux and Windows drivers, simple application development, and APIs of selected devices. BI-MVT.21 Modern Visualisation Technologies Z,ZK The goal of the course is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augmented reality, visualization on high resolution displays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentioned technologies, namely fractal and procedural visualization, scientific data visualization, and 3D model scanning. BI-OOP Object-Oriented Programming Z,ZK Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together by message passing. In this course we look at some of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software development including testing, error handing, refactoring and design patterns. BI-OPT Z.ZK Introduction to Optical Networks Students get basic overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possible problems with deployment of optical network technology and on their solutions. The course will include the history of optical communications, an overview of passive components (optical fibres, multiplexors, dispersion compensators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission systems). The course will also cover the most up-to-date topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as the accurate time on Internet, ultrastable frequency transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters. Students will solve real tasks from practice. **BI-OSY** Operating Systems Z,ZK Students understand the classical theory of operating systems (OS) in addition to the knowledge gained in the module "Programming in Shell 1". They get a solid knowledge of OS kernels, processes and threads implementations. They understand the problems of race conditions, thread scheduling, resource allocation and deadlocks, the techniques of the management of virtual memory, principles and architectures of disks, RAID and file systems. They are able to design and implement simple multithreaded applications BI-PA1 Programming and Algorithmics 1 Z.ZK Students gain the ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, structured, pointers), expressions, statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searching, sorting, and manipulating with linked lists.

BI-PA2	Programming and Algorithmics 2	Z,ZK	7
Students know th	ie 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 im	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
5. 5	with all C++ features needed to achieve the main objective (operator overloading, templates).		
BI-PAI	Law and Informatics	ZK	3
DI DOA	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	7.71/	-
BI-PGA	Programming of graphic applications This course is presented in Czech only.	Z,ZK	5
DI DOD 4	· · · · · · · · · · · · · · · · · · ·	Z,ZK	_
BI-PGR.1	Computer graphics programming		5
	to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textuike 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	1	l
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 for the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for the course for t	ior BIE-TWA.1. The	ey should
	register for this course in their 3rd semester of study.		
BI-PJP	Programming Languages and Compilers	Z,ZK	5
	asic methods of implementation of common high-level programming languages. They get experience with the design and implementat		
	amming language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that has	•	•
form and write a co	ompiler based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages, but	t extends to all other	er programs
DI D 10 4	for parsing and processing text in a language defined by a LL(1) grammar.	1/7	
BI-PJS.1	JavaScript Programming	KZ	4
	course is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development	•	
recommended for s	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 th of study.	iis course iii trieii 4	un semesiei
BI-PJV	Programming in Java	Z,ZK	4
DI-FJV	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZR	4
BI-PKM	Introduction to mathematics	Z	4
DI-I KIVI	This course is presented in Czech.	_	7
BI-PMA	Programming in Mathematica	Z.ZK	4
	prking with modern technical and scientific software. Students will learn how to use different programming styles (functional programm	, , ,	
Ciadonio inii bo in	etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.	g, raio bacca pr	og.ag,
BI-PNO	Practical Digital Design	KZ	5
Students get an ov	verview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the		L language,
and implementati	ion technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern, in	dustry-standard C	AD design
	tools.		
BI-PPA	Programming Paradigms	Z,ZK	5
	s with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of partic		
	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The		
on iambda caicuit	us and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr such as C++ and Java.	eam programming	ianguages
BI-PRP	Law and business	Z,ZK	4
DIFERE	This course is presented in Czech.	Z,ZR	4
BI-PRR	Project management	KZ	4
DI-FKK	This course is presented in Czech.	IXZ	4
BI-PS1	Programming in Shell 1	KZ	5
	Frogramming in Shell 1 knowledgeable users of common Unix-like operating systems. They understand the fundamental principles of the operating systems		l
	this, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of the shell, l		
,	process various text data.		
BI-PS2	Programming in shell 2	Z,ZK	4
	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In additi		eper insight
	into shell and some other particular scripting languages and will get practical experience with shell script programming.		
BI-PSI	Computer Networks	Z,ZK	5
	nd the basic common techniques, protocols, technologies, and algorithms necessary to communicate in computer networks. The topic		
2nd to 4th layer	of the ISO OSI model. They also get a basic understanding of communication media, security, and network administration. Students v	will be able to write	a simple
	network application and configure a simple network.		_
BI-PST	Probability and Statistics	Z,ZK	5
	earn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable	-	
	indom variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction nown distributional parameters from random sample characteristics. They will also be introduced to the methods of determining the st	=	-
estimations of unk	move random variables.	alistical dependen	ce or two or
BI-PYT	Python Programming	Z,ZK	4
ו ויום	The course is taught in Czech.	۷,۲۱۸	, ,
BI-QAP	Quantum algorithms and programming	KZ	5
	ing students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, o		_
_	gorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developr	· ·	_
	ige. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VMN		
	and what has a more and constants. More more described as a find to relate the second of the second		

BI-SAP	Computer Structure and Architecture	Z,ZK	6
	nd basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inpus, students gain practical experience with the design and implementation of the logic of a simple processor using modern digital desi		
	of digital computer construction principles, how a computer performs its operations, what is machine code, and what are its connect languages.	,	
BI-SCE1	Computer Engineering Seminar I	Z	4
	nputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
	rofessional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester.		
BI-SCE2	Computer Engineering Seminar II	Z	4
	nputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
	rofessional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher	•	
	semester.		
BI-SEP	World Economy and Business sented in Czech. The course introduces students of technical university to the international business. It does that predominantly by c	Z,ZK	4 Locuntries
and key regions of w	vorld economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as nomic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of directions. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.	indexes of econom	ic freedom,
BI-SI1.2	Software Engineering I	Z,ZK	5
	ne methods of analysis and design of large software systems, which are typically designed and implemented in teams. They get prac and design of a large-scale software project that is to be developed within the concurrent BI-SP1 module. They get skill to use CASE		
•	solving software-related problems. They get overview of object-oriented analysis, design, architecture, validation, verification, and tes		modelling
BI-SI2.3	Software Engineering 2	Z,ZK	3
DI CO I	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	7 71/	4
BI-SOJ Students of the cour	Machine Oriented Languages rse will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal us	Z,ZK	4 or's features
	ation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view lin	· ·	
BI-SP1	This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	V7	
-	Team Software Project 1 ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	KZ e BEI-SWI course t	4 hat runs
concurrently and the	hat teaches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in the	e role of the team a	nd project
leader, regularly co	insults with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will be f in the BEI-SP2 course.	urther developed a	nd finished
BI-SP2.1	Team Software Project 2	KZ	4
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-SQL.1	Language SQL, advanced knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In page 1.00 page	KZ Articular stored prod	4 Iram unites
	ueries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of		
	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan are	•	
will be discussed	 d. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora PostgreSQL. 	acie Dbivio ariu par	lially Off
BI-SRC	Real-time systems	KZ	4
	basic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues. Thereticla kn	_	
experimentally veril	ied on the practical labs of the Department of Digital Design. This subject is mainly based on embedded R-T systems, therefore the as in BI-VES subject and FPGA.	used design kits ar	e trie Sarrie
BI-SSB	System and Network Security	Z,ZK	5
DI CT4	This course is focused on selected areas of computer networks and computer systems in terms of cyber security	7	
BI-ST1 The subject is ori	Network Technology 1 ented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredited CCNA1 - R& S Introduction to Networks.	Z d under the Cisco N	3 Netacad -
BI-ST2	Network Technology 2 This course is presented in Czech.	Z	3
BI-ST3	Network Technology 3	Z	3
	r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during E led in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pred		
g	simple topology, security, etc.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
BI-ST4	Network Technology 4	Z	3
	er enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switching of further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased effici	-	
•	topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completely		
· ·	e Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and switch pergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation.	-	
rocoveries, and em	network running.	on ways wille ilidifi	tanning tile
BI-STO	Storage and Filesystems	Z,ZK	4
The student will lear	rn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and arch load balancing and high availability.	iving, as so as stora	age scaling,
BI-SVZ	Machine vision and image processing	Z,ZK	5
Camera systems a	are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate in	mage information. T	he course
introduces students	to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical use problems of practice that the graduates may encounter.	of camera systems	s for solving
	problems of practice that the graduates may encounter.		

BI-TDA Test driven architecture KZ 4 The course is focused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that are well known in the DevOp	
world. This course has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in the semester project.	ро
BI-TEX TeX and Typography Z,ZK 4 his course is presented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the course focuses on typogra rules.	
BI-TIS Information Systems Design Z,ZK 5	5
tudents 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 exist technologies (databases, programming languages, GUI etc.).	sting
BI-TJV Java Technology Z,ZK 4	- 1
The subject goal is to introduce the programming language Java. The student gains practical experiences for smaller enterprise application programming. This subject presents 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-TS1 Theoretical Seminar I Z 4	1
heoretical 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 stud re 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	
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	anu
BI-TS2 Theoretical Seminar II Z 4	1
heoretical 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 stud re 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	
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	anu
BI-TS3 Theoretical Seminar III Z 4	ī .
heoretical 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 which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical reading group. The students are interested as a second science of the contemporary theoretical computer science. It is mostly a classical reading group. The students are interested as a second science of the contemporary theoretical computer science. It is mostly a classical reading group. The students are interested as a second science of the contemporary theoretical computer science. It is mostly a classical reading group. The students are interested as a second science of the contemporary theoretical computer science in the contemporary the contemp	
re 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 other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	and
BI-TS4 Theoretical Seminar IV Z 4	<u> </u>
heoretical 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 stud	
re 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 other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	and
BI-TUR User Interface Design Z,ZK 4	-
tudents 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	is do
ot 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 meth that bring users into the development process to ensure optimal communication with a user.	nods
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 nodern libraries facilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony 2, Doctrine 2. Development	
on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS.	51115
BI-ULI Introduction to Linux Z 2	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 comman	nds
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 Z 3	
the course aims to introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the basic courses, we approach	
sue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic data structures. Furtherm	
rith 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 will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimization and more. Students we	
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	
tudents 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.	ated
BI-VHS Virtual game worlds ZK 4	1
he 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 furthern	
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 the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.	1 by
BI-VMM Selected Mathematical Methods Z,ZK 4 We start reviewing geometric properties of linear spaces with inner product. Next, we introduce and analyze the discrete Fourier transform (DFT) and its fast implementation (FF	
Further we deal with differential calculus of functions involving multiple variables. We present methods for the localization of extreme values of functions. For this purposes, we st	
ormed linear spaces and quadratic forms. In addition, we introduce the least square method. The last part of the course is devoted to optimization and duality. The linear programmed linear spaces and quadratic forms.	ming
and the Simplex method is analyzed in more detail. BI-VR1 Virtual reality I KZ 4	
troduction 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, emparance and shared social activities.	ıthy
BI-VR2 Virtual reality II KZ 3	
ontinuation 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 applicat for computer science and gamification in various social metaverse and desktop engines.	tions
BI-VWM Searching the Web and Multimedia Databases Z,ZK 5	=
Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storage of documents. In particul	
students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from web pages. They get detail	
nowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web search engines for the mentic data types (documents).	oned
36-2 (

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

BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	uced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classic		
space search, mult	i-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm	s and the neural n	etworks, will
	be presented as well.		T
FI-FIL	Philosophy	ZK	2
	see A0B16		1
FI-GNO	Introduction to Gnoseology	ZK	2
-	uvádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v do		-
	lenkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní c	•	•
1 *	osti na teorii pírodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém pehledu nastín na hlediska este		
kapitolou jsou mou	ely spojitých p írodních soustav a systém , v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje. Ing. Ivo Janoušek CSc.	r edili i p edilasi	a garantuje
FI-HPZ		7	3
	Humanities subject from a study abroad ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	_	_
A Humaniles sur	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	i is required in the	curriculum.
FI-HTE	History of Technology and Economics	ZK	2
	ces the scientific disciplines of history and technology , economic and social history of the Czech lands and Czechoslovakia in compa		
	the European region 19 to 21 century.		olopillolik ol
FI-KSA	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit	l	l
	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	-	
	shown. The course is an interesting alternative to other humanities, taught at FIT.	, ,,	,
FI-MPL	Managerial Psychology	ZK	2
FI-ULI	Introduction to Linguistics for Computer	ZK	2
I I-OLI	This course is presented in Czech.	210	
FI-VEZ	economic-managerial course from a study abroad	Z	4
	ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that		
A Humanities sur	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	i is required in the	curricularii.
NI-AFP	Applied Functional Programming	KZ	5
	ented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional p		_
	and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, master		_
and not not addy t	necessary competence of a software engineer: the theory and especially the practice.	g ao paraaig	500011100 G
NI-DDM	Distributed Data Mining	KZ	4
	estate-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands of		
	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations a		
	approaches to parallelize other algorithms. The course is prezented in czech language.	•	
NI-DSP	Database Systems in Practes	Z,ZK	4
_	This course is presented in Czech.	,	ı
NI-DZO	Digital Image Processing	Z.ZK	4
This course prese	nts a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical alg	orithms that are b	oth easy to
implement and hav	e an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is als	so valuable outside	the domain
of digital image	processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR	compression, de-l	olurring in
frequency domain,	abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray converges to the convergence of the c	ersion, context en	hancement,
interactive as-ri	gid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ac	dding depth, alpha	matting.
NI-IAM	Internet and Multimedia	Z,ZK	4
The NI-IAM cours	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	uisition of AV signa	als (input),
	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u		
	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effective of the contract of		
the quality and late	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording th	e scene up to the p	oresentation
	for audience.		_
NI-LSM	Statistical Modelling Lab	KZ	5
	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p		
available informati	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, an	•	properties.
NUMBER	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi		
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	ogramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where		
	plex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development n		
	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work of		
· ·	ms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involven		
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	emantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scot		ı
	Introduction to category theory.	oudi di lambaa	- 2.00100.
NI-OLI	Linux Drivers	Z,ZK	4
	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po	•	1
-	ability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developmen		
	urse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practic		

NI-PDD	Data Preprocessing	Z,ZK	5
Students learn to p	orepare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data s	ources, such as i	mages, texts,
time series, etc.,	and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characterist	tics from images	or from web
	pages.		
NI-PSL	Programming in Scala	Z,ZK	4
The course introd	duces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature	es - e.g.pattern m	atching and
advance standard	library. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and	libraries e.g. Play	, Cassandra,
	Scalaz, etc.		
NI-REV	Reverse Engineering	Z,ZK	5
_	cquainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens before		
	s will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dedicated		
• •	itten in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be de		•
debuggers and d	ebugging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the computer	malware scene.	The focus of
NII 0) (E	the course is on the seminars, where students will solve practically oriented tasks from the real world.	7 714	
NI-SYP	Parsing and Compilers	Z,ZK	5
The module builds	upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of va	irious variants and	applications
	of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
NI-TSP	Testing and Reliability	Z,ZK	5
Students will gain	Testing and Reliability knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepare to the control of	oare a test set wit	h the help of
Students will gain	Testing and Reliability knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with but	oare a test set wit	h the help of
Students will gain the intuitive path s	Testing and Reliability knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preparensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with but will be able to compute, analyze, and control the reliability and availability of the designed circuits.	pare a test set wit ilt-in-self-test equ	h the help of ipment. They
Students will gain the intuitive path s	Testing and Reliability knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preparensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with but will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing	pare a test set wit ilt-in-self-test equ Z,ZK	th the help of ipment. They
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