Study plan

Name of study plan: Bachelor branch Knowledge Engineering, in Czech, 2018-2020

Faculty/Institute/Others:

Department: Department of Applied Mathematics

Branch of study guaranteed by the department: Knowledge Engineering

Garantor of the study branch: doc. RNDr. Ing. Marcel Ji ina, Ph.D.

Program of study: Informatics 2009 Type of study: Bachelor full-time

Required credits: 157 Elective courses credits: 23 Sum of credits in the plan: 180

Note on the plan: Tato verze studijního plánu je ur ena pro ro ník, který byl p ijat ke studiu v akademickém

roce 2018/2019 do prezen ní formy studia bakalá ského programu.

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 119

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 101 credits

Requirement courses in the group: In this group you have to complete 18 courses

Credits in the group: 101

Povinný předmět BI-SI1 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-AG1	Algorithms and Graphs 1 Dušan Knop, Pavel Tvrdík, Ji ina Scholtzová, Ond ej Suchý Pavel Tvrdík Pavel Tvrdík (Gar.)	Z,ZK	6	2P+2C	Z	PP	
BI-AAG	Automata and Grammars Št pán Plachý, Eliška Šestáková, Jan Holub, Jan Janoušek, Tomáš Pecka, Jan Trávní ek, Martin Svoboda, Radomír Polách Jan Janoušek Jan Holub (Gar.)	Z,ZK	6	2P+2C	Z	PP	
BI-BAP	Bachelor Thesis Miroslav Balík Zden k Muziká (Gar.)	Z	14		L,Z	PP	
BI-BPR	Bachelor project Zden k Muziká Miroslav Balík Zden k Muziká (Gar.)	Z	2		Z,L	PP	
BI-BEZ	Security Ji í Bu ek, Ji í Dostál, Martin Jure ek, Filip Kodýtek, Róbert Lórencz, Tomáš Zahradnický Daniel Kobrle Róbert Lórencz (Gar.)	Z,ZK	6	2P+2C	L	PP	
BI-CAO	Digital and Analog Circuits Jaroslav Borecký, Martin Da hel, Martin Kohlík, Pavel Kubalík, Vojt ch Miškovský, Martin Novotný, Jan ezní ek Martin Kohlík Martin Novotný (Gar.)	Z,ZK	5	2P+2C	Z	PP	
BI-DBS	Database Systems Tomáš Nová ek, Jan Blizni enko, Ji í Hunka, Karel Quast, David Šenký, Michal Valenta, Old ich Malec, Monika Borkovcová, Marek Erben, Antonín Procházka Michal Valenta (Gar.)	Z,ZK	6	2P+2R+1L	Z,L	PP	
BI-DPR	Document., Presentation, Rhetorics Eliška Šestáková, Ond ej Guth, Petra Pavlí ková, Dana Vynikarová, Alena Libánská Ond ej Guth Dana Vynikarová (Gar.)	KZ	4	2P+2C	Z,L	PP	
BI-OSY	Operating Systems Ladislav Vagner, Ji í Kašpar, Michal Šoch, Michal Štepanovský, Jan Trdli ka Ji í Kašpar Jan Trdli ka (Gar.)	Z,ZK	5	2P+1R+1L	. L	PP	
BI-PSI	Computer Networks Pavel Kubalík, Dana ermáková, Viktor erný, Vladimír Smotlacha, Yelena Trofimova, Vojt ch Pail, Jan Fesl Tomáš Herout Jan Fesl (Gar.)	Z,ZK	5	2P+1R+1C	L	PP	
BI-PST	Probability and Statistics Petr Novák Pavel Hrabák Petr Novák (Gar.)	Z,ZK	5	2P+1R+1C	Z	PP	

BI-PAI	Law and Informatics Alžb ta Krausová, Zden k Ku era, Mat j Myška, Michal Mat jka Zden k Ku era (Gar.)	ZK	3	2P	Z	PP
BI-PA1	Programming and Algorithmics 1 Jan Trávní ek, Roman Jelínek, Ladislav Vagner, David Bernhauer, Josef Vogel, Ji í Kašpar, Ivan Šime ek, Miroslav Balík Ladislav Vagner Ladislav Vagner (Gar.)	Z,ZK	6	2P+2R+2C	Z	PP
BI-PA2	Programming and Algorithmics 2 Šimon Schierreich, Jan Trávní ek, Roman Jelínek, Ladislav Vagner, David Bernhauer, Ji í Chludil, Josef Vogel, Ji í Kašpar, Jaroslav K íž, Ladislav Vagner Ladislav Vagner (Gar.)	Z,ZK	7	2P+1R+2C	L	PP
BI-PS1	Programming in Shell 1 Zden k Muziká, Jakub Žitný, Lukáš Ba inka, Dana ermáková, Viktor erný, Ji í Kašpar, Michal Šoch, Jan Trdli ka, Yelena Trofimova Dana ermáková Zden k Muziká (Gar.)	KZ	5	2P+2C	Z	PP
BI-SI1.2	Software Engineering I Filip Glazar, Petr Kroha, Stanislav Kuznetsov, Ji í Mlejnek, Zden k Rybola, Marek Skotnica, Marek Suchánek Ji í Mlejnek Ji í Mlejnek (Gar.)	Z,ZK	5	2P+1C	Z,L	PP
BI-SAP	Computer Structure and Architecture Petr Fišer, Hana Kubátová Hana Kubátová (Gar.)	Z,ZK	6	2P+1R+2C	L	PP
BI-ZDM	Elements of Discrete Mathematics Ji ina Scholtzová, Josef Kolá, Petr Matyáš, Daniel Dombek, Lud k Kleprlík, Jan Sp vák, Pavel K s Daniel Dombek Josef Kolá (Gar.)	Z,ZK	5	2P+2C	Z	PP

Characteristics of the courses of this group of Study Plan: Code=BI-PP.2015 Name=Compulsory Courses of Bachelor Study Program

BI-AG1	Algorithms and Graphs 1	Z,ZK	6
The course covers th	e basics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every compu	ıting curriculum. İt	t is interlinked
	IE-AAG and BIE-ZDM courses in which the students gain the basic skills and knowledge needed for time and space complexity	of algorithms and	d learn to handle
practically the asymp	totic mathematics.		
BI-AAG	Automata and Grammars	Z,ZK	6
	ed to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of fin		•
	s, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships between		
	through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation	. 	
BI-BAP	Bachelor Thesis	Z	14
BI-BPR	Bachelor project	Z	2
BI-BEZ	Security	Z,ZK	6
	the mathematical fundamentals of cryptography and have an overview of current cryptographic algorithms and applications: symmetr	•	
	hey also learn the fundamentals of secure programming and IT security, the fundamentals of designing and using modern cryp	tosystems for cor	nputer systems.
	properly and securely cryptographic primitives and systems that are based on these primitives.		
BI-CAO	Digital and Analog Circuits	Z,ZK	5
•	lamental understanding of technologies underlying electronic digital systems. They understand the basic theoretical models and		•
	cuits, and conductors. They are able to design simple circuits and evaluate circuit parameters. They understand the differences be	etween analog a	nd digital modes
of electronic devices.		7.71	
BI-DBS	Database Systems	Z,ZK	6
Students are introduc			
	ted to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lea		
(including integrity co	nstraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with t	the SQL language	e, as well as with
(including integrity co	nstraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with t ion - the relational database model. They learn the principles of normalizing a relational database schema. They understand the fur	the SQL language ndamental concep	e, as well as with ots of transaction
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(including integrity or its theoretical foundat processing, controllir in relational database optimizing database BI-DPR This subject is aimed and presenting befor BI-OSY Students understand kernels, processes a management of virtu BI-PSI Students understand 2nd to 4th layer of the network application a BI-PST The students will lear basic models of rand estimations of unknomore random variable BI-PAI This course is preser BI-PA1	Instraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with to in the relational database model. They learn the principles of normalizing a relational database schema. They understand the furging parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduces with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of datapplications, distributed database systems, data stores. Document., Presentation, Rhetorics to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create and an audience. Students will also learn to write technical reports and scientific texts. Operating Systems	the SQL language indamental concept do special ways atabase systems, with the systems and prepare interactions. It is a solid know a system and the system a	e, as well as with ots of transaction of storing data debugging and 4 ve presentations 5 wledge of OS pues of the s. 5 y focused on the ite a simple 5 e able to to apply able to perform dence of two or 3

with linked lists.

RI-PA2 Programming and Algorithmics 2 Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, queue, enlargeable array, set, table). They can implement linked structures. They learn these skills using the programming language C++. Although this is not a module of programming in C++, students are introduced with all C++ features needed to achieve the main objective (operator overloading, templates). Programming in Shell 1 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 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 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 Elements of Discrete Mathematics BI-7DM 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.

Code of the group: BI-PP_LIN+LA1+LA2

Name of the group: Compulsory subject in Module of Bachelor Study Program Informatics Linear Algebra, in Czech

Requirement credits in the group: In this group you have to gain at least 7 credits (at most 10)

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

Credits in the group: 7

Note on the group:

BI-LIN

Tato skupina ve studijních plánech BI-xxx.2015 a BI-xxx.2018 nahrazuje předmět BI-LIN z důvodu přechodu na novou akreditaci. Předmět BI-LIN bude naposledy vyučován v semestru B212. Poté již studenti, kteří předmět nestihli odstudovat, musí absolvovat dvojici předmětů BI-LA1.21 a BI-LA2.21.

Z,ZK

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-LIN	Linear Algebra Ji ina Scholtzová, Petr Matyáš, Daniel Dombek, Tomáš Kalvoda, Lud k Kleprlík, Marta Nollová, Eva Pernecká, Jitka Rybní ková, Lucie Strmisková, Daniel Dombek Daniel Dombek (Gar.)	Z,ZK	7	4P+2C	L	PP
BI-LA1.21	Linear Algebra 1 Karel Klouda	Z,ZK	5	2P+1R+1C	Z	PP
BI-LA2.21	Linear Algebra 2 Karel Klouda	Z,ZK	5	2P+2C	L	PP

Characteristics of the courses of this group of Study Plan: Code=BI-PP_LIN+LA1+LA2 Name=Compulsory subject in Module of Bachelor Study Program Informatics Linear Algebra, in Czech

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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	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 ap	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.							
BI-LA1.21	Linear Algebra 1	Z,ZK	5					
We will introduce stude	Ve will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field of real and complex numbers							

and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination method (GEM) and show the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenvalues and eigenvectors of a matrix. We will also demonstrate some applications of these concepts in computer science.

BI-LA2.21 | Linear Algebra 2 | Z,ZK | 5 | 1. Vektorové prostory. 2. Skalární sou in, norma vektoru, ortogonalita. 3. Snalytická geometrie. 4. Lineární zobrazení 5. Matice lineárního zobrazení. 6. [2] Afinní transformace,

homogenní sou adnice, projekce a operace v 3D prostoru jako lineární zobrazení. 8. ešení soustav lineárních rovnic. 9. [2] Maticové rozklady (metody LU, SVD, QR) a jejich výpo et. 11. Metoda nejmenších tverc . 12. Lineární programování. 13. Rekurentní rovnice.

Code of the group: BI-PP_MLO+DML+LOG

Linear Algebra

Name of the group: Compulsory subject in Module of Bc.Study Program Informatics Mathematical Logic in Czech

Requirement credits in the group: In this group you have to gain at least 5 credits (at most 10)

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

Credits in the group: 5

Note on the group:

Tato skupina ve studijních plánech BI-xxx.2015 a BI-xxx.2018 nahrazuje předmět BI-MLO z důvodu přechodu na novou akreditaci. Předmět BI-MLO bude naposledy vyučován v semestru B211. Poté

již studenti, kteří předmět nestihli odstudovat, musí absolvovat dvojici předmětů BI-DML.21 a BI-LOG.21.

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Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-DML.21	Discrete Mathematics and Logic Daniel Dombek	Z,ZK	5	2P+1R+1C	Z	PP
BI-LOG.21	Mathematical Logic Kate ina Triifajová	Z,ZK	5	2P+2C	Z	PP
BI-MLO	Mathematical Logic Marta Nollová, Jitka Rybní ková, Jan Starý, Alena Šolcová, Kate ina Trlifajová, Jakub Šolc Jan Starý Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+1C	Z	PP

Characteristics of the courses of this group of Study Plan: Code=BI-PP_MLO+DML+LOG Name=Compulsory subject in Module of Bc.Study Program Informatics Mathematical Logic in Czech

BI-DML.21	Discrete Mathematics and Logic	Z,ZK	5					
Students will get acquainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts from set theory will be explained								
Special attention is paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The course also lays down the basics of								
combinatorics and nu	mber theory, with emphasis on modular arithmetics.							
BI-LOG.21	Mathematical Logic	Z,ZK	5					
The course focuses of	n the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfial	oility, logical equiv	alence, and the					
logical consequence	of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, a	re explained. This	relates to the P					
vs. NP problem and E	loolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, an	d their models. Th	ne syntactic					
approach to mathem	approach to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorems is explained.							
BI-MLO	Mathematical Logic	Z,ZK	5					
The course seminary	is taught in Czech		•					

Code of the group: BI-PP_ZMA+MA1+MA2

Name of the group: Compulsory subject in Module of Bachelor Study Program Informatics Elements of Calculus, in Czech

Requirement credits in the group: In this group you have to gain at least 6 credits (at most 11)

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

Credits in the group: 6

Note on the group:

Tato skupina ve studijních plánech BI-xxx.2015 a BI-xxx.2018 nahrazuje předmět BI-ZMA z důvodu přechodu na novou akreditaci. Předmět BI-ZMA bude naposledy vyučován v semestru B211. Poté již studenti, kteří předmět nestihli odstudovat, musí absolvovat dvojici předmětů BI-MA1.21 a BI-MA2.21.

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-MA1.21	Mathematical Analysis 1 Tomáš Kalvoda	Z,ZK	5	2P+1R+1C	L	PP
BI-MA2.21	Mathematical Analysis 2 Tomáš Kalvoda	Z,ZK	6	3P+2C	Z	PP
BI-ZMA	Elements of Calculus Petr Olšák, Magda Friedjungová, Pavel Hrabák, Tomáš Kalvoda, Karel Klouda, Ivo Petr, Jaroslav Zhouf, Petr Pauš, Jakub Šolc Jitka Hrabáková Tomáš Kalvoda (Gar.)	Z,ZK	6	3P+2C	Z	PP

Characteristics of the courses of this group of Study Plan: Code=BI-PP_ZMA+MA1+MA2 Name=Compulsory subject in Module of Bachelor Study Program Informatics Elements of Calculus, in Czech

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BI-MA1.21	Mathematical Analysis 1	Z,ZK	5			
We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers. Then we study real sequences						
and real functions of a re	eal variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of fui	nctions. This theor	etical foundation			
is then applied to root-fin	nding problems (iterative method of bisection and Newton's method), construction of cubic interpolation (spline), and formulation	and solution of sin	nple optimization			
problems (i.e., the issue	of finding extrema of functions). The course is closed with the Landau's asymptotic notation and methods of mathematical desc	ription of complex	ity of algorithms.			
BI-MA2.21	Mathematical Analysis 2	Z,ZK	6			
The course completes	the theme of analysis of real functions of a real variable initiated in BIE-MA1 by introducing the Riemann integral. Students w	ill learn how to int	egrate by parts			
and use the substitution	n method.The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylor's theoren	n to the computation	on of elementary			
functions with a prescri	bed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms	, and its analysis	using the Master			
theorem. Finally, we into	roduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and	Hessian matrix, v	ve study the			
analytical method of loc	alization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the ir	ntegration of multiv	/ariate functions.			
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 techniq	ues. They get skills to practically handle functions of one variable in solving the problems in informatics. They understand the	links between the	integrals and			

Name of the block: Compulsory courses of the specialization

sums of sequences. They are able to estimate lower or upper bounds of values of real functions and to handle simple asymptotic expressions.

Minimal number of credits of the block: 26

The role of the block: PO

Code of the group: BI-PO-ZI.2018

Name of the group: Compulsory Courses of Bachelor Branch Knowledge Engineering, in Czech, Version

2018

Requirement credits in the group: In this group you have to gain 26 credits

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

Credits in the group: 26 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-BIG	DB Technologies for Big Data Josef Gattermayer, Monika Borkovcová, Barbora ervenková Josef Gattermayer Josef Gattermayer (Gar.)	KZ	4	2P+2C	Z	РО
BI-PJV	Programming in Java Jan Blizni enko, Filip Glazar, Miroslav Balík, Vojt ch Knaisl Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z	РО
BI-VWM	Searching the Web and Multimedia Databases Ji í Novák, Tomáš Skopal Michal Valenta Tomáš Skopal (Gar.)	Z,ZK	5	2P+1C	L	PO
BI-VZD	Data Mining Alexander Kovalenko, Karel Klouda, Daniel Vašata Alexander Kovalenko Pavel Kordík (Gar.)	Z,ZK	4	2P+2C	Z	РО
BI-ZUM	Artificial Intelligence Fundamentals Pavel Surynek Tomáš eho ek Pavel Surynek (Gar.)	Z,ZK	4	2P+2C	L	PO
BI-ZNS	Knowledge-based Systems Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	Z	РО

Characteristics of the courses of this group of Study Plan: Code=BI-PO-ZI.2018 Name=Compulsory Courses of Bachelor Branch Knowledge Engineering, in Czech, Version 2018

BI-BIG	DB Technologies for Big Data	KZ	4				
This course is presente							
BI-PJV	Programming in Java	Z,ZK	4				
The course is taught in	The course is taught in Czech.						
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 particular, students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from web pages. They get detailed knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web search engines for the mentioned data types (documents).

BI-VZD Data Mining

Students are introduced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, multidimensional data visualization, multidimensional data visualization,

statistical techniques of data transformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships between model bias and variance, and know the fundamentals of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic data mining tools to common problems (classification, regression, clustering).

BI-ZUM Artificial Intelligence Fundamentals 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-ZNS Knowledge-based Systems Z,ZK 5

Students will become familiar with the systems based on knowledge (knowledge-based systems), which are systems that usetechniques of artificial intelligence to solve problems that require human judgment, learning and reasoning from findingsand actions. The course introduces students to the philosophy and architecture of knowledge-based systems to support decision-makingand planning. The course assumes knowledge of set theory, probability theory, artificial neural networks, and evolutionary algorithms.

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

The role of the block: PE

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

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

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

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

Credits in the group: 4

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

individuálně podle pokynů z katedry Softwarového inženýrství.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-EMP	Economics and Management Principles David Buchtela, Petra Pavlí ková, Pavla Vozárová, Veronika Havazíková David Buchtela David Buchtela (Gar.)	KZ	4	2P+2C	Z,L	PE

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

BI-EMP Economics and Management Principles

readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.

ΚZ

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

Name of the block: Compulsory elective economic-management courses

Minimal number of credits of the block: 4

The role of the block: VE

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

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

Czech, Ver. 2015

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

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

Credits in the group: 4

Note on the group:

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 Michal Valenta 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 Pavla Vozárová (Gar.)	Z,ZK	5	2P+2C	L	VE
BI-MEK	Macroeconomic Context of Domestic and World Economy Ivo Straka Michal Valenta Ivo Straka (Gar.)	Z,ZK	4	2P+2C	Z	VE
BI-PRP	Law and business Zden k Ku era Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	VE
BI-PRR	Project management David Pešek Martin P Ipitel David Pešek (Gar.)	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 Pavla Vozárová Pavla Vozárová Pavla Vozárová (Gar.)	Z,ZK	4	2P+2C	Z	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

	mation, i rosentea in ozoon, von zoro							
BI-DAN	Taxes for non-Economists	Z,ZK	4					
Taxes, including social insurance contributions, are obligatory payments paid by people or institutions to public budgets. This is the way how a significant portion of GDP is redistributed.								
This course concerns w	This course concerns who pays which taxes or who bears the tax burden. The course introduces students to the tax theory and policy fundamentals and shows how they affect taxation							
of income, consumption	n, and wealth. The course provides practical information on calculations of tax liabilities of both citizens and institutions as wel	II as information a	bout important					
taxpayers' formal duties	s towards public administration.							
FI-VEZ	economic-managerial course from a study abroad	Z	4					
A "Humanities subject t	hat 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 appr	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 presente	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 presente	d in Czech.							
BI-PRP	Law and business	Z,ZK	4					
This course is presente	d in Czech.	, ,						
BI-PRR	Project management	KZ	4					
This course is presente		!						
BI-SEP	World Economy and Business	Z,ZK	4					
This course is presente	d in Czech. The course introduces students of technical university to the international business. It does that predominantly by	comparing indivi	dual countries					
and key regions of world	d economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as wel	Il as indexes of eco	onomic 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

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).

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 2 credits

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

Credits in the group: 2

Note on the group: Ze skupiny je nutné absolvovat jeden ze dvou předmětů, představujících interní zkoušku z angličtiny.

Předmět BI-ANG si zapisují studenti, kteří absolvovali přípravné kurzy z angličtiny a mají zápočet z předmětu BI-A2L. Předmět BI--ANG1 si zapisují studenti, kteří se na zkoušku připravovali samostatně.

Tito studenti musí před vlastní zkouškou absolvovat zápočtovou písemku.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-AZKE	English, an External Exam Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	ZK	2		L	PJ
BI-ANG1	English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová (Gar.)	Z,ZK	2		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-AZKE	English, an External Exam	ZK	2		
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2		
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.

NOTE OU THE	group.	and biney or an	00000			
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 Michal Valenta Peter Zamarovský (Gar.)	ZK	2	2P	Z,L	VH
BI-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	L	VH
FI-HTE	History of Technology and Economics Jan Mikeš, Marcela Efmertová 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, Marek Procházka Jan Fiala Jan Fiala (Gar.)	ZK	2	2+0	Z,L	VH
BI-EHD	Introduction to European Economic History Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	3	2P+1C	Z	VH
FI-KSA	Cultural and Social Anthropology Tomáš Houdek, Alena Libánská, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	L,Z	VH
BI-KSA	Cultural and Social Anthropology Tomáš Houdek, Alena Libánská, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	Z,L	VH
FI-ULI	Introduction to Linguistics for Computer Václav Cvr ek Michal Valenta Václav Cvr ek (Gar.)	ZK	2	2P	L	VH
FI-GNO	Introduction to Gnoseology Michal Valenta	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

Bachelor Stud	ly 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-	sented in Czech.		
FI-HTE	History of Technology and Economics	ZK	2
The course introdu	uces the scientific disciplines of history and technology, economic and social history of the Czech lands and Czechoslovakia in co	mparison with the	development of
the European regi	on 19 to 21 century .		
FI-HPZ	Humanities subject from a study abroad	Z	3
A "Humanities sub	ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module	that is required in th	he curriculum.
The substitution is	approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.		
FI-MPL	Managerial Psychology	ZK	2
BI-EHD	Introduction to European Economic History	Z,ZK	3
This course is pre-	sented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
FI-KSA	Cultural and Social Anthropology	ZK	2
The one-semester	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the dive	ersity of the world -	examples from
anthropological re	search from our "exotio" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, h	ealth, history, death	n, etc) will be
shown. The course	e is an interesting alternative to other humanities, taught at FIT.		
BI-KSA	Cultural and Social Anthropology	ZK	2
The one-semester	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the dive	ersity of the world -	examples from
anthropological re	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, h	ealth, history, death	n, etc) will be
shown. The course	e is presented in Czech.		
FI-ULI	Introduction to Linguistics for Computer	ZK	2
This course is pre-	sented in Czech.	•	

FI-GNO Introduction to Gnoseology

P edm t studenty uvádí do teorie poznání, systémovým pohledem nahlíží na pole kultury, na vztahy a rozdíly mezi p írodními a humánními obory, v dou a um ním. Rozborem d jin modernismu a myšlenkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní odhaleny mechanismy tv r ích proces . V návaznosti na teorii p írodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém p ehledu nastín na hlediska estetického vnímání. Samostatnou kapitolou jsou modely spojitých p írodních soustav a systém , v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje. P edm t p ednáší a garantuje Ing. Ivo Janoušek CSc.

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-ZI-VO.2017

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

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

Credits in the group: 0

Note on the group	o: Všechny povinné předměty obo	rů a zaměře	ní s výjir	mkou tol	hoto oboru	
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADU.1	Unix Administration Zden k Muziká , Jan Ž árek Zden k Muziká Zden k Muziká (Gar.)	Z,ZK	5	2P+2C	L	٧
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	٧
BI-AG2	Algorithms and Graphs 2 Dušan Knop, Šimon Schierreich, Ond ej Suchý Josef Kolá Ond ej Suchý (Gar.)	Z,ZK	5	2P+2C	L	V
BI-APS.1	Architectures of Computer Systems Pavel Tvrdík, Michal Štepanovský Ji í Dostál Pavel Tvrdík (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-BEK	Secure Code Josef Kokeš, Róbert Lórencz Róbert Lórencz Josef Kokeš (Gar.)	Z,ZK	5	2P+2C	L	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	٧
BI-JPO	Computer Units Pavel Kubalík, Alois Pluhá ek Alois Pluhá ek Pavel Kubalík (Gar.)	Z,ZK	5	2P+2C	Z	٧
BI-KOM	Conceptual Modelling Robert Pergl, Nikola Rytí ová, Marek Suchánek, Michal Valenta, Ond ej Král Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	z	V
BI-MGA	Multimedia and Graphics Applications Lukáš Ba inka, Jan Buriánek, Ji í Chludil Radek Richtr Jan Buriánek (Gar.)	Z,ZK	5	2P+2C	Z	٧
BI-OOP	Object-Oriented Programming Petr Máj, Filip K ikava, Ivo Strejc, Jan Sliacký Robert Pergl Filip K ikava (Gar.)	Z,ZK	4	2P+2C	Z	V
BI-PGR.1	Computer graphics programming Petr Felkel Petr Felkel (Gar.)	Z,ZK	5	2P+2C	L	٧
BI-PNO	Practical Digital Design Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	٧
BI-PRP	Law and business Zden k Ku era Zden k Ku era (Gar.)	Z,ZK	4	2P+1R	L	٧
BI-PJP	Programming Languages and Compilers Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	٧
BI-PPA	Programming Paradigms Jan Janoušek, Tomáš Pecka, Radomír Polách, Petr Máj, Jan Sliacký Radomír Polách Jan Janoušek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PGA	Programming of graphic applications Ji i Chludil, Radek Richtr Radek Richtr Radek Richtr (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PYT	Python Programming Michal Valenta	Z,ZK	4	2P+2C	L	٧
BI-SI2.3	Software Engineering 2 Martin Hlavatý Tomáš Krátký Martin Hlavatý (Gar.)	Z,ZK	3	2P	Z	٧
BI-SP1.21	Team Software Project 1 Ji i Mlejnek	KZ	5	2C	L	٧
BI-SP1	Team Software Project 1 Jan Baier, Ond ej Dvo ák, Josef Gattermayer, Filip Glazar, Ji í Hunka, Ji í Chludil, Jan Chrastina, Vojt ch Jirkovský, Stanislav Kuznetsov, Jan Baier Ji í Mlejnek (Gar.)	KZ	4	2C	L	V
BI-SP2	Team Software Project 2 Ji i Mlejnek	KZ	6	2C	Z	V

BI-SP2.1	Team Software Project 2 Filip Glazar, Ji í Hunka, Ji í Chludil, Jan Chrastina, Stanislav Kuznetsov, Ji í Mlejnek, Robert Pergl, Zden k Rybola, Marek Skotnica, Ji í Mlejnek Ji í Mlejnek (Gar.)	KZ	4	2C	Z	V
BI-SSB	System and Network Security Ji í Dostál Alexandru Moucha Ji í 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, Miloslav Ni Jan Mokrý Miloslav Ni (Gar.)	Z,ZK	4	2P+2C	L	V
BI-TIS	Information Systems Design Pavel Náplava Michal Valenta Pavel Náplava (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-TUR	User Interface Design Jan Schmidt Tomáš Zahradnický Jan Schmidt (Gar.)	Z,ZK	4	2P+2C	L	V
BI-TWA.1	Web Application Design David Bernhauer, Filip Glazar Tomáš Kadlec David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-VES	Embedded Systems Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	L	V
BI-ZRS	Basics of System Control Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	4	2P+2C	Z	V

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

BI-PRP This course is presente	Law and business ed in Czech.	Z,ZK	4
BI-ADU.1	Unix Administration	Z,ZK	5

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

BI-ADW.1	Windows Administration	Z,ZK	4	
This course is presente	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		· 	
BI-AG2	Algorithms and Graphs 2	7.7K	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.

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

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

BI-BEK | Secure Code | Z,ZK | 5

The students will learn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting familiar with the threat modeling theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every program needs to run with administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing data and the relationships of security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the defense against them.

BI-HWB Hardware Security Z,ZK 5

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

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 Z,ZK 5

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

BI-MGA Multimedia and Graphics Applications Z,ZK 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-OOP Object-Oriented Programming Z,ZK 4

Students will learn the pure object-oriented paradigm, being a tool for effective implementation of quality, evolvable business software systems. They will understand fundamentals and they will learn how to apply it for solving typical implementation tasks. Students will learn syntax and programming fundamentals of a pure OO open-source technology Pharo. Various other modern programming languages utilising the OO concepts will be introduced in the subject, as well.

BI-PGR.1	Computer graphics programming	Z,ZK	5
Students are able to pro	gram a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add to	extures imitating g	eometric details
,	surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in		
	netric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid f		-
	PU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surface.		
BI-PNO	Practical Digital Design w of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the	KZ	5
-	thologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the module project sing modern,		
tools.	intelligible 11 6.7 and 7.676. Stadente demonstrate producti dee of the design continiques in the module project only modern,	madelly claridata	or to doorgin
	Programming Languages and Compilers	Z,ZK	5
	nethods of implementation of common high-level programming languages. They get experience with the design and implemen		_
for a simple programmir	ng language: data types, subroutines, and data abstractions. Students are able to formally specify a translation of a text that h	as a certain synta	ax into a target
•	er based on such a specification. The notion of compiler in this context is not limited to compilers of programming languages,	but extends to all	other programs
	ing text in a language defined by a LL(1) grammar.		
BI-PPA	Programming Paradigms	Z,ZK	5
	asic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of part		
	and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern main		
such as C++ and Java.	on Esp (Nacion) and 1 rolog programming languages. Moreover, asage of these principles is demonstrated of modern main	stream programm	iiig ianguages
BI-PGA	Programming of graphic applications	Z,ZK	5
This course is presented		_,	
BI-PYT	Python Programming	Z,ZK	4
The course is taught in	, · · · · · · · · · · · · · · · · · · ·	, 1	
BI-SI2.3	Software Engineering 2	Z,ZK	3
This course is presented	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	,	
BI-SP1.21	Team Software Project 1	KZ	5
-	experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the		
	aches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The tea		
	consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software	artefact will be fur	rther developed
and finished in the BIE-	· · · · · · · · · · · · · · · · · · ·	1/7	4
BI-SP1	Team Software Project 1 experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided by the	KZ KZ	4
-	aches the necessary techniques and theory. Teams consisting of 4-6 students will work on a specific project. The teacher, in t		
=	is with the team (at the seminars) with respect to both the formal and material aspects of the design. The resulting work will b		
in the BEI-SP2 course.			
BI-SP2	Team Software Project 2	KZ	6
Students gain hands-on	experience with the iterative development process while working on a large-scale software project. The first iteration is the res	ult of the BEI-SP1	l course project.
	functionality, testing and documenting of the system being developed will be emphasized. Students will work in teams of 4-6 p	-	
	ader, regularly consults with the team (at the seminars) with regard to the formal as well as material aspects of their solution.		se that runs
	e the students with supporting knowledge, especially in the area of teamwork, testing and quality assurance of the software p		
BI-SP2.1	Team Software Project 2 d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	KZ	4
BI-SSB	System and Network Security	Z,ZK	5
	on selected areas of computer networks and computer systems in terms of cyber security	2,21	3
BI-SRC	Real-time systems	KZ	4
	ic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues. Thereticla		
	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 an	d FPGA.		
BI-XML	XML Technology	Z,ZK	4
	and validate XML documents (XML Schema, Relax, Schematron) and learn standard methods of their processing (SAX, DO		~ I
	enables addressing of parts of XML documents and its usage in different XML technologies. Students will also learn basics of	XSLT programmi	ing. XSLT and
	be based on version 2.0. Students will gain a broad overview of XML technologies.	7.71	
BI-TIS	Information Systems Design Types of ISs and their practical implementation aspects and are able to match the needs of different market segments (custon	Z,ZK	5
	s, programming languages, GUI etc.).	ners) with applica	lions of existing
BI-TUR	User Interface Design	Z,ZK	4
	poser interface Design everview of the methods for designing and testing common user interfaces. They have experience to solve the problems wher		-
	ne user optimally, since the needs and characteristics of users are not taken into account during product development. Students		•
	development process to ensure optimal communication with a user.		
BI-TWA.1	Web Application Design	Z,ZK	5
The basic course of web	o application development. Initially, the students become familiar with HTTP and its possibilities and partly with some properti		escribing the
. , , .	resentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications		
	te the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfo	ony 2, Doctrine 2.	Developments
	edemonstrated using a JavaScript language with library jQuery and possibly MV* framework AngularJS.	7 71/	
BI-VES	Embedded Systems embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embe	Z,ZK	5
	rempedued systems and develop sortware for them. They get basic knowledge of the most common microcontrollers and embe remping methods, and applications. They get practical skills with development kits and tools.	aded processors	, wien miegraieu

BI-ZRS Basics of System Control

Z,ZK

4

The course gives an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focus our attention particularly on control of engineering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description methods of system models, basic linear dynamic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creating a description of the system model, the basic linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also given to sensors and actuators in control loops, issues of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial implementation of continuous and digital controllers and PLC control.

Code of the group: BI-V-PRO_MG

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

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

Credits in the group: 0

Note on the group:

Courses in this group are recommended for students who intend to enroll to master

program at FIT.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role	
BI-AG2	Algorithms and Graphs 2 Dušan Knop, Šimon Schierreich, Ond ej Suchý Josef Kolá Ond ej Suchý (Gar.)	Z,ZK	5	2P+2C	L	V	

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

BI-AG2 | Algorithms and Graphs 2 | Z,ZK | 5

This course, presented in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsory course BI-AG1. It further delves into advances data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English version of the course see BIE-AG2.

Code of the group: BI-V.2017

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

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

Credits in the group: 0

Note on the group: Volitelné předměty, které nejsou povinnými v programu ani žádného oboru či

zaměření

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ALO	Algebra and Logic Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era Lud k Ku era (Gar.)	Z,ZK	4	2P+1C	L	٧
BI-A2L	English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	L	V
BI-A0Z	English Language 0-1 Kate ina Valentová (Gar.)	Z	0	2C	Z	V
BI-A0L	English Language 0-2 Kate ina Valentová Kate ina Valentová (Gar.)	Z	0	2C	L	V
BI-A1Z	English Language 1-1 Kate ina Valentová (Gar.)	Z	0	2C	Z	٧
BI-A1L	English Language 1-2 Kate ina Valentová Kate ina Valentová (Gar.)	Z	0	2C	L	٧
BI-A2Z	English Language 2-1 Kate ina Valentová (Gar.)	Z	0	2C	Z	V
BI-APJ	Aplication Programming in Java Michal Valenta	Z,ZK	4	2P+1R+1C	Z	V
MI-AFP	Applied Functional Programming Robert Pergl, Marek Suchánek, Jan Slifka Robert Pergl Robert Pergl (Gar.)	KZ	5	2P+1C	L	V
BIE-ZUM	Artificial Intelligence Fundamentals Pavel Surynek Tomáš eho ek Pavel Surynek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-BLE	Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.)	Z,ZK	4	2P+2C	L	V
MI-DSP	Database Systems in Practes Ond ej Zýka Michal Valenta Ond ej Zýka (Gar.)	Z,ZK	4	2P+1C	L	V
BI-STO	Storage and Filesystems Ji í Kašpar Tomáš Zahradnický Ji í Kašpar (Gar.)	Z,ZK	4	2P+2C	L,Z	V

MI-DZO	Digital Image Processing Daniel Sýkora Daniel Sýkora (Gar.)	Z,ZK	4	2P+1C	L	V
NI-DZO	Digital Image Processing Daniel Sýkora Daniel Sýkora (Gar.)	Z,ZK	4	2P+1C	L	V
NI-DDM	Distributed Data Mining Tomáš Borovi ka, Ond ej Stuchlík Tomáš Borovi ka Tomáš Borovi ka (Gar.)	KZ	4	3C	L	V
MI-DDM	Distributed Data Mining Tomáš Borovi ka	KZ	4	3C	L	V
BI-EP1	Effective programming 1 Martin Ka er Martin Ka er (Gar.)	Z	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-EJA	Enterprise Java Ji í Dan ek Zden k Troní ek Ji í Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-EHA	Ethical Hacking Ji í Dostál, Martin Kolárik, Tomáš Dvo á ek Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	V
BI-FMU	Financial and Management Accounting David Buchtela David Buchtela (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-HAM	HW accelerated network traffic monitoring Tomáš ejka Tomáš ejka Tomáš ejka (Gar.)	KZ	4	2P+1C	L	V
BI-HMI	History of Mathematics and Informatics Alena Solcová Alena Solcová (Gar.)	Z,ZK	3	2P+1C	L	V
BI-ARD	Interactive applications on Arduino Ji í Cvr ek, Robert Hülle, Libor Kucha, Vojt ch Miškovský Robert Hülle Robert Hülle (Gar.)	KZ	4	3C	L	V
NI-IAM	Internet and Multimedia Sven Ubik, Ji í Melnikov Ji í Melnikov Sven Ubik (Gar.)	Z,ZK	4	2P+1C	L	V
BIE-IMA2	Introduction to Mathematics 2 Karel Klouda	Z	2	1C	Z	V
BI-CS2	C# language and data access Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	0P+3C	Z	V
BI-CS3	Language C# - design of web applications Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	3C	Z	V
BI-SQL.1	Language SQL, advanced Michal Valenta Michal Valenta (Gar.)	KZ	4	3C	L	V
BI-QAP	Quantum algorithms and programming	KZ	5	1P+2C	Z	V
NI-LSM	Statistical Modelling Lab Kamil Dedecius Karel Klouda Kamil Dedecius (Gar.)	KZ	5	3C	L	V
NI-MPL	Managerial Psychology Jan Fiala Jan Fiala (Gar.)	ZK	2	2P	Z,L	V
MI-MSI	Mathematical Structures in Computer Science Jan Starý	Z,ZK	4	2P+1C	L	V
NI-MSI	Mathematical Structures in Computer Science Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-MPP	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	Z	V
BI-MIT	Mikrotik technologies Jan Fesl Jan Fesl (Gar.)	KZ	3	1P+2C	Z	V
NI-MOP	Modern Object-Oriented Programming in Pharo Jan Blizni enko, Robert Pergl, Marek Skotnica Robert Pergl Marek Skotnica (Gar.)	KZ	4	3C	Z	V
BI-MVT.21	Modern Visualisation Technologies Petr Pauš	Z,ZK	5	2P+2C	Z	V
BI-MMP	Multimedia team project Zde ka echová Michal Valenta Zde ka echová (Gar.)	KZ	4	3C	L	V
NI-OLI	Computer Engineering Seminar Master II Miroslav Skrbek Jaroslav Borecký Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	L	V
MI-OLI	Linux Drivers Miroslav Skrbek Martin Da hel Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ACM	Programming Practices 1 Václav Blažej, Ond ej Suchý, Tomáš Valla Ivan Šime ek Tomáš Valla (Gar.)	KZ	5	4C	L	V
BI-ACM2	Programming Practices 2 Václav Blažej, Jan Matyáš K iš an, Ond ej Suchý, Tomáš Valla Ivan Šime ek Tomáš Valla (Gar.)	KZ	5	4C	Z	V
BI-ACM3	Programming Practices 3 Václav Blažej, Jan Matyáš K iš an, Ond ej Suchý, Tomáš Valla Ivan Šime ek Tomáš Valla (Gar.)	KZ	5	4C	L	V
BI-ACM4	Programming Practices 4 Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	Z	V
BI-AND	Programming for the Android Operating System Ond ej ermák, Michal Havryluk, Vladislav Skoumal, David Bilík Michal Havryluk Michal Havryluk (Gar.)	Z,ZK	4	2P+2C	L	V
BI-CS1	Programming in C# Pavel Št pán, Helena Wallenfelsová Helena Wallenfelsová Pavel Št pán (Gar.)	KZ	4	3C	L,Z	V

D. D. W.	Programming in Java	7.71		00.00	_	
BI-PJV	Jan Blizni enko, Filip Glazar, Miroslav Balík, Vojt ch Knaisl Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z	V
BI-PJS.1	JavaScript Programming Old ich Malec, Nikita Mironov Vojt ch Jirkovský Nikita Mironov (Gar.)	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
MI-PSL	Programming in Scala Ji í Dan ek Michal Valenta Ji í Dan ek (Gar.)	Z,ZK	4	2P+1C	L	V
BI-PMA	Programming in Mathematica Zden k Buk Zden k Buk (Gar.)	Z,ZK	4	2P+2C	Z	V
BI-PHP.1	Programing in PHP Old ich Malec, Marek Erben Tomáš Kadlec Old ich Malec (Gar.)	KZ	4	3C	Z	V
MI-PDD.16	Data Preprocessing Marcel Ji ina Daniel Vašata Marcel Ji ina (Gar.)	Z,ZK	5	2P+1C	Z	V
NI-PDD	Data Preprocessing Marcel Ji ina Daniel Vašata Marcel Ji ina (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-PKM	Introduction to mathematics Karel Klouda Karel Klouda (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
MI-REV.16	Reverse Engineering	Z,ZK	5	1P+2C	Z	V
DI SOE4	Josef Kokeš Tomáš Zahradnický Josef Kokeš (Gar.) Computer Engineering Seminar I	7	1	20	1.7	.,,
BI-SCE1	Hana Kubátová, Martin Novotný, Miroslav Skrbek Miroslav Skrbek Hana Kubátová (Gar.)	Z	4	2C	L,Z	V
BI-SCE2	Computer Engineering Seminar II Hana Kubátová, Martin Novotný Miroslav Skrbek 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 Pavel Cimbál Pavel Cimbál Pavel Cimbál (Gar.)	Z,ZK	4	2P+2C	L	V
BI-SVZ	Machine vision and image processing Marcel Ji ina, Jakub Novák Jakub Novák Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	Z	V
MI-SYP.16	Parsing and Compilers Jan Janoušek, Bo ivoj Melichar Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	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 Robin Ob rka, Petr Pulc Petr Pulc (Gar.)	KZ	2	16P	Z,L	V
BI-TS1	Theoretical Seminar I	Z	4	2C	Z	V
BI-TS2	Ond ej Suchý, Tomáš Valla Jan Janoušek Tomáš Valla (Gar.) Theoretical Seminar II	Z	4	2C	L	V
BI-TS3	Ond ej Suchý, Tomáš Valla Tomáš Valla (Gar.) Theoretical Seminar III	Z	4	2C	Z	V
BI-TS4	Tomáš Valla Tomáš Valla (Gar.) Theoretical Seminar IV	 Z	4	2C	L	V
BI-TDA	Ond ej Suchý, Tomáš Valla Jan Janoušek Tomáš Valla (Gar.) Test driven architecture	KZ	4	2P+1C	Z,L	V
NI-TSP	Marek Hakala Testing and Reliability	Z,ZK	5	2P+2C	Z	V
-	Petr Fišer Martin Da hel Petr Fišer (Gar.) Testing and Reliability	·				
MI-TSP.16	Petr Fišer TeX and Typography	Z,ZK	5	2P+2C	Z	V
BI-TEX	Petr Olšák Petr Olšák Petr Olšák (Gar.) Introduction to Linux	Z,ZK	4	2P+1C	L	V
BI-ULI	Zden k Muziká, Jan Ž árek, Dana ermáková Zden k Muziká Zden k Muziká (Gar.)	Z	2		Z	V
BI-OPT	Introduction to Optical Networks Pavel Tvrdík Jan Radil Pavel Tvrdík (Gar.)	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	KZ	3	1P+2C	Z,L	V

BI-VMM	Selected Mathematical Methods Tomáš Kalvoda František Štampach Tomáš Kalvoda (Gar.)	Z,ZK	4	2P+2C	L	V
MI-VYC	Computability Jan Starý Jan Štarý Jan Starý (Gar.)	Z,ZK	4	2P+2C	L	V
NI-VYC	Computability Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ZS10	Bachelor internship abroad for 10 credits Miroslav Balík Zden k Muziká (Gar.)	Z	10		Z,L	V
BI-ZS20	Bachelor internship abroad for 20 credits Miroslav Balík Zden k Muziká (Gar.)	Z	20		Z,L	V
BI-ZS30	Bachelor internship abroad for 30 credits Miroslav Balík Zden k Muziká (Gar.)	Z	30		Z,L	V
BI-ZIVS	Intelligent Embedded System Fundamentals Miroslav Skrbek Miroslav Skrbek (Gar.)	KZ	4	1P+3C	Z	V
BI-ZPI	Process engineering Robert Pergl Robert Pergl Robert Pergl (Gar.)	KZ	4	1P+2C	L	V
BI-ZNF	PHP Framework Nette - basics Ji í Chludil	KZ	3	2P+1C	L	٧
BI-ZRS	Basics of System Control Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	4	2P+2C	Z	٧
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad Martin P Ipitel, Dominik Veselý Jakub Hladík Martin P Ipitel (Gar.)	KZ	4	2C	Z	V
BI-ZWU	Introduction to Web and User Interfaces Lukáš Ba inka Ji í Pavelka Jakub Klímek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-3DT.1	3D Printing Marián Hlavá , Miroslav Hron ok, Tomáš Sýkora Marek Žehra Miroslav Hron ok (Gar.)	KZ	4	3C	L	V

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

BI-PJV	Programming in Java	Z,ZK	4		
The course is taught in	Czech.				
BI-HMI	History of Mathematics and Informatics	Z,ZK	3		
This course is presented in Czech.					
BI-ZRS	Basics of System Control	Z,ZK	4		

The course gives an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focus our attention particularly on control of engineering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description methods of system models, basic linear dynamic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creating a description of the system model, the basic linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also given to sensors and actuators in control loops, issues of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial implementation of continuous and digital controllers and PLC control.

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

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-A0Z	English Language 0-1	Z	0
BI-A0L	English Language 0-2	Z	0
BI-A1Z	English Language 1-1	Z	0
BI-A1L	English Language 1-2	Z	0

This course is opened in every summer semester. It is designed for students attending the bachelor degree programme, whose language knowledge and skills are on a pre-intermediate or intermediate level. Students enroll on this course predominantly in 1st, eventually 2nd or 3rd year of study. The output level of this course corresponds to Level B1 within the Common European Framework of Reference for Languages (CEFR). On completion of this course students are supposed to enroll on the course BI-A2Z in the following winter semester and then on BI-A2L in the following summer semester, followed by a compulsory examination on Level B2 within CEFR. To choose the right course level the student should consider how many semesters he/she needs to prepare for the examination properly. Course objective: The course focuses on practising basic grammar issues (morphology including the entire tense system; basic sentence constructions) and building communicative skills applied to both everyday and professional topics.

BI-A2Z	English Language 2-1	Z	0				
BI-APJ	Aplication Programming in Java	Z,ZK	4				
This course is presented in Czech. Advanced technologies in Java.							
MI-AFP	Applied Functional Programming	KZ	5				

This course is prezented 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

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.

Z,ZK

BI-BLE The course extends knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those interested in 3D graphics and animation. It offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graphics applications) course. MI-DSP Database Systems in Practes BI-STO Storage and Filesystems BI-STO The student will learn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archiving, as so as storage scaling load balancing and high availability. MI-DZO Digital Image Processing This course presents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical algorithms that are both easy to digital image processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR compression, de-blurring in frequency domain, abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray conversion, context enhancement interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, adding depth, alpha matting. NI-DZO Digital Image Processing A,ZK 4 The student will learn principles of data store, protection, and archiving, as so as storage scaling leads with practical algorithms that are both easy to digital image processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR compression, context enhancement interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, adding depth, alpha matting. NI-DZO Digital Image Processing This course will introduce algorithms solving the followin
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interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, adding depth, alpha matting.
NI-DDM Distributed Data Mining KZ 4
Course focuses on state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands on experience with large scale data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations and will be capable to propose
approaches to parallelize other algorithms. The course is prezented in czech language.
MI-DDM Distributed Data Mining KZ 4
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data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations and will be capable to propose
approaches to parallelize other algorithms. The course is prezented in czech language. BI-EP1 Effective programming 1 Z 4
The course is taught in Czech.
BI-EP2 Efficient Programming 2 KZ 4
Continuation of Efficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving individual problems are discussed,
with the aim to choose the best one and avoid implementation errors. BI-EJA Enterprise Java Z,ZK 4
BI-EJA Enterprise Java Z,ZK 4 The course is on advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information systems which are connected to
a database and are accessed through the web interface.
BI-EHA Ethical Hacking Z,ZK 5
The course gives a professional and academic introduction to computer and information security using the ethical hacking approach, which enables improved defence thanks to adoptin an attacker mindset when discovering vulnerabilities, hands-on experience with different attacks, facilitates linking theory and practice in significant areas of one's digital literacy, and
can therefore be utilized by (future) security professionals, (informed) decision-makers, (savvy) users and developers alike. This course is taught in English.
BI-FMU Financial and Management Accounting Z,ZK 5
The aim of the course is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the particular accounting operations
operations in accounts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modification of bookkeeping, description of economic operations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of management accounting are base of
Business Inteligence moduls in Business information systems.
BI-HAM HW accelerated network traffic monitoring KZ 4
This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The monitoring and analysis of
network traffic are mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a source of information and data for analysis). The goals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traffic on a hardware and software
level and to develop their practical abilities in this field.
BI-ARD Interactive applications on Arduino KZ 4
The subject is designed for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applications for modern programmable like and exercise will be a subject in the above specific to above specific to above specific to a programmable with both of subject in the specific to above specific to a programmable with both of subject in the specific to a programmable with both of subject in the specific to a programmable with programmable with both of subject in the specific to a programmable with programmable with both of subject in the specific to a programmable with programmabl
kits and control varied peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded systems, i.e. to see the results not only on display of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore is suitable even for Web and
Software Engineering students.
NI-IAM Internet and Multimedia Z,ZK 4
The NI-IAM course is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acquisition of AV signals (input),
presentation of AV signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical use case scenarios of real-tim audiovisual transmissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effect of various components on
the quality and latency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the scene up to the presentation
for audience.
BIE-IMA2 Introduction to Mathematics 2 Z 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
PROPERTY IN THE PARTY AND THE PROPERTY INTO DOTA AND THE BUT DISTRICT OF THE PARTY
examples.
examples. BI-CS2 C# language and data access The C# language and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Microsoft platform. The students will
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examples. BI-CS2

BI-CS3 Language C# - design of web applications	KZ	4
The students will be introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive on thisplatform. They will learn to create WebAPI and to use it by client programs.	overview of the developm	nent possibilities
BI-SQL.1 Language SQL, advanced	KZ	4
Module is based on knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL lang	l l	· ·
triggers, recursive queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from		
structures like indexes, clusters, index-organized tables, and materialized views, as well as from the point of view query optimization. Execution will be discussed by a transfer of the point of view query optimization.		- 1
will be discussed. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based PostgreSQL.	on Oracle DBMS and pa	artially on
BI-QAP Quantum algorithms and programming	KZ	5
Course aims at giving students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum me	1 1	
are based, and algorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software	e development kit Qiskit,	which is based
on Python language. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 of the proof of the pro	or BI-VMM and experience	e with Python
might be an advantage. No previous knowledge of physics is assumed. NI-LSM Statistical Modelling Lab	KZ	5
The subject is oriented on a low-level approach to Bayesian statistical and information-theoretical modelling, where the student both learns the	1	-
Kalman filtering, models fusion, etc.) and tries to implement them. That is, instead of the (standard) intensive use of high-level libraries like pa		
stress is put on the use of numpy and scipy, as well as the low-level algebra and calculus. The second half of the semester is focused on the	_	lgorithms, and
analyses of their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or backets)		
NI-MPL Managerial Psychology	ZK	2
Students will get acquainted with the basic psychological basis for managerial practice and personnel management. They will understand the bast the importance of the manager's personality, his internal attitudes, behavior, interaction and communication. They will get acquainted with theori	=	
cognitive and affective processes. Selected techniques will be practiced during practical exercises. The knowledge acquired in the course can	, ,	
everyday life.		-
MI-MSI Mathematical Structures in Computer Science	Z,ZK	4
Mathematical semantics of programming languages.		
NI-MSI Mathematical Structures in Computer Science	Z,ZK	4
Mathematical semantics of programming languages.	Z.ZK	4
BI-MPP Methods of interfacing peripheral devices The course is focused on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based or	1 / 1	•
includes both PC side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant pa	·	
drivers, simple application development, and APIs of selected devices.		
BI-MIT Mikrotik technologies	KZ	3
The main motivation of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which		
middle internet service providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary or	•	
and technologies of the data-link, network and transport layer of the OSI model.	ompater networks concep	pto like protocolo
NI-MOP Modern Object-Oriented Programming in Pharo	KZ	4
Object-oriented programming is currently one of the most widespread paradigms of software creation, especially enterprise information system	•	
is used to build complex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deeper	•	
of object systems in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses of individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students, their development of the course focuses on individual approach to students of the course focuses of the course focus of the cou		
technologies in terms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our directions of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our directions of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our directions of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our directions of the properties of t	,	•
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		
high resolution displays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the	e mentioned technologies	s, namely fractal
and procedural visualization, scientific data visualization, and 3D model scanning.	1/7	
BI-MMP Multimedia team project This course is presented in Czech.	KZ	4
NI-OLI Computer Engineering Seminar Master II	Z,ZK	4
The Linux operating system is an important operating system for personal computer and also for embedded systems. Systems on chip and contact the contact in		
increase the variability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver dev		
course provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practical expensions.		
MI-OLI Linux Drivers	Z,ZK	4
The Linux operating system is an important operating system for personal computer and also for embedded systems. Systems on chip and colling repositions the provided the provided systems of the provided systems of the provided systems.		
increase the variability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver dev course provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practical exp	•	udents. The
BI-ACM Programming Practices 1	KZ	5
This course is presented in Czech.		
BI-ACM2 Programming Practices 2	KZ	5
This course is presented in Czech.		
BI-ACM3 Programming Practices 3	KZ	5
This course is presented in Czech.	1/7	
BI-ACM4 Programming Practices 4	KZ	5
This course is presented in Czech. BI-AND Programming for the Android Operating System	Z,ZK	4
This course is presented in Czech.	∠,∠ſ\	• •
BI-CS1 Programming in C#	KZ	4
The goal of the course is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its funda-		· ·
operators, arrays, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - c		٠. ا
constructors, methods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. D	Debugging and exception	processing, as
well as work with files are emphasized.		

BI-PJS.1	JavaScript Programming	KZ	4
•	is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases developmen	•	
	nts of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for	or this course in th	eir 4th semester
of study. BI-KOT	Dragraming in Katlin	7 71/	4
	Programing in Kotlin cally-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of adv	Z,ZK	
	va compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of		
	plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).		
MI-PSL	Programming in Scala	Z,ZK	4
The course introduces t	he modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature	ures - e.g.pattern	matching and
· ·	y. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks	and libraries e.g. F	Play, Cassandra,
Scalaz, etc.			
BI-PMA	Programming in Mathematica	Z,ZK	4
•	g with modern technical and scientific software. Students will learn how to use different programming styles (functional progra amic interactive applications and visualisations, data processing and presentations.	mining, rule-base	ed programming,
BI-PHP.1	Programing in PHP	KZ	4
	Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a	ı	•
	e course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register		
register for this course in	n their 3rd semester of study.		
MI-PDD.16	Data Preprocessing	Z,ZK	5
	re raw data for further processing and analysis. They learn what algorithms can be used to extract parameters from various data		-
	arn the skills to apply these theoretical concepts to solve a specific problem in individual projects - e.g., parameter extraction		
NI-PDD Students learn to propa	Data Preprocessing re row data for further processing and analysis. They learn what algorithms can be used to extract information from various data.	Z,ZK	5 images toyte
	re raw data for further processing and analysis.They learn what algorithms can be used to extract information from various dat arn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of character		-
pages.	anti tilo ottilo to appri, tilogo tilogotto contogno to conto aposilio prosionio il matriada projecto i cigi, oxtaction di citaliacion	ionoo iroin imago	o or nom wos
BI-PKM	Introduction to mathematics	Z	4
This course is presented	d in Czech.	'	
NI-REV	Reverse Engineering	Z,ZK	5
	nted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens l		
	inderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is ded		• •
• •	C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be doing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compute	-	, ,
	nings, where students will solve practically oriented tasks from the real world.	si maiware scene	e. The locus of
MI-REV.16	Reverse Engineering	Z,ZK	5
Students will get acquai	inted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens l		he main function
is called. Students will u	inderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is ded	icated to reverse	engineering of
	C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be disassemblers and obfuscation techniques.	•	, ,
	ing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the computeninars, where students will solve practically oriented tasks from the real world.	er malware scene	e. The focus of
BI-SCE1	Computer Engineering Seminar I	Z	4
	er Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistanc	_	
·	ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of t		
	ssional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teach		
semester.			
BI-SCE2	Computer Engineering Seminar II	Z	4
	er Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance.		
	ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of t ssional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teac		
semester.	solution motitate and of work in the transfer of the capacity of the caspet to infinite a sy the pecchanics of the confinite teach	nord. The topico t	are new ior 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 acredite	d under the Cisc	o Netacad -
CCNA1 - R&S Intro	oduction to Networks.		
BI-ST2	Network Technology 2	Z	3
This course is presented		_	
BI-ST3	Network Technology 3	Z	3
	nance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented durin the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, prec	_	
simple topology, security		inclability, exterisi	on beyond a
BI-ST4	Network Technology 4	Z	3
	nance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switchin	_	_
	her extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased effi		- 1
	gy, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completel		
· · ·	ess) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and switch		
recoveries, and emerge network running.	ncy procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigate.	ation ways while r	naintaining the
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	riviacinine Otherited Languages will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optima	, ,	
	n of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view	· · · · · · · · · · · · · · · · · · ·	
This knowledge will be u	used during reverse engineering, optimization, and evaluation of code security.		-

BI-SVZ Machine vision and image processing	Z,ZK	5
Camera systems are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluat 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.	use of carriera sys	sterns for solving
MI-SYP.16 Parsing and Compilers	Z,ZK	5
The module builds upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge	of various variants	and applications
of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.	7.71/	-
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 of	Z,ZK	5 and applications
of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.	or various variants	and applications
BI-GIT Version control system GIT	KZ	2
Students will be introduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pr		articular system
even the implementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git serve		4
BI-TS1 Theoretical Seminar I Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	Ssical reading gro	4 up The students
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		-
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS2 Theoretical Seminar II	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	0.0	•
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	3 a Work Will 3010	nune papers and
BI-TS3 Theoretical Seminar III	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla		-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	s a work with scie	ntific papers and
BI-TS4 Theoretical Seminar IV	7	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	_	•
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	s a work with scie	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	147	
BI-TDA Test driven architecture The course is focused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that	KZ	the DevOns
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		
NI-TSP Testing and Reliability	Z,ZK	5
Students will gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to		· ·
the intuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with		
	i bulit-iri-seli-test t	equipment. They
will be able to compute, analyze, and control the reliability and availability of the designed circuits.		
	Z,ZK	5
will be able to compute, analyze, and control the reliability and availability of the designed circuits. MI-TSP.16 Testing and Reliability Students gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preprintuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built	Z,ZK pare a test set with	5 n the help of the
will be able to compute, analyze, and control the reliability and availability of the designed circuits. MI-TSP.16 Testing and Reliability Students gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preprintuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built be able to analyze and control reliability and availability of the designed circuits.	Z,ZK pare a test set with t-in-self-test equip	5 n the help of the ment. They will
will be able to compute, analyze, and control the reliability and availability of the designed circuits. MI-TSP.16 Testing and Reliability Students gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preprintuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built be able to analyze and control reliability and availability of the designed circuits. BI-TEX TeX and Typography	Z,ZK pare a test set with t-in-self-test equip	5 n the help of the ment. They will
will be able to compute, analyze, and control the reliability and availability of the designed circuits. MI-TSP.16 Testing and Reliability Students gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to preprintuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built be able to analyze and control reliability and availability of the designed circuits.	Z,ZK pare a test set with t-in-self-test equip	5 n the help of the ment. They will
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BI-VMM	Selected Mathematical Methods	Z.ZK	4
	ometric properties of linear spaces with inner product. Next, we introduce and analyze the discrete Fourier transform (DFT) an	1 '	· •
	differential calculus of functions involving multiple variables. We present methods for the localization of extreme values of functions	•	, ,
	and quadratic forms. In addition, we introduce the least square method. The last part of the course is devoted to optimization at		
•	od is analyzed in more detail.	•	
MI-VYC	Computability	Z,ZK	4
Classical theory of red	cursive functions and effective computability.		
NI-VYC	Computability	Z,ZK	4
Classical theory of red	cursive functions and effective computability.		
BI-ZS10	Bachelor internship abroad for 10 credits	Z	10
Each student can onc	e within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institution	n. Before the
•	f the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional		
	purses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits	•	
	reign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided	d into two subjects	if the internship
exceeds the academic	<u>:</u>		
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
	e within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or		
•	f the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content. The student must provide evidence of the professional content. The student must provide evidence of the professional content. The student must provide evidence of the professional content.		
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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-A0L	English Language 0-2	Z	0
BI-A0Z	English Language 0-1	Z	0
BI-A1L	English Language 1-2	Z	0
This course is open	ed in every summer semester. It is designed for students attending the bachelor degree programme, whose language knowledge and	skills are on a pre-i	ntermediate

In scourse is opened in every summer semester. It is designed for students attending the bachelor degree programme, whose language knowledge and skills are on a pre-intermediate or intermediate level. Students enroll on this course predominantly in 1st, eventually 2nd or 3rd year of study. The output level of this course corresponds to Level B1 within the Common European Framework of Reference for Languages (CEFR). On completion of this course students are supposed to enroll on the course BI-A2Z in the following winter semester and then on BI-A2L in the following summer semester, followed by a compulsory examination on Level B2 within CEFR. To choose the right course level the student should consider how many semesters he/she needs to prepare for the examination properly. Course objective: The course focuses on practising basic grammar issues (morphology including the entire tense system; basic sentence constructions) and building communicative skills applied to both everyday and professional topics.

BI-A1Z	English Language 1-1	Z	0
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.

	class of the term.		
BI-A2Z	English Language 2-1	Z	0

DI AAO	A 10	7 71/	
BI-AAG	Automata and Grammars	Z,ZK	6
Students are introd	uced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite:	automata, regular	expressions
and regular gramma	ars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, Relationships between foi	mal languages an	d automata.
Knowledge acquir	ed through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation,	and design of digi	tal circuits.
BI-ACM	Programming Practices 1	KZ	5
2.7.0	This course is presented in Czech.		1
DI AOMO		1/7	_
BI-ACM2	Programming Practices 2	KZ	5
	This course is presented in Czech.		
BI-ACM3	Programming Practices 3	KZ	5
'	This course is presented in Czech.		'
BI-ACM4	Programming Practices 4	KZ	5
DI-ACIVI4		NΖ	5
	This course is presented in Czech.		
BI-ADU.1	Unix Administration	Z,ZK	5
Students will learn t	he internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They	will understand the	differences
between user and a	administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights,	file systems, disk s	subsystems.
	ry, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the known of the control of		=
proceduce, mome	specific examples from practice.	moago nom mo n	ootaroo orr
DI ADIMA		7.71/	
BI-ADW.1	Windows Administration	Z,ZK	4
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-AG1	Algorithms and Graphs 1	Z,ZK	6
- 1	s the basics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing	•	_
	BIE-AAG and BIE-ZDM courses in which the students gain the basic skills and knowledge needed for time and space complexity of a	•	
with the concurrent		algoritimis and lea	iii to nandie
	practically the asymptotic mathematics.		1
BI-AG2	Algorithms and Graphs 2	Z,ZK	5
This course, preser	nted in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsory on	ourse BI-AG1. It fu	rther delves
into advances data	structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English versic	on of the course se	ee BIE-AG2.
BI-ALO	Algebra and Logic	Z,ZK	4
DI-ALO		۷,۷۱۲	-
	The course extends and deepens the study of topics touched upon in the basic course in logic.		1
BI-AND	Programming for the Android Operating System	Z,ZK	4
	This course is presented in Czech.		
BI-ANG	English Language, Internal Certificate	ZK	2
DI / IIIO	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN		_
51.4115.4			
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-APJ	Aplication Programming in Java	Z,ZK	4
	ı o		1
	This course is presented in Czech. Advanced technologies in Java.		
DI ADQ 1	This course is presented in Czech. Advanced technologies in Java.	7 7K	5
BI-APS.1	Architectures of Computer Systems	Z,ZK	5
Students will lear	Architectures of Computer Systems n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec	ial emphasis is giv	ven on the
Students will lear pipelined instruction	Architectures of Computer Systems In the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Specin processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles.	ial emphasis is giverial in the sign is giverial in the sign in the sign in the sign is given in the sign in the s	ven on the processing
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Students will lear pipelined instruction not only in scalar propelined instruction not only in scalar propelined i	Architectures of Computer Systems In the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Specing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of processors, 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 Interactive applications on Arduino Interactive applications in Interactive Interactive applications Interactive	ial emphasis is given instruction sequential model of consistency in sure instructions of the consistency in sure instructions of the consistency in sure instructions. It is not seen in the consistency in sure instruction in the consistency in sure instruction in the consistency	ven on the processing of programs. ch systems. 4 ogrammable the results r Web and 4 substantially sion.org>) 2 14 5 sat modeling run with onships of them. 6 prosystems, ter systems. 4 4 aphics and course. 2 5
Students will lear pipelined instruction not only in scalar propelined instruction not only in scalar propelined i	Architectures of Computer Systems In the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec in processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of an one sycle, while ensuring the correctness of the elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence and Interactive applications on Arduino Interactive applications in one volve and solutions in the Bedsign applications of Interactive Interac	ial emphasis is giviples of instruction sequential model of consistency in sure KZ ons for modern proystems, i.e. to see is suitable even for Z,ZK interested in 3D granics applications) of Z,ZK interested in 3D granics applications) of Z,ZK principles of functions	ven on the processing of programs. ch systems. 4 ogrammable the results r Web and 4 substantially sion.org>) 2 14 5 at modeling run with onships of them. 6 prosystems, ver systems. 4 4 aphics and course. 2 5 ionality of
Students will lear pipelined instruction not only in scalar propelined instruction not only in scalar propelined i	Architectures of Computer Systems In the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Specing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of processors, 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 Interactive applications on Arduino Interactive applications in Interactive Interactive applications Interactive	ial emphasis is giviples of instruction sequential model of consistency in sure KZ ons for modern proystems, i.e. to see is suitable even for Z,ZK interested in 3D granics applications) of Z,ZK interested in 3D granics applications) of Z,ZK principles of functions	ven on the processing of programs. ch systems. 4 ogrammable the results r Web and 4 substantially sion.org>) 2 14 5 at modeling run with onships of them. 6 prosystems, ver systems. 4 4 aphics and course. 2 5 ionality of

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 cc s, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class def		
	ods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging		-
	well as work with files are emphasized.		Ç.
BI-CS2	C# language and data access	KZ	4
	and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros	-	
-	s used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current techr rying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (L	-	
). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data u		
(ORM). This part of	f the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model	, Storage Model a	nd Mapping
DI 000	(XML description).		
BI-CS3	Language C# - design of web applications introduced to current technologies in web application development on the .NET platform.They will acquire a comprehensive overview of	KZ	t possibilities
The students will be	on thisplatform. They will learn to create WebAPI and to use it by client programs.	il the development	possibilities
BI-DAN	Taxes for non-Economists	Z,ZK	4
Taxes, including so	cial insurance contributions, are obligatory payments paid by people or institutions to public budgets. This is the way how a significant p	ortion of GDP is re	edistributed.
	ns who pays which taxes or who bears the tax burden. The course introduces students to the tax theory and policy fundamentals and s	•	
of income, consum	option, and wealth. The course provides practical information on calculations of tax liabilities of both citizens and institutions as well a taxpayers' formal duties towards public administration.	s information abou	it important
BI-DBS	Database Systems	Z,ZK	6
	oduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lear	,	_
	constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with the		
	ation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda Iling parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced t	•	
	iling paraller user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to assess with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of data!		J
	optimizing database applications, distributed database systems, data stores.	.,	33 3
BI-DML.21	Discrete Mathematics and Logic	Z,ZK	5
_	equainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts from	=	
Special attention is	paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cours combinatorics and number theory, with emphasis on modular arithmetics.	e also lays down t	ne basics of
BI-DPR	Document., Presentation, Rhetorics	KZ	4
	d to the professional communication and writing of the scientific texts (bachelor's and diploma thesis). Students will learn to create and pr		
	and presenting before an audience. Students will also learn to write technical reports and scientific texts.		
BI-EHA	Ethical Hacking	Z,ZK	5
=	professional and academic introduction to computer and information security using the ethical hacking approach, which enables improvet when discovering vulnerabilities, hands-on experience with different attacks, facilitates linking theory and practice in significant area		
	erefore be utilized by (future) security professionals, (informed) decision-makers, (savvy) users and developers alike. This course is t	_	intoracy, and
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	dvanced technologies in the Java programming language. The focus is on technologies for development of enterprise information system a database and are accessed through the web interface.	items which are co	onnected to
BI-EMP	Economics and Management Principles	KZ	4
	ned to fundamental problems of business economy. The course makes students familiar with a life cycle of business, specifically with		oundation,
enterprise putting in	nto state economic environment (CR), management of property and capital structure, business transaction records keeping during an		d, a relation
BI-EP1	between business production and costs, evaluation of enterprise financial health and business rehabilitation or termination Effective programming 1	Z	4
DI-EF I	The course is taught in Czech.	2	4
BI-EP2	Efficient Programming 2	KZ	4
	ficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving individual		discussed,
	with the aim to choose the best one and avoid implementation errors.		1
BI-FMU	Financial and Management Accounting rse is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the pa	Z,ZK	5
	unts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modificatio	_	
	ations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manager		•
	Business Inteligence moduls in Business information systems.		
BI-FTR.1	Financial Markets	Z,ZK	5
BI-GIT	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	KZ	2
	Version control system GIT roduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pract		
	replementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git s		
BI-HAM	HW accelerated network traffic monitoring	KZ	4
	duces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The	_	-
	mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a s oals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traffi		
	level and to develop their practical abilities in this field.		
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
	This course is presented in Czech.		1
BI-HWB	Hardware Security	Z,ZK	5
	s with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar wit ules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about vi		
,. 5 ,			1

including side-channel attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including applicat and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.	tions
BI-IOS Fundamentals of iOS Application Development for iPhone and iPad KZ 4 This course is presented in Czech.	
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 a 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 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 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 simulated programmable hardware design kits (FPGA).	and ation and with
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 categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the Ontol 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 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.	ty to UML also
BI-KOT Programing in Kotlin Z,ZK Kotlin is a modern, statically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advanced language construction. 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 with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	ns.
BI-KSA Cultural and Social Anthropology 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 f anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health, history, death, etc) wi shown. The course is presented in Czech.	from ill be
BI-LA1.21 Linear Algebra 1 Z,ZK 5 We will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field of real and complex numb and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination method (GEM) and s the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenvalues and eigenvectors of matrix. We will also demonstrate some applications of these concepts in computer science.	ers show
BI-LA2.21 Linear Algebra 2 Z,ZK 5 1. Vektorové prostory. 2. Skalární sou in, norma vektoru, ortogonalita. 3. Snalytická geometrie. 4. Lineární zobrazení 5. Matice lineárního zobrazení. 6. [2] Afinní transformace, homogenní sou adnice, projekce a operace v 3D prostoru jako lineární zobrazení. 8. ešení soustav lineárních rovnic. 9. [2] Maticové rozklady (metody LU, SVD, QR) a jejich výpo 11. Metoda nejmenších tverc . 12. Lineární programování. 13. Rekurentní rovnice.	,
BI-LIN Linear Algebra Z,ZK 7 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 dependent 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.	ncies
BI-LOG.21 Mathematical Logic Z,ZK 5 The course focuses on the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfiability, logical equivalence, and logical consequence of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are explained. This relates to the vs. NP problem and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and their models. The syntact approach to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorems is explained.	I the he P
BI-MA1.21 Mathematical Analysis 1 Z,ZK 5 We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers. Then we study real sequer and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functions. This theoretical foundaris then applied to root-finding problems (iterative method of bisection and Newton's method), construction of cubic interpolation (spline), and formulation and solution of simple optimizer problems (i.e., the issue of finding extrema of functions). The course is closed with the Landau's asymptotic notation and methods of mathematical description of complexity of algorithms.	nces ation ation
BI-MA2.21 Mathematical Analysis 2 Z,ZK 6 The course completes the theme of analysis of real functions of a real variable initiated in BIE-MA1 by introducing the Riemann integral. Students will learn how to integrate by part and use the substitution method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylor's theorem to the computation of element functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, and its analysis using the Matheorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and Hessian matrix, we study the analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integration of multivariate functions.	arts ntary aster he
BI-MEK Macroeconomic Context of Domestic and World Economy Z,ZK 4 This course is presented in Czech.	-
BI-MGA Multimedia and Graphics Applications Z,ZK 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, of graphics and animation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to graphic formats, and compress technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the principle of operation and of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.	3D ssion
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 KZ 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 a 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 I and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer networks concepts like proto and technologies of the data-link, network and transport layer of the OSI model.	and links ocols
BI-MLO Mathematical Logic Z,ZK 5 The course seminary is taught in Czech.	
BI-MMP Multimedia team project KZ 4 This course is presented in Czech.	

BI-MPP			
The	Methods of interfacing peripheral devices	Z,ZK	4
	sed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universa side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USB	, ,	
includes both FC	drivers, simple application development, and APIs of selected devices.	devices, Linux a	iiu vviiiuows
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
	purse is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augm	•	
•	plays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentione	•	
	and procedural visualization, scientific data visualization, and 3D model scanning.	5 ,	,
BI-OOP	Object-Oriented Programming	Z,ZK	4
Students will learn	the pure object-oriented paradigm, being a tool for effective implementation of quality, evolvable business software systems. They will	understand funda	mentals and
hey will learn how	to apply it for solving typical implementation tasks. Students will learn syntax and programming fundamentals of a pure OO open-sou	rce technology Pl	naro. Various
	other modern programming languages utilising the OO concepts will be introduced in the subject, as well.		
BI-OPT	Introduction to Optical Networks	Z,ZK	4
=	overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possi	-	
•	k technology and on their solutions. The course will include the history of optical communications, an overview of passive components		
•	nsators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system	•	
	e topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as ency transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters.		
diffastable freque	from practice.	Addentis will solve	real tasks
BI-OSY	Operating Systems	Z,ZK	5
	and the classical theory of operating systems (OS) in addition to the knowledge gained in the module "Programming in Shell 1". They	,	1
	ses and threads implementations. They understand the problems of race conditions, thread scheduling, resource allocation and deadl	_	_
manageme	nt of virtual memory, principles and architectures of disks, RAID and file systems. They are able to design and implement simple multi	threaded applicat	tions.
BI-PA1	Programming and Algorithmics 1	Z,ZK	6
Students gain the	ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, struc	tured, pointers), e	expressions,
statements, funct	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searching	ng, sorting, and m	nanipulating
	with linked lists.		_
BI-PA2	Programming and Algorithmics 2	Z,ZK	7
	e instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, q	=	-
able). They can im	plement linked structures. They learn these skills using the programming language C++. Although this is not a module of programming in	C++, students ar	e introduced
DI DAI	with all C++ features needed to achieve the main objective (operator overloading, templates).	717	
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	Z,ZK	5
BI-PGR.1	This course is presented in Czech only.	Z,ZK	5
	Computer graphics programming	Z.ZN)
	to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textu	,	natric datails
	to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textu ike wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in c	res imitating geor	
and materials (I	to program a simple interactive 3D graphical application like a computer game or scientific visualisation, to design the scene, add textu ike wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in o geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fund	res imitating geor computer graphics	s, such as
and materials (I graphical pipeline,	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in contract the fundamental principles and the fundamental principles and the fundamental principles and the fundamental principles are the fundamental principles and the fundamental principles are the fundamental principles and the fundamental principles are the fundamental principl	res imitating geor computer graphics amentals for your	s, such as professiona
and materials (I graphical pipeline,	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in ogeometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fund	res imitating geor computer graphics amentals for your	s, such as professiona
and materials (I graphical pipeline, development, e.g BI-PHP.1	ike wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in orgeometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fundations for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces	res imitating geor computer graphics amentals for your s, and scientific vi	s, such as professiona sualisation.
and materials (I graphical pipeline, development, e.g BI-PHP.1 The course is t	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in a geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fundation. For GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces Programing in PHP	res imitating geor computer graphics amentals for your s, and scientific vi KZ nd will use tool th	s, such as professiona sualisation. 4 nat eases
and materials (I graphical pipeline, development, e.g BI-PHP.1 The course is t development in	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in a geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fund. for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces Programing in PHP aught in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a	res imitating geor computer graphics amentals for your s, and scientific vi KZ and will use tool the or BIE-TWA.1. The	s, such as professiona sualisation. 4 nat eases
and materials (I graphical pipeline, development, e.g BI-PHP.1 The course is t development in	ke wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in a geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics, and representing solid fund. for GPU programming and animations. They get used to techniques utilised in geometric modelling, modelling of curves and surfaces. Programing in PHP aught in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a PHP. The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for this course in their 3rd semester of study. Programming Languages and Compilers	res imitating geor computer graphics amentals for your s, and scientific vi KZ and will use tool the or BIE-TWA.1. The Z,ZK	s, such as professiona sualisation. 4 hat eases ey should
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BI-PRR Project management This course is presented in Czech.	KZ	4
BI-PS1 Programming in Shell 1	KZ	5
Students become knowledgeable users of common Unix-like operating systems. They understand the fundamental principles of the operating systems		esses and
threads, access rights, memory management, network interfaces). They gain the knowledge of advanced users, with hands-on experience of the shell, to process various text data.	pasic commands, a	and filters to
BI-PSI Computer Networks	Z,ZK	5
Students understand 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	vill be able to write	a simple
network application and configure a simple network. BI-PST Probability and Statistics	Z,ZK	5
The students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable		
basic models of random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction	-	
estimations of unknown distributional parameters from random sample characteristics. They will also be introduced to the methods of determining the st more random variables.	atistical dependen	ce of two or
BI-PYT Python Programming	Z,ZK	4
The course is taught in Czech.	_,_,	
BI-QAP Quantum algorithms and programming	KZ	5
Course aims at giving students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, o are based, and algorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developments.		
on Python language. 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		
might be an advantage. No previous knowledge of physics is assumed.		
BI-SAP Computer Structure and Architecture	Z,ZK	6
Students understand basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inputransfer. In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern digital design.	•	-
basic knowledge 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
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
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 teacher	-	
semester.		
BI-SCE2 Computer Engineering Seminar II The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to	Z Z	4
are approached individually within the subject. Each student or group of students solves some interesting topics of digital design, reliability and resistance to		
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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 teacher	-	
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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 teacher semester. 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 course 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 corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of di	Z,ZK comparing individua indexes of econom	4 al countries
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 teacher semester. BI-SEP	Z,ZK mparing individua indexes of econom scussions based o	4 al countries nic freedom, on individual
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	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan ar d. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora	•	_
	PostgreSQL.		
BI-SRC	Real-time systems	KZ	4
	e basic knowledge in the Real-time theory and in the design methods for RT systems including the dependability issues. Thereticla kn fied on the practical labs of the Department of Digital Design. This subject is mainly based on embedded R-T systems, therefore the		
experimentally ven	as in BI-VES subject and FPGA.	acca accigii ille a	
BI-SSB	System and Network Security This course is focused on selected areas of computer networks and computer systems in terms of cyber security	Z,ZK	5
BI-ST1	Network Technology 1	Z	3
	iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredited	d under the Cisco	l .
BI-ST2	CCNA1 - R&S Introduction to Networks.	Z	3
DI-312	Network Technology 2 This course is presented in Czech.		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	_	_
get further extend	ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, prediction	ctability, extension	beyond a
	simple topology, security, etc.		T
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		-
recoveries, and en	nergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation	on ways while mair	ntaining the
	network running.		T
BI-STO	Storage and Filesystems	Z,ZK	4
The student will lea	rn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archi load balancing and high availability.	ving, as so as stor	age scaling,
BI-SVZ	Machine vision and image processing	Z.ZK	5
	are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate in	,	_
· · · · · · · · · · · · · · · · · · ·	s to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical use	-	
	problems of practice that the graduates may encounter.		_
BI-TDA	Test driven architecture	KZ	4
	cused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that are		-
	urse 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 occu		
BI-TEX	TeX and Typography ented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the	Z,ZK	typographic
This course is pres	rules.	Jourse locuses on	typograpriic
BI-TIS	Information Systems Design	Z.ZK	5
_	ious types of ISs and their practical implementation aspects and are able to match the needs of different market segments (customer	s) with application	s of existing
	technologies (databases, programming languages, GUI etc.).		
BI-TS1	Theoretical Seminar I	Z	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic		
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a vother scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	vork with scientific	papers and
BI-TS2	Theoretical Seminar II	Z	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	1	ı
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS3	Theoretical Seminar III	Z _	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic It is intended for students with interesting topics from the latest research in the area. Therefore, an integral part of the course is a		
are treated marvido	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	WORK WITH SCIENTIFIC	papers and
BI-TS4	Theoretical Seminar IV	Z	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	al reading group. T	he students
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TUR	User Interface Design	Z,ZK	4
	asic overview of the methods for designing and testing common user interfaces. They have experience to solve the problems where s vith the user optimally, since the needs and characteristics of users are not taken into account during product development. Students ga		-
	that bring users into the development process to ensure optimal communication with a user.		
BI-TWA.1	Web Application Design	Z,ZK	5
The basic course	of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some propertie	s of language desc	
	and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications, visit to the development of Web applications.		
modern libraries fa	acilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework Angular.		veiopments
BI-ULI	Introduction to Linux	7 Z	2
	familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become f	_	l .
	and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (tel		
BI-VES	Embedded Systems	Z,ZK	5
Students learn to d	esign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedd	ed processors, the	ir integrated
	peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.		

ZK **BI-VHS** Virtual game worlds The course leads students to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,...). This current students knowledge is furthermore complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. The course can be followed by the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices. BI-VMM Selected Mathematical Methods Z,ZK 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 (FFT). 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 study normed linear spaces and quadratic forms. In addition, we introduce the least square method. The last part of the course is devoted to optimization and duality. The linear programming and the Simplex method is analyzed in more detail. BI-VR1 Virtual reality I Introduction to Virtual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of virtual worlds communication. The course focuses on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds and improves computational thinking and shared social activities. BI-VR2 Virtual reality II ΚZ 3 Continuation of the course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The objective is to develop applications for computer science and gamification in various social metaverse and desktop engines. Searching the Web and Multimedia Databases Z.ZK Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storage of documents. In particular, students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from web pages. They get detailed knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web search engines for the mentioned data types (documents). Z,ZK BI-VZD **Data Mining** Students are introduced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, multidimensional data visualization, statistical techniques of data transformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships between model bias and variance, and know the fundamentals of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic data mining tools to common problems (classification, regression, clustering). BI-XML XML Technology Students learn to make and validate XML documents (XML Schema, Relax, Schematron) and learn standard methods of their processing (SAX, DOM). An emphasis will be given to language XPath which enables addressing of parts of XML documents and its usage in different XML technologies. Students will also learn basics of XSLT programming. XSLT and XPath programming will be based on version 2.0. Students will gain a broad overview of XML technologies. **BI-ZDM** Z,ZK Elements of Discrete Mathematics 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. 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 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-ZPI 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 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. 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

internship the De			e internship
Each student car internship the De	exceeds the academic year's dead-line. Bachelor internship abroad for 30 credits	Z	30
•	n once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or re	search institution.	
internable Auvilian	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession		
	y courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits corr	-	
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	o two subjects if th	e internship
DI 71114	exceeds the academic year's dead-line.	7 71/	
BI-ZUM	Artificial Intelligence Fundamentals luced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical	Z,ZK	4
	ideed to the fundamental problems in the Artificial intelligence, and the basic methods for their solving, it locuses mainly on the classical discontinuous for their solving, it locuses mainly on the classical discontinuous problems in the Artificial Intelligence, and the basic methods for their solving, it locuses mainly on the classical discontinuous for their solving, it locuses mainly on the classical discontinuous for their solving. It locuses mainly on the classical discontinuous for their solving, it locuses mainly on the classical discontinuous for their solving. It locuses mainly on the classical discontinuous for their solving, it locuses mainly on the classical discontinuous for the		
space scarcii, mai	be presented as well.	s and the neutarn	Stworks, wiii
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
	This course is presented in Czech.	,	
BIE-IMA2	Introduction to Mathematics 2	Z	2
Students refresh a	nd extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are a	ble to apply them	in particular
	examples.		
BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	luced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical		
space search, mul	ti-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm	s and the neural ne	etworks, will
F1 F11	be presented as well.	71/	
FI-FIL	Philosophy see A0B16	ZK	2
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		_
	slenkových proud 20. století jsou ukázány prom ny paradigmat a p evrat k postmodernismu, analýzou paralelism ve v d a um ní c		
-	osti na teorii p írodních jazyk a sémiotiky je vedena diskuze i o kognitivních procesech, v historickém p ehledu nastín na hlediska este	· ·	-
kapitolou jsou mod	lely spojitých p írodních soustav a systém, v záv ru p ednášek je pozornost v nována filozofii v dy a otázkám udržitelného rozvoje.	P edm t p ednáší	a garantuje
	Ing. Ivo Janoušek CSc.		
FI-HPZ	Humanities subject from a study abroad	Z	3
A "Humanities sul	oject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	is required in the	curriculum.
	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	717	
FI-HTE	History of Technology and Economics	ZK	2
The course introdu	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.	arison with the dev	elopment of
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 diversity		
	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health		•
	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
	This serves is served in Ossel	ΔN	_
	This course is presented in Czech.	ZΝ	
FI-VEZ	economic-managerial course from a study abroad	Z	4
	economic-managerial course from a study abroad oject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	Z	4
A "Humanities sul	economic-managerial course from a study abroad oject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.	Z is required in the	4 curriculum.
A "Humanities sul	economic-managerial course from a study abroad oject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student. Applied Functional Programming	Z is required in the	4 curriculum.
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MI-PSL	Programming in Scala	Z,ZK	4
	uces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature library. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and		_
MI DEV/16	Scalaz, etc.	7 7V	
MI-REV.16	Reverse Engineering	Z,ZK	5
_	cquainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens befo s will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dedica		
	tten in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be de		
	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 in	-	
.ozuggo.o a.i.a a.	the course is on the seminars, where students will solve practically oriented tasks from the real world.		
MI-SYP.16	Parsing and Compilers	Z,ZK	5
	upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of val	•	-
	of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
MI-TSP.16	Testing and Reliability	Z,ZK	5
	wledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepare	•	ne help of th
ntuitive path sens	itization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built-in-	self-test equipme	ent. They w
	be able to analyze and control reliability and availability of the designed circuits.		
MI-VYC	Computability	Z,ZK	4
	Classical theory of recursive functions and effective computability.		•
NI-DDM	Distributed Data Mining	KZ	4
	n state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands on		
ata processing fr	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations are	nd will be capabl	e to propos
	approaches to parallelize other algorithms. The course is prezented in czech language.		
NI-DZO	Digital Image Processing	Z,ZK	4
his course prese	ents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical algo	orithms that are l	both easy to
-	e an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is als		
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	gid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ad		
NI-IAM	Internet and Multimedia	Z,ZK	4
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acqu	_	
	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical us		
	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effe		-
ne quality and late	ency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the	scene up to the	presentation
NII I ON4	for audience.		
NI-LSM		1/7	
	Statistical Modelling Lab	KZ	5
he subject is orie	ented on a low-level approach to Bayesian statistical and information-theoretical modelling, where the student both learns the existing	methods (regres	sion models
he subject is orie Kalman filtering,	ented on a low-level approach to Bayesian statistical and information-theoretical modelling, where the student both learns the existing in models fusion, etc.) and tries to implement them. That is, instead of the (standard) intensive use of high-level libraries like pandas, scil	methods (regres	sion models models, the
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he subject is orie Kalman filtering, stress is put on th analy	ented on a low-level approach to Bayesian statistical and information-theoretical modelling, where the student both learns the existing is models fusion, etc.) and tries to implement them. That is, instead of the (standard) intensive use of high-level libraries like pandas, so it is use of numpy and scipy, as well as the low-level algebra and calculus. The second half of the semester is focused on the design of research their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or be seen of their properties).	methods (regres kit-learn or stats nethods and algo pachelor thesis).	sion models models, the orithms, and
The subject is orie Kalman filtering, stress is put on th analy NI-MOP	neted on a low-level approach to Bayesian statistical and information-theoretical modelling, where the student both learns the existing models fusion, etc.) and tries to implement them. That is, instead of the (standard) intensive use of high-level libraries like pandas, soil the use of numpy and scipy, as well as the low-level algebra and calculus. The second half of the semester is focused on the design of revises of their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or the second half of the semester is focused on the design of revises of their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or the second half of the semester is focused on the design of revises of their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or the second half of the semester is focused on the design of revises of their properties. At this point, the subject is on the border of own research and may result in the topic of final work (diploma or the second half of the semester is focused on the design of revises of their properties.	methods (regres kit-learn or stats nethods and algo pachelor thesis).	sion models models, the orithms, and
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NI-TSP	Testing and Reliability	Z,ZK	5			
	knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prej	· ′				
"	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu					
	will be able to compute, analyze, and control the reliability and availability of the designed circuits.					
NI-VCC	Virtualization and Cloud Computing	Z,ZK	5			
Students will gain knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and organizations. They will get						
acquainted with virtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficiently operate and optimize the						
performance parameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effective technology today for the						
management of complex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in the use of modern integration						
	and development tools (Continuous integration and development).					
NI-VYC	Computability	Z,ZK	4			
Classical theory of recursive functions and effective computability.						
TV1	Physical Education	Z	0			
TV2	Physical Education	Z	0			
TVKLV	Physical Education Course	Z	0			
TVKZV	Physical Education Course	Z	0			
TVV	Physical education	Z	0			
TVV0	Physical education	Z	0			

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 15. 05. 2021, time 18:32.