Study plan

Name of study plan: Bachelor Specialization Software Engineering, in Czech, 2021

Garantor of the st Program of study: Type of study: Ba Required credits: Elective courses of Sum of credits in Note on the plan: akademického rol	uaranteed by the department: Welcome page audy branch: Informatika chelor full-time 153 credits: 27					chal
	k: Compulsory courses in the program of credits of the block: 106 bock: PP					
2021 Requirement creat Requirement cour Credits in the grou Note on the If group: In B E of in pl	b: Compulsory Courses of Bachelor Study Program dits in the group: In this group you have to gain 106 rses in the group: In this group you have to complet up: 106 you plan to profile the specialization Information Security, Ma ternet, Computer Systems and Virtualization, Software Engin I-PSI.21 in your 2nd semester of study. If you plan to profile t ngineering, Computer Science, or Artificial Intelligence, enror study. If you plan to profile yourself in the Artificial Intelligence your 3rd semester of study. Otherwise, enroll in the course an to profile the specialization Artificial Intelligence or Web F	6 credits ete 20 cou anagement I neering, or W he specializa oll in the cou ice specializa BI-PSI.21 in Engineering,	rses nformati Veb Engi ation Co rse BI-P ation, en your 5th enroll ir	cs, Com ineering, mputer (SI.21 in soll in th semes the cou	puter Netw enroll in th Graphics, C your 4th se e course E ter of study irse BI-AA	vorks and ne course Computer emester BI-PST.21 y. If you
Code	bur 5th semester of study. Otherwise, enroll in the course Bl Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members)	Completion				Role
BI-AG1.21	Tutors, authors and guarantors (gar.) Algorithms and Graphs 1 Dušan Knop, Michal Opler, Ond ej Suchý, Tomáš Valla, Radek Hušek Dušan Knop Dušan Knop (Gar.)	Z,ZK	5	2P+2C	z	PP
BI-AAG.21	Automata and Grammars Jan Holub, Jan Janoušek Jan Holub Jan Holub (Gar.)	Z,ZK	5	2P+2C	Z	PP
BI-BAP.21	Bachelor Thesis Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BI-BPR.21	Bachelor project Zden k Muziká Zden k Muziká (Gar.)	Z	1	0P+0C	Z,L	PP
BI-DBS.21	Database Systems Michal Valenta, Jan Blizni enko, Ji í Hunka, Monika Borkovcová, Jan Matoušek, Pavel K íž, Št pán Pechman, Dominik Roudný, Jan Bittner, Ji í Hunka Michal Valenta (Gar.)	Z,ZK	5	2P+2R+1L	. L	PP
BI-DML.21	Discrete Mathematics and Logic Ji ina Scholtzová, Daniel Dombek, Jan Sp vák Daniel Dombek Jan Sp vák	Z,ZK	5	2P+1R+1C	z	PP
BI-KAB.21	(Gar.) Cryptography and Security Ivana Trummová, Tomáš Rabas, Tomáš Zahradnický, Ji í Bu ek, Martin Jure ek, Josef Kokeš, Róbert Lórencz, Julia Plotnikova, David Pokorný, Róbert Lórencz Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	L	PP
BI-LA1.21	Linear Algebra 1 Lud k Kleprlík, Jakub Krásenský, Karel Klouda Lud k Kleprlík Karel Klouda (Gar.)	Z,ZK	5	2P+1R+1C	z	PP

BI-UOS.21	Unix-like Operating Systems Zden k Muziká, Petr Zemánek, Viktor erný, Michal Hažlinský, Jakub Jan i ka, Miroslav Prágl, Michal Šoch, Jan Trdli ka, Yelena Trofimova, Zden k Muziká Zden k Muziká (Gar.)	KZ	5	2P+2C	Z	PP
BI-TDP.21	Documentation and Presentation Ond ej Guth, Petra Pavlí ková, Dana Vynikarová, Alena Libánská, Tomáš Nová ek Dana Vynikarová Dana Vynikarová (Gar.)	ΚZ	3	2P+2C	Z,L	PP
BI-GIT.21	SW Development Technologies Petr Pulc, Robin Ob rka Robin Ob rka Petr Pulc (Gar.)	Z	3	2P	Z	PP
BI-TZP.21	Technological Fundamentals of Computers Jan ezní ek, Jaroslav Borecký, Robert Hülle, Martin Kohlík, Vojt ch Miškovský, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.)	Z,ZK	5	2P+2C	Z	PP
BI-SAP.21	Computer Structure and Architecture Hana Kubátová, Jaroslav Borecký, Petr Fišer, Martin Kohlík Hana Kubátová Hana Kubátová (Gar.)	Z,ZK	5	2P+1R+2C	L	PP
BI-PA2.21	Programming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Josef Vogel, Ladislav Vagner Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	2P+1R+2C	L	PP
BI-PA1.21	Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Miroslav Balík, Josef Vogel, Ladislav Vagner Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	2P+2R+2C	Z	PP
BI-PST.21	Probability and Statistics Kamil Dedecius, Pavel Hrabák, Jitka Hrabáková, Petr Novák, Jana Vacková Pavel Hrabák Pavel Hrabák (Gar.)	Z,ZK	5	2P+2C	Z	PP
BI-PSI.21	Computer Networks Viktor erný, Michal Hažlinský, Vladimír Smotlacha, Yelena Trofimova, Jan Fesl, Josef Koumar, Petr Hoda , Josef Zápotocký, Michal Polák, Jan Fesl Jan Fesl (Gar.)	Z,ZK	5	2P+1R+1C	L	PP
BI-OSY.21	Operating Systems Petr Zemánek, Ji í Kašpar, Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík, Ladislav Vagner Pavel Tvrdík Michal Štepanovský (Gar.)	Z,ZK	5	2P+1R+1L	L	PP
BI-MA2.21	Mathematical Analysis 2 Pavel Hrabák, Tomáš Kalvoda, Ivo Petr, Petr Olšák, Pavel Paták Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	6	3P+2C	Z	PP
BI-MA1.21	Mathematical Analysis 1 Pavel Hrabák, Tomáš Kalvoda, Ivo Petr, Petr Olšák, Pavel Paták Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	5	2P+1R+1C	L	PP

Characteristics of the courses of this group of Study Plan: Code=BI-PP.21 Name=Compulsory Courses of Bachelor Study Program Informatics, presented in Czech, version 2021

BI-AG1.21 Algorithms and Graphs 1	Z,ZK	5			
The course covers the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing of	urriculum. It links a	and partially			
develops the knowledge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the	ne time and space	complexity of			
algorithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic notat	tion.				
BI-AAG.21 Automata and Grammars	Z,ZK	5			
Students are introduced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of fini	ite automata, regu	lar expressions,			
and regular grammars, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know	the hierarchy of fo	ormal languages			
and they understand the relationships between formal languages and automata. They are introduced to the Turing machine and complexity classes F	P and NP.				
BI-BAP.21 Bachelor Thesis	Z	14			
BI-BPR.21 Bachelor project	Z	1			
1. At the beginning of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the	e partial tasks tha	t he / she will			
perform during the semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at the end of the semester. 2. The					
external supervisor enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvut.cz/student/studijni/formulare).					
The completed and signed form must be delivered in person or by email to the SZZ coordinator, who will arrange for the credit to be granted. 3. If the topic of the work that the student					
has reserved is formulated more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the a	ssignment so that	the assignment			
can be supplemented and approved at the end of the semester.					
BI-DBS.21 Database Systems	Z,ZK	5			
Students are introduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lea	rn to design smal	databases			
(including integrity constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with t	the SQL language	, as well as with			
its theoretical foundation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the fun	ndamental concep	ots of transaction			
processing, controlling parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduce	ed to special ways	of storing data			
in relational databases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of data	tabase systems,	debugging and			
optimizing database applications, distributed database systems, data stores.					
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 w	ill be explained.			
Special attention is paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The co	ourse also lays do	wn the basics of			
combinatorics and number theory, with emphasis on modular arithmetics.					
BI-KAB.21 Cryptography and Security	Z,ZK	5			
Students will understand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to	o use cryptograph	ic keys and			
certificates in systems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in a	pplications. Withir	labs, students			
will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedures of cryptanalysis.					
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 fie	ld of real and con	plex 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 elin	mination 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 eiger	nvalues and eigen	vectors of a			
matrix. We will also demonstrate some applications of these concepts in computer science.					

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 number	ers. Then we study	real sequences
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of fu	inctions. This theor	etical foundation
is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation	and solution of sir	nple optimization
problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical desc	cription 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 BI-MA1 by introducing the Riemann integral. Students will	1 1	-
use the substitution method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylors theorem t	•	
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms	-	-
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and		-
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the in		-
BI-OSY.21 Operating Systems	Z,ZK	5
In this course that is a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread	1 '	
critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS r		
and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.	normornigi inoj u	to able to accigit
BI-PSI.21 Computer Networks	Z.ZK	5
The course introduces students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in lo	1 '	-
well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced net	-	. Students
practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS	1	
BI-PST.21 Probability and Statistics	Z,ZK	5
Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable	-	
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 for testing statist	ical hypotheses ar	nd determining
the statistical dependence of two or more random variables.		
BI-PA1.21 Programming and Algorithmics 1	Z,ZK	7
Students gain the ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, s	structured, pointer	s), expressions,
statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for sear	rching, sorting, and	d manipulating
with linked lists and trees.		
BI-PA2.21 Programming and Algorithmics 2	Z,ZK	7
Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack,	, queue, enlargeat	le array, list, set,
table). They learn these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming	(e.g., template pro	ogramming,
copying/moving of objects, operator overloading, inheritance, polymorphism).		
BI-SAP.21 Computer Structure and Architecture	Z.ZK	5
Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of ar	ithmetic-logic unit	
memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple pr	-	
in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.		
BI-TZP.21 Technological Fundamentals of Computers	Z,ZK	5
Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computers		-
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to r		
limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a		-
(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.	compater perior e	
BI-GIT.21 SW Development Technologies	Z	3
This course is aimed at one of the rudimental team software development technology - version control. To be more specific, we will introduce studer		-
		manon manager
from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.	1/7	0
BI-TDP.21 Documentation and Presentation	KZ	3
The course is focused on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typical		
learn to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically p		
the teacher. The course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first	14 days of teachin	g. Within the
exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.	1	
BI-UOS.21 Unix-like Operating Systems	KZ	5
Unix-like operating systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative	e functions of mult	iuser operating
systems for computers and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic prop	perties of this OS f	amily, such as
processes and threads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the le		sers who are not
only able to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting interface	e, called shell.	
Name of the block: Compulsory courses in the specialization		
Minimal number of credits of the block: 40		
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The role of the block: PS

Code of the group: BI-PS-SI.21

Name of the group: Compulsory courses of specialization Software engineering, version 2021 Requirement credits in the group: In this group you have to gain 40 credits Requirement courses in the group: In this group you have to complete 8 courses Credits in the group: 40 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-KOM.21	Conceptual Modelling Robert Pergl, Marek B lohoubek Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-OOP.21	Object-Oriented Programming Filip K ikava, Petr Máj, Filip íha Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-PPA.21	Programming Paradigms Jan Janoušek, Tomáš Pecka, Petr Máj, Tomáš Jakl Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+2R	Z	PS
BI-SWI.21	Software Engineering Michal Valenta, Ji í Mlejnek, Zden k Rybola Zden k Rybola Michal Valenta (Gar.)	Z,ZK	5	2P+1C	L	PS
BI-SP1.21	Team Software Project 1 Michal Valenta, Ji í Chludil, Ji í Mlejnek, Ji í Hunka, Zden k Rybola, Ji í Borský, Jan Matoušek, Radek Richtr, Marek Suchánek, Zden k Rybola Ji í Mlejnek (Gar.)	кz	5	2C	L	PS
BI-SP2.21	Team Software Project 2 Stanislav Kuznetsov, Michal Valenta, Ji í Chludil, Ji í Mlejnek, Ji í Hunka, Zden k Rybola, Ji í Borský, Jan Matoušek, Radek Richtr, Ji í Mlejnek Ji í Mlejnek (Gar.)	кz	5	2C	Z	PS
BI-TJV.21	Java Technology Stanislav Kuznetsov, Jan Blizni enko, Ji í Dan ek, Raian Samerkhanov Ji í Dan ek	Z,ZK	5	2P+2C	Z	PS
BI-IDO.21	Introduction to DevOps Michal Valenta, Ji í Mlejnek, Tomáš Vondra, Zden k Rybola Tomáš Vondra Ji í Mlejnek (Gar.)	Z,ZK	5	2P+2C	Z	PS

Characteristics of the courses of this group of Study Plan: Code=BI-PS-SI.21 Name=Compulsory courses of specialization Software engineering, version 2021

BI-KOM.21 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 domai	n, the ability to
categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological str	ructural 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 repres	entation in the Int	ernet. They also
learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEM	O method and the	BPMN notation
will be taught. The course is designed with the respect to continuation in software implementations. Recommended optional follow-up course: BI-ZPI.		
BI-OOP.21 Object-Oriented Programming	Z,ZK	5
Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate togethe	er by message pa	ssing. In this
course students get acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The en	nphasis is on prac	tical techniques
for developing software, which includes testing, error handing, refactoring, and application of design pattern.		
BI-PPA.21 Programming Paradigms	Z,ZK	5
The course deals with basic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of	particular approa	ches. Functional
programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming.	. The principles ar	e demonstrated
on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern main:	stream programm	ing languages
such as C++ and Java.		
BI-SWI.21 Software Engineering	Z,ZK	5
Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They	consolidate and	practically verify
their knowledge during the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hand	ds-on experience	with CASE tools
and the second		
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design	n and testing. With	nin the course,
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development.	•	nin the course,
	•	nin the course,
students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development.	KZ	5
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Name of the block: Compulsory elective courses Minimal number of credits of the block: 5 The role of the block: PV

Code of the group: BI-PV-SI.21

Name of the group: Compulsory elective courses of the specialization Software engineering, version 2021 Requirement credits in the group: In this group you have to gain at least 5 credits (at most 15) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) Credits in the group: 5

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-EPP.21	Economic Business Processes David Buchtela David Buchtela Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	L,Z	PV
BI-FBI.21	Financial Business Intelligence David Buchtela David Buchtela Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	PV
BI-PAI.21	Law and Informatics Zden k Ku era, Št pánka Havlíková, Dominik Vítek, Martin Samek, Ji í Maršál, Michal Mat jka Št pánka Havlíková Zden k Ku era (Gar.)	ZK	5	2P+2C	L	PV

Characteristics of the courses of this group of Study Plan: Code=BI-PV-SI.21 Name=Compulsory elective courses of the specialization Software engineering, version 2021

BI-EPP.21	Economic Business Processes	Z,ZK	5
The aim of the course is	to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic	and financial aspe	ects of business
in the market environme	ent of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the	ne company's life	cycle, from the
establishment of the co	npany, through the management of property and capital structure, financing of the company, determining the cost function of	the company and	d labor costs, to
evaluating the financial	health of the company and its eventual rehabilitation or termination.		
BI-FBI.21	Financial Business Intelligence	Z,ZK	5
The aim of the course is	to acquaint students primarily with financial accounting as a tool for recording business operations and documents for busines	ess analysis, dete	rmining its value
	comparison with other companies and management decision process at the tactical and strategic level. The second view is n	•	
for financial manageme	nt and prediction of business development. Management accounting allows monitoring of the financial status and performance	of business activi	ities over several
accounting periods, ena	bles a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital ar	nd to use value in	formation to
assess options related t	o future business decisions. The principles of management accounting, described in this course, are the basis of Business In	telligence module	es in business
information systems, de	cision support systems, and other knowledge-oriented systems.		
BI-PAI.21	Law and Informatics	ZK	5
The aim of the course is	to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge	of doing business	s in the Czech
	rted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding co		
environment, will know	heir responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able	to use commerci	al license types
· ·	es. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protectio	•	
will also be alerted to su	ich behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses o	f real cases from	practice.

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.21

Note on the group:

Name of the group: Compulsory Physical Education, version 2021

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses (at most 7) Credits in the group: 0

The student is obliged to successfully complete two courses of this 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
TVK1	Physical Education Luboš Neuman Ji í Drnek (Gar.)	Z	1		L,Z	PT
TVV	Physical education	Z	0	0+2	Z,L	PT
TV1	Physical Education	Z	0	0+2	Z	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.21 Name=Compulsory Physical Education, version 2021

TVK1	Physical Education	Z	1
TVV	Physical education	Z	0
TV1	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: 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.21 Name of the group: English Language Exam Requirement credits in the group: In this group you have to gain at least 2 credits (at most 4) Requirement courses in the group: In this group you have to complete 1 course Credits in the group: 2 BI-ANG, ending with an exam for two credits, is enrolled by students who have completed preparator English Note on the courses and have a credit from the BI-A2L course.
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 BI-ANG1, ending with an exam for two credits, group: is enrolled by students who prepared for the exam independently and do not have credit from BI-A2L. These students must complete a credit paper before their own exam. After passing the exam, the student will also be recognized for the course BI-ANGS (Independent preparation for the English exam) for 2 credits.
 --- The BIE-ECC course can be recognized for any active semester after the submission of a external certificate at the level of at least B2 according to the Common European Framework of Reference. Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their Completion Credits Code Scope Semester Role members) Tutors, authors and guarantors (gar.) English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.) **BI-ANG1** Z.ZK 2 2D L PJ English language external certificate **BIE-EEC** Ζ 4 2D L PJ Zden k Muziká **Zden k Muziká** Zden k Muziká (Gar.) English Language, Internal Certificate 2 Z.L **BI-ANG** ΖK 2D PJ Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)

Characteristics of the courses of this group of Study Plan: Code=BI-ZKA.21 Name=English Language Exam

BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2		
BIE-EEC	English language external certificate	Z	4		
The BIE-ECC course ca	n be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in E	nglish comparabl	e to or exceeding		
the B2 level of the Com	the B2 level of the Common European Framework of Reference for Languages.				
BI-ANG	English Language, Internal Certificate	ZK	2		
Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-ANG					

Name of the block: Elective courses Minimal number of credits of the block: 0 The role of the block: V

Code of the group: BI-V.2021

Name of the group: Purely Elective Courses of Bachelor Programme Informatics, version from 2021/22 till 2024/25

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-ALO	Algebra and Logic Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era Lud k Ku era (Gar.)	Z,ZK	4	2P+1C	L	V
BI-A2L	English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	L	V
BI-APJ	Aplication Programming in Java <i>Ji í Dan ek</i>	Z,ZK	4	2P+1R+1C	Z	V

NI-AFP	Applied Functional Programming Robert Pergl, Marek Suchánek, Daniel N mec Robert Pergl Robert Pergl (Gar.)	KZ	5	2P+1C	L	V
BIE-ZUM	Artificial Intelligence Fundamentals Pavel Surynek	Z,ZK	4	2P+2C	L	V
BI-BLE	Blender Lukáš Ba inka Lukáš Ba inka Lukáš Ba inka (Gar.)	Z,ZK	4	2P+2C	L	V
NI-DSP	Database Systems in Practes Tomáš Vichta Tomáš Vichta Tomáš Vichta (Gar.)	Z,ZK	4	2P+1C	L	V
BI-STO	Storage and Filesystems	Z,ZK	4	2P+2C	L,Z	V
NI-PSD	Public Services Design David Pešek, Ond ej Brém David Pešek Ond ej Brém (Gar.)	KZ	4	1P+2C		V
BIE-DIF	Differential equations Antonella Marchesiello, Jan Valdman, Ond ej Bouchala Tomáš Kalvoda Ond ej Bouchala (Gar.)	Z,ZK	5	2P+2C	L	v
NI-DZO	Digital Image Processing	Z,ZK	4	2P+1C	L	V
NI-DDM	Distributed Data Mining	KZ	4	3C	L	V
BI-EP1.24	Effective programming 1 Martin Ka er Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-ANGK	English language, contact preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	Z,L	V
BI-EJA	Enterprise Java Ji í Dan ek	Z,ZK	4	2P+2C	L	V
BI-EJK	Enterprise Java and Kotlin Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-FMU	Financial and Management Accounting David Buchtela	Z,ZK	5	2P+2C	Z	V
BI-HAM	HW accelerated network traffic monitoring Tomáš ejka, Karel Hynek Tomáš ejka Tomáš ejka (Gar.)	KZ	4	2P+1C	L	V
BI-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	L	V
BI-ARD	Interactive applications on Arduino Jan ezní ek, Ji í Cvr ek, Robert Hülle, Vojt ch Miškovský Robert Hülle Robert Hülle (Gar.)	KZ	4	3C	L	V
NI-IAM	Internet and Multimedia Ji í Melnikov	Z,ZK	4	2P+1C	L	V
BIE-CSI	Introduction to Computer Science Christoph Kirsch Christoph Kirsch Christoph Kirsch (Gar.)	Z	2	2C	Z	V
FITE-EHD	Introduction to European Economic History Tomáš Evan	Z,ZK	3	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 Michal Valenta (Gar.)	KZ	4	3C	L	V
BI-QAP	Quantum algorithms and programming Tomáš Kalvoda, Ivo Petr Ivo Petr Ivo Petr (Gar.)	KZ	5	1P+2C	Z	V
NI-LSM	Statistical Modelling Lab Kamil Dedecius Kamil Dedecius (Gar.)	KZ	5	3C	L	V
BI-HAS	Human Aspects in Cryptography and Security Ivana Trummová Ivana Trummová Ivana Trummová (Gar.)	Z,ZK	5	2P+1C	Z	V
NI-MPL	Managerial Psychology Jan Fiala Jan Fiala Jan Fiala (Gar.)	ZK	2	2P	Z,L	V
NI-MSI	Mathematical Structures in Computer Science Jan Starý	Z,ZK	4	2P+1C	L	V
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MIT	Mikrotik technologies Jan Fesl Jan Fesl Jan Fesl (Gar.)	KZ	3	1P+2C	Z	V
NI-MOP	Modern Object-Oriented Programming in Pharo Jan Blizni enko Robert Pergl Robert Pergl (Gar.)	KZ	4	3C	Z	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MMP	Multimedia team project Zde ka echová Zde ka echová Zde ka echová (Gar.)	KZ	4	3C	Z,L	V
BI-ORL	Operations Research and Linear Programming <i>Dušan Knop</i> Dušan Knop <i>Dušan Knop (Gar.)</i>	KZ	5	1P+2C	L	V
NI-OLI	Linux Drivers Miroslav Skrbek, Jaroslav Borecký Jaroslav Borecký Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	L	V

BI-ACM	Programming Practices 1	KZ	5	4C	L	V
BI-ACM2	Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Programming Practices 2	KZ	5	4C	Z	V
BI-ACM3	Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Programming Practices 3	KZ	5	4C	L	V
BI-ACM4	Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Programming Practices 4	KZ	5	4C	Z	V
	Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.) Programming for the Android Operating System		-			
BI-AND.21	Jan Mottl, Jan Vep ek, Marek Kodr, Petr Šíma Jan Mottl Marek Kodr (Gar.)	KZ	4	3C	L	V
BI-CS1	Programming in C# Pavel Št pán, Helena Wallenfelsová Helena Wallenfelsová Pavel Št pán (Gar.)	KZ	4	3C	L,Z	V
BI-PJV	Programming in Java Miroslav Balík, Jan Blizni enko, Ji í Borský, Jan Zimolka Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PJS.1	JavaScript Programming Old ich Malec	KZ	4	3C	L	V
BI-KOT	Programing in Kotlin Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
NI-PSL	Programming in Scala Ji í Dan ek Ji í Dan ek Ji í Dan ek (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-PMA	Programming in Mathematica Zden k Buk Zden k Buk Zden k Buk (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PHP.1	Programing in PHP	KZ	4	3C	Z	V
BI-PS2	Programming in shell 2	Z,ZK	4	2P+2C	L	V
NI-PDD	Lukáš Ba inka Data Preprocessing	Z,ZK	5	2P+1C	Z	V
BI-PKM	Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.) Introduction to mathematics	Z	4		Z	V
NI-REV	Tomáš Kalvoda Tomáš Kalvoda Tomáš Kalvoda (Gar.) Reverse Engineering	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Josef Kokeš Josef Kokeš Josef Kokeš (Gar.) Computer Engineering Seminar I	_, Z	4	2C	L,Z	V
	Hana Kubátová Hana Kubátová Hana Kubátová (Gar.) Computer Engineering Seminar II			-		
BI-SCE2	Hana Kubátová Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V
BI-ST1	Network Technology 1 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST2	Network Technology 2 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	3C	L	V
BI-ST3	Network Technology 3 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST4	Network Technology 4 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	L	V
BI-SKJ.21	Scripting Languages Lukáš Ba inka, Jan Ž árek Lukáš Ba inka Jan Ž árek (Gar.)	Z,ZK	4	2+2	L	V
BI-SOJ	Machine Oriented Languages	Z,ZK	4	2P+2C	L	V
FIT-SEP	World Economy and Business	Z,ZK	4	2P+2C	L	V
BI-SEP	Tomáš Evan World Economy and Business	-	4	2P+2C		
	Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK				V
NI-SYP	Parsing and Compilers Jan Janoušek Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-GIT	Version control system GIT Petr Pulc	KZ	2	16P	Z,L	V
BIE-SEG	Systems Engineering Christoph Kirsch Christoph Kirsch (Gar.)	Z	0	2C	Z	V
TVK1	Physical Education Luboš Neuman Ji (Drnek (Gar.)	Z	1		L,Z	V
TVV	Physical education	Z	0	0+2	Z,L	V
TV1	Physical Education	Z	0	0+2	Z	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TV2	Physical Education	Z	0	0+2	L	V
TV2K1	Physical Education 2	Z	1		L,Z	V
TVKLV	Physical Education Course	Z	0	7dní	, L	V
TVKZV	Physical Education Course	 Z	0	7dní	 Z	V
BI-TS1	Theoretical Seminar I	Z	4	2C	Z	V
BI-TS2	Dušan Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Theoretical Seminar II	Z	4	2C	L	V
	Dušan Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.)	۷	4	20	L	v

BI-TS3	Theoretical Seminar III Ond ej Suchý, Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BI-TS4	Theoretical Seminar IV Ond ej Suchý, Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	L	V
BI-TDA	Test driven architecture Marek Hakala	KZ	4	2P+1C	Z,L	V
NI-TSP	Testing and Reliability Petr Fišer Martin Da hel Petr Fišer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-QUA	Quality Assurance Marek Kodr, Martin Pilný, Kate ina Kalášková Kate ina Kalášková Marek Kodr (Gar.)	ΚZ	4	3C	Z	v
FI-TOP	Academic writing Tomáš Nová ek	Z	2	10B	Z	V
BI-CCN	Compiler Construction Christoph Kirsch Christoph Kirsch (Gar.)	Z,ZK	5	2P+1C	L	V
BI-TEX	TeX and Typography Petr Olšák Petr Olšák (Gar.)	Z,ZK	4	2P+1C	L	v
BI-EHD	Introduction to European Economic History Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	3	2P+1C	Z,L	v
BI-KSA	Cultural and Social Anthropology Tomáš Houdek, Alena Libánská, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	Z,L	V
BI-ULI	Introduction to Linux Zden k Muziká, Petr Zemánek, Jan Ž árek Zden k Muziká Zden k Muziká (Gar.)	Z	2	4D	Z	v
BI-OPT	Introduction to Optical Networks Pavel Tvrdík	Z,ZK	4	2P+1C	Z	V
NI-VCC	Virtualization and Cloud Computing Tomáš Vondra, Jan Fesl Tomáš Vondra Tomáš Vondra (Gar.)	Z,ZK	5	2P+1C	L	V
BI-VHS	Virtual game worlds Radek Richtr	ZK	4	2P+2C	Z	V
BI-VR1	Virtual reality I Petr Pauš, Petr Klán Petr Klán (Gar.)	KZ	4	2P+2C	L,Z	V
BI-VR2	Virtual reality II Petr Klán Petr Klán (Gar.)	KZ	3	1P+2C	L	V
BI-VAK.21	Selected Applications of Combinatorics Michal Opler Michal Opler Michal Opler (Gar.)	Z	3	2R	L	V
BI-VMM	Selected Mathematical Methods Marzieh Forough Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	4	2P+2C	L	V
NI-VYC	Computability Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+2C	L	V
BI-ZS10	Bachelor internship abroad for 10 credits Zden k Muziká Zden k Muziká (Gar.)	Z	10		Z,L	V
BI-ZS20	Bachelor internship abroad for 20 credits Zden k Muziká Zden k Muziká (Gar.)	Z	20		Z,L	V
BI-ZS30	Bachelor internship abroad for 30 credits Zden k Muziká Zden k Muziká (Gar.)	Z	30		Z,L	V
BI-ZIVS	Intelligent Embedded System Fundamentals Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	KZ	4	1P+3C	Z	V
BI-ZPI	Process engineering Robert Pergl Robert Pergl (Gar.)	KZ	4	1P+2C	L	v
BI-ZNF	PHP Framework Nette - basics Ji í Chludil	KZ	3	2P+1C	L	v
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad Rostislav Babá ek, Igor Rosocha Martin P Ipitel Martin P Ipitel (Gar.)	ΚZ	4	2C	Z	V
BI-ZWU	Introduction to Web and User Interfaces Lukáš Ba inka Lukáš Ba inka Jakub Klímek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-3DT.1	3D Printing Miroslav Hron ok, Tomáš Sýkora Tomáš Sýkora Miroslav Hron ok (Gar.)	KZ	4	3C	L	v

Characteristics of the courses of this group of Study Plan: Code=BI-V.2021 Name=Purely Elective Courses of Bachelor Programme Informatics, version from 2021/22 till 2024/25

TVK1	Physical Education	Z	1
TVV	Physical education	Z	0
TV1	Physical Education	Z	0
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
BI-ADW.1	Windows Administration	Z,ZK	4
This course is prese	nted in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-ALO	Algebra and Logic	Z,ZK	4
The course extends	and deepens the study of topics touched upon in the basic course in logic.		

BI-AVI.21 Algorithms visually	Z,ZK	4
The course complements other algorithm courses at FIT. It brings knowledge about particular important algorithms from different field		-
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: td="" www.alg<=""><td>govision.org>)</td></http:>	govision.org>)
that make understanding the principles of algorithms easy.		
BI-A2L English language, preparation for the B2 level exam	Z	2
The content of the course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Acad	demic Achievement - students are	due to: -Take an
active part in the language instructionMeet 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 wi	I be specified by individual teacher	rs during the first
class of the term.		
BI-APJ Aplication Programming in Java	Z,ZK	4
This course is presented in Czech. Advanced technologies in Java.		
NI-AFP Applied Functional Programming	KZ	5
This course is presented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional a	nd novel functional programming la	anguages are on
the rise nowadays and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Jav	a). As such, mastering this paradig	gm becomes a
necessary competence of a software engineer: the theory and especially the practice.		
BIE-ZUM Artificial Intelligence Fundamentals	Z,ZK	4
Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses i	1 ' 1	he areas of state
space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the e	volutionary algorithms and the neu	ral networks, will
be presented as well.		
BI-BLE Blender	Z,ZK	4
The course extends knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is i	· · · · ·	graphics and
animation. It offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Prog	gramming graphics applications) co	ourse.
NI-DSP Database Systems in Practes	Z,ZK	4
This course is presented in Czech.	_,	
BI-STO Storage and Filesystems	Z,ZK	4
The student will learn principles and current solutions of storage systems architecture. The module explains principles of data store,	1 '	· ·
load balancing and high availability.	protection, and areniving, as so as	storage sealing,
NI-PSD Public Services Design	KZ	4
The course will introduce students to specifics of UX, Service design and development for public sector. We will look into the design		· ·
suppliers (devs and designesr) as well as clients. In small teams students will work on projects from partner organizations and will it		
Course is aimed at students-designers as well as clients.	ry out conaboration with client repr	esentatives.
	7.72	5
	Z,ZK	-
This course provides a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progr of variables. Key theorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based OI	-	-
polynomial analysis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase re		
partial differential equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical method		
	Is for solving ODEs and PDEs_incl	ludina implicit
	Is for solving ODEs and PDEs, incl	luding implicit
and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
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and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs. NI-DZO Digital Image Processing This course presents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly determinate that have an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical of digital image processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, to frequency domain, abstraction, hybrid images, gradient domain editing, seamless image sticting and cloning, digital photo-montage interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, coloriz NI-DDM Distributed Data Mining Course focuses on state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Stude data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallelize other algorithms. The course is prezented in czech language. BI-EP1.24 Effective programming 1 The course is taught in Czech. Elificient Programming 2 Continuation of Efficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various we with the aim to choose the best one and avoid implements for writing assignments - Summary, Abstract, Argumentation Paper. The content of the course corresponds to the preparation for the EQ level exam The course is on advanced technologies in the Java programming l	Z,ZK als with practical algorithms that are background that is also valuable ou the mapping, HDR compression, define, color-to-gray conversion, contextation, painting, adding depth, alpha kits will gain hands on experience that implementations and will be capated in the series of solving individual problems at the series of solving individual problems at the series of solving individual problems at the series of solving individual teacher is a solving systems which are the series of the serie	4 e both easy to tside the domain a-blurring in t enhancement, a matting. 4 with large scale able to propose 4 are discussed, 2 due to: -Take an the final term rs during the first 4 re connected to 4 yith microservice 5 nting operations, ing, description g are base of 4 analysis of nation and data

BI-HMI History of Mathematics and Informatics This course is presented in Czech.	Z,ZK	3
BI-ARD Interactive applications on Arduino The subject is designed for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple app kits and control varied peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded 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 Software Engineering students.	d systems, i.e. to s	see the results
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 a presentation of AV signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practi- audiovisual transmissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the the quality and latency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recordin for audience.	cal use case scen effect of various of	arios of real-time components on
BIE-CSI Introduction to Computer Science	Z	2
This is an introductory class on Elementary Computer Science for broad audiences: bachelor students in computer science, students majoring in oth science, high-school students, anybody with a background in basic math and the desire to understand the absolute basics of computer science. The and relate basic principles of computer science for students to understand, early on, what computer science is, why things such as high-level progra done the way they are, and even how, on a basic yet representative and practically relevant level. After taking the class, students are able to answer questions but also questions about themselves such as which courses to take next and which books to follow up with, ideally realizing if they are int than expected, or even less than before.	e goal of the class amming languages r not just basic cor	is to introduce s and tools are nputer science
FITE-EHD Introduction to European Economic History	Z,ZK	3
The course introduces a selection of themes from the European economic history. It gives the student basic knowledge about forming of the global of the key periods in history. As European countries have been dominant actors in this process it focuses predominantly on their roles in the econom area of Roman Empire to fragmentation of the Middle Ages, from destruction of WWII to the current affairs, the development of modern financial ins does not cover detailed economic history of particular European countries but rather the impact of trade and role of particular events, institutions an meetings will consist of a mixture of lecture and discussion.	nic history. From la stitutions is deciphe	arge economic ered. The course
BIE-IMA2 Introduction to Mathematics 2 Students refresh and extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they a examples.	Z are able to apply th	2 nem in particular
BI-CS2 C# language and data access	KZ	4
The C# language and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Mid get to know objects used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current te of features for querying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQ and LINQ to SQL). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data (ORM). This part of the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Me (XML description).	echnologies such a L (LINQ to Objects a using domain-sp	as LINQ - a set s, LINQ to XML pecific objects
BI-CS3 Language C# - design of web applications The students will be introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overvious on thisplatform. They will learn to create WebAPI and to use it by client programs.	KZ iew of the develop	4 nent possibilities
BI-SQL.1 Language SQL, advanced Module is based on knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. I triggers, recursive queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the pu structures like indexes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plar will be discussed. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Or PostgreSQL.	oint of view of spec and possibilities	ialized database of its. changes
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 mechanic are based, and algorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software devel 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-V might be an advantage. No previous knowledge of physics is assumed.	lopment kit Qiskit,	which is based
NI-LSM Statistical Modelling Lab	KZ	5
The subject is oriented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is available information and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms.	•	
At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesis).		
BI-HAS Human Aspects in Cryptography and Security This course is for students interested not only in technical scope of computer science, but also in making products usable - for users and for develop use their gained knowledge to design, plan and analyse their own projects in the context of human-centered security.	Z,ZK pers. Students of t	5 his course can
NI-MPL Managerial Psychology	ZK	2
NI-MSI Mathematical Structures in Computer Science	Z,ZK	4
Mathematical semantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Sco Introduction to category theory.	ott model of lambd	a calculus.
BI-MPP.21 Methods of interfacing peripheral devices	Z,ZK	5
The course is focused on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ includes both PC side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of drivers, simple application development, and APIs of selected devices.		
BI-MIT Mikrotik technologies The main motivation of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are middle internet service providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on th and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary compute and technologies of the data-link, network and transport layer of the OSI model.	e metallic, optical	or wireless links

NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	nming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, whe		
	modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the s	•	
	dern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development		
	bject programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to wo f semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involv		-
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
	is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and au	· · ·	-
-	(e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the menti		
and procedural visualiz	ation, scientific data visualization, and 3D model scanning.		
BI-MMP	Multimedia team project	KZ	4
This course is presente	d in Czech.		
BI-ORL	Operations Research and Linear Programming	KZ	5
-	oduce students to the issues of operational research and primarily to the practical application of linear programming as a fun	-	ation technique.
	rimarily focuses on the use of engineering methods (with a mathematical background) to solve practical problems (such as m		
NI-OLI	Linux Drivers	Z,ZK	4
	stem is an important operating system for personal computer and also for embedded systems. Systems on chip and combining of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developme		
	dge of Linux operating system architecture, principles of development of various types drivers, including practical experience		
BI-ACM	Programming Practices 1	KZ	5
	se for preparing talented student for representation in international programming contests.	1	-
BI-ACM2	Programming Practices 2	KZ	5
This is a selective cours	se for preparing talented student for representation in international programming contests.	I	
BI-ACM3	Programming Practices 3	KZ	5
This is a selective cours	se for preparing talented student for representation in international programming contests.		
BI-ACM4	Programming Practices 4	KZ	5
This is a selective cours	se for preparing talented student for representation in international programming contests.		
BI-AND.21	Programming for the Android Operating System	KZ	4
This course is presente			
BI-CS1	Programming in C#	KZ	4
-	is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamenta , definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class de		
	properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debuggi		
well as work with files a		ng und oxooption	proceeding, de
BI-PJV	Programming in Java	Z,ZK	4
This course is presente	d in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	- 1	
BI-PJS.1	JavaScript Programming	KZ	4
	is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development		
	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	Programing in Kotlin	Z,ZK	4
	cally-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of adv wa compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of		
	plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	a modern, object	-functional way
NI-PSL	Programming in Scala	Z,ZK	4
	the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feat		
	y. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks		
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	imming, rule-base	ed programming,
	amic interactive applications and visualisations, data processing and presentations.		
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 the course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register		
	n their 3rd semester of study.	IOI DIE-IWA.I. II	ley should
BI-PS2	Programming in shell 2	Z,ZK	4
-	I overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In adv	I ' I	-
	er particular scripting languages and will get practical experience with shell script programming.	,, g	p
NI-PDD	Data Preprocessing	Z,ZK	5
Students learn to prepa	re raw data for further processing and analysis. They learn what algorithms can be used to extract information from various da		as images, texts,
	arn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of character	ristics from image	s or from web
pages.			
BI-PKM This course is presente	Introduction to mathematics d in Czech.	Z	4
NI-REV	Reverse Engineering	Z,ZK	5
	inted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens		
	inderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dec		
	C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be d		-
	ing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the comput ninars, where students will solve practically oriented tasks from the real world.	ei maiware scene	

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	ce to failures and a	attacks. Students
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	the subject is wor	k with scientific
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	chers. The topics a	are new for each
semester.		
BI-SCE2 Computer Engineering Seminar II	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance of the second state of the seco		
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	-	
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	chers. The topics a	are new for each
	<u> </u>	2
BI-ST1 Network Technology 1		3
The subject is oriented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredit	ed under the Cisc	o Netacad -
CCNA1 - R&S Introduction to Networks.	7	2
BI-ST2 Network Technology 2	Z	3
This course is presented in Czech.	7	2
BI-ST3 Network Technology 3		3 ST2 aguraga will
Students will further enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented duri get further extended in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pre-	-	
simple topology, security, etc.	dictability, exterior	on beyond a
	Z	3
BI-ST4 Network Technology 4 Students will further enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switchi		-
BI-ST2 courses got further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased eff		
beyond a simple topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a complete		
Broadcast Multiple Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and swi		
recoveries, and emergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitig	-	-
network running.	,	
BI-SKJ.21 Scripting Languages	Z,ZK	4
Students gain a general overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In ad	· · ·	•
into shell and some other particular scripting languages and will get practical experience with shell script programming.	aniori, irioy gain a	deeper meight
BI-SOJ Machine Oriented Languages	Z,ZK	4
Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal	· · ·	•
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie		
This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	5	33
FIT-SEP World Economy and Business	Z,ZK	4
This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly by		dual countries
and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as we		
corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of		
readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		
BI-SEP World Economy and Business	Z,ZK	4
This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly by	y comparing indivi	dual countries
and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as we	II 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 bas	ed on individual
readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		
NI-SYP Parsing and Compilers	Z,ZK	5
The module builds upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge	of various variants	and applications
of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
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 principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be then shown on DCVS Git both theoretically and principles will be the shown on DCVS	actically. In this pa	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	r administrators.	
BIE-SEG Systems Engineering	Z	0
This is an introductory class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles	of operating system	ems for students
to understand processor and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After tak	•	
understand the difference between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what co	ncurrency is, as o	pposed to
parallelism, and how processes and threads synchronize efficiently to overcome concurrency for communication.		
TV2K1 Physical Education 2	Z	1
BI-TS1 Theoretical Seminar I	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	ssical reading gro	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 i	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.		
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 i	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.		
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 i	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.		
BI-TS4 Theoretical Seminar IV	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla		-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course i	S a WORK WITH SCIE	nunc papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		

BI-TDA	Toot driven prohitesture	KZ	4
	Test driven architecture	1	-
	on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that		-
	a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur	· · ·	·
NI-TSP	Testing and Reliability	Z,ZK	5
Students will gain know	ledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to	prepare a test set	with the help of
the intuitive path sensit	ization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with	n built-in-self-test (equipment. They
	, analyze, and control the reliability and availability of the designed circuits.		
BI-QUA		KZ	4
	Quality Assurance	1	
	students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the contex		
	xperience hands-on application testing using both manual and automated testing. At the end of the semester, the student sho		
	test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found	d in the product ur	nder test.
FI-TOP	Academic writing	Z	2
Publishing is an import	ant and required part of research activity. It is not only about obtaining research results but also about applying them in the fo	orm of publication.	Writing scientific
publications can be use	eful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the	course. students v	vill learn how to
	what parts such an article should have, and how the peer review process works. Students will also try their hand at presenting		
	se will be taught in blocks, with one lecture at the beginning of the semester and one practicum in the middle of the semester	-	-
on the availability of en		Dates will be det	
-			
BI-CCN	Compiler Construction	Z,ZK	5
This is an introductory	class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principle	s of compilers for	students to
understand the design	and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching theme	e of the class.	
BI-TEX	TeX and Typography	Z,ZK	4
	d in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of		1
			s on typographic
rules.			
BI-EHD	Introduction to European Economic History	Z,ZK	3
This course is presente	ed in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-KSA	Cultural and Social Anthropology	ZK	2
	rse aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the dive	1 1	- examples from
	ch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, h		-
shown. The course is p		cann, mistory, aca	
· · · ·			-
BI-ULI	Introduction to Linux	Z	2
Students become famil	iar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and becom	ne familiar with bas	sic commands
and techniques of a Un	ix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (terminal).		
BI-OPT	Introduction to Optical Networks	Z,ZK	4
	rview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on p	· · ·	
-	nology and on their solutions. The course will include the history of optical communications, an overview of passive compone	-	
			-
1 · ·	rs, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission sy	,	
	ics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such		
	ansfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameter	s. Students will so	lve real tasks
from practice.			
NI-VCC	Virtualization and Cloud Computing	Z,ZK	5
	ledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies an		hev will aet
-	zation principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to eff	-	
	rs of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effec		
			-
	ex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical sk	his in the use of mo	odern integration
	(Continuous integration and development).		
BI-VHS	Virtual game worlds	ZK	4
The course leads stude	nts to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current	students knowled	ge is furthermore
complemented by the t	heory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world	I. The course can !	be followed by
	n the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.		
BI-VR1		KZ	4
	Virtual reality I	1	
	Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirement		
The course focuses on	the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves c	computational think	king, empathy
and shared social activ	ities.		
BI-VR2	Virtual reality II	KZ	3
	rse Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The of	1	elop applications
	nd gamification in various social metaverse and desktop engines.		
		7	2
BI-VAK.21	Selected Applications of Combinatorics	Z	3
	oduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the		
issue from applications	to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some b	asic data structure	es. Furthermore,
with the active participa	ation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical)	informatics. Areas	s from which we
will select problems to	be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optim	nization and more.	Students will
	olutions to the studied problems with a special focus on the effective use of existing tools.		
		7 71/	4
BI-VMM	Selected Mathematical Methods	Z,ZK	-
-	an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then		
	introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the	a wavelet transform	n. We examine
the linear programming	problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting examples.		
NI-VYC	Computability	Z,ZK	4
	Inside functions and effective computability.		'
, · · · · ·			

BI-ZS10	Bachelor internship abroad for 10 credits	Z	10
Each student can once	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	n. Before the
internship the Dean of t	he FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes	sional content and	d extent of the
internship. Auxiliary cou	rses 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 w	veeks of full-time
employment with a forei	gn 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	s if the internship
exceeds the academic y	/ear's dead-line.		
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
Each student can once	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	n. Before the
	he FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
	rses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits		
	gn 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	s if the internship
exceeds the academic y	/ear's dead-line.		
BI-ZS30	Bachelor internship abroad for 30 credits	Z	30
Each student can once	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	n. Before the
	he FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
	rses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits	•	
	gn 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	s if the internship
exceeds the academic y			
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
Intelligent embedded sy	stem fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim	of the course is to	o teach students
modern humanoid robot	t control and development of applications in a graphical development environment. Lectures provide fundamentals of motion c	ontrol, sensor rea	ding, application
interfaces, robot navigation	tion and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to g	et practical experi	ence with these
technologies.			
BI-ZPI	Process engineering	KZ	4
Students will learn fund	amentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	of process model	ling and they will
learn basics of the used	I notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of	ousiness processe	es using modern
CASE tools. The role of	process engineering for information systems development is discussed as well as its importance in the overall context of info	ormation and busi	ness strategy of
an enterprise.			
BI-ZNF	PHP Framework Nette - basics	KZ	3
Students will gain the ba	sics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czecl	n popular framewo	ork. The resulting
knowledge should serve	e for the efficient creation of a web backend in PHP language.		
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
This course is presented	d in Czech.	-	
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presente	d in Czech.		
BI-3DT.1	3D Printing	KZ	4
L			

Code of the group: BI-SI-VO.21

Name of the group: Elective vocational Courses for a Bachelor Specialization BI-SI.21, version 2021 Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADU.21	Unix Administration Zden k Muziká, Petr Zemánek, Miroslav Prágl Zden k Muziká Zden k Muziká (Gar.)	Z,ZK	5	2P+2C	L	V
BI-AWD.21	Web and Database Server Administration Michal Valenta, Lukáš Ba inka Lukáš Ba inka Michal Valenta (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-AG2.21	Algorithms and Graphs 2 Dušan Knop, Michal Opler, Ond ej Suchý, Tomáš Valla, Radek Hušek Ond ej Suchý Ond ej Suchý (Gar.)	Z,ZK	5	2P+2C	L	V
BI-ASB.21	Applied Network Security Yelena Trofimova, Ji í Dostál, Jakub Tetera, Michal Polák, Martin Šutovský, Martin Mandík Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	z	V
BI-APS.21	Architectures of Computer Systems Michal Štepanovský, Pavel Tvrdík Michal Štepanovský Pavel Tvrdík (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-BEK.21	Secure Code Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	2P+2C	L	V
BI-BIG.21	DB Technologies for Big Data Monika Borkovcová Monika Borkovcová Monika Borkovcová (Gar.)	KZ	5	2P+2C	Z,L	V
BI-EPP.21	Economic Business Processes David Buchtela David Buchtela Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	L,Z	V
BI-EHA.21	Ethical Hacking Ji í Dostál, Martin Kolárik, Andrej Šimko Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	V
BI-FBI.21	Financial Business Intelligence David Buchtela David Buchtela Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	V

BI-HWB.21	Hardware Security	Z,ZK	5	2P+2C	Z	v
	Jií Bu ek Jií Bu ek Jií Bu ek (Gar.) Internet of Things	Ζ,ΖΝ	5	2F+20	2	V
BI-IOT.21	Viktor erný, Lenka Kosková T ísková Lenka Kosková T ísková Lenka Kosková T ísková (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-JPO.21	Computer Units Pavel Kubalík Pavel Kubalík Pavel Kubalík (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-LA2.21	Linear Algebra 2 Daniel Dombek, Lud k Kleprlík, Karel Klouda, Marta Nollová, Jakub Šístek Lud k Kleprlík Karel Klouda (Gar.)	Z,ZK	5	2P+2C	L	v
BI-LOG.21	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-MDF.21	Modern Data Formats Petr Pauš Petr Pauš Petr Pauš (Gar.)	KZ	3	1P+1C	Z	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MGA.21	Multimedia and Graphics Applications Ji í Chludil, Lukáš Ba inka, Jan Buriánek, Šimon Tan v Lukáš Ba inka Ji í Chludil (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-PGR.21	Computer graphics programming Petr Felkel, Jaroslav Sloup Jaroslav Sloup Petr Felkel (Gar.)	Z,ZK	5	2P+2C	L	V
BI-PRS.21	Practical Statistics Kamil Dedecius, Petr Novák Petr Novák (Gar.)	KZ	5	1P+2C	L	V
BI-PNO.21	Practical Digital Design Martin Novotný Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	v
BI-PAI.21	Law and Informatics Zden k Ku era, Št pánka Havlíková, Dominik Vítek, Martin Samek, Ji í Maršál, Michal Mat jka Št pánka Havlíková Zden k Ku era (Gar.)	ZK	5	2P+2C	L	v
BI-PJP.21	Programming Languages and Compilers Jan Janoušek, Tomáš Pecka Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	v
BI-PGA.21	Programming of Graphic Applications Ji í Chludil, Radek Richtr Radek Richtr (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-PJS.21	JavaScript Programming Martin Kolárik, Nikita Mironov Monika Borkovcová Monika Borkovcová (Gar.)	KZ	5	3C	L	v
BI-PYT.21	Python Programming Martin Šlapák, Ji í Hanuš, Ond ej Bouchala, Mohamed Bettaz, Jan Šafa ík Martin Šlapák Martin Šlapák (Gar.)	KZ	5	3C	Z,L	v
BI-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	v
BI-SIP.21	Network Programming Jan Fest Jan Fest (Gar.)	Z	5	2P+2C	Z	v
BI-SPS.21	Administration of Computer Networks and Services Jan Kubr, Libor Dostálek Pavel Tvrdík Libor Dostálek (Gar.)	Z,ZK	5	2P+2S	Z	v
BI-ML1.21	Machine Learning 1 Karel Klouda, Daniel Vašata Daniel Vašata (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-ML2.21	Machine Learning 2 Daniel Vašata Daniel Vašata Daniel Vašata (Gar.)	Z,ZK	5	2P+2C	L	v
BI-SVZ.21	Machine vision and image processing Marcel Ji ina, Jakub Novák, David Kramný, Justýna Frommová Jakub Novák Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	L,Z	v
BI-SRC.21	Real-time systems Hana Kubátová, Ji í Vysko il Jaroslav Borecký Hana Kubátová (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-TAB.21	Applications of Security in Technology Ji í Dostál, Jan B lohoubek, Martin Kolárik, Martin Pozd na Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	v
BI-TPS.21	Computer Networks Technologies Vladimír Smotlacha, Josef Koumar Vladimír Smotlacha Vladimír Smotlacha (Gar.)	Z,ZK	5	2P+2S	Z	v
BI-TIS.21	Information Systems Pavel Náplava Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-TUR.21	User Interface Design Jan Schmidt Jan Schmidt Jan Schmidt (Gar.)	Z,ZK	5	2P+2C	L	v
BI-TWA.21	Design of Web Applications David Bernhauer David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-UKB.21	Introduction to Cybersecurity Ivana Trummová, Jan B lohoubek, David Pokorný, Jakub Tetera, František Ková , Martin Mandík, Tomáš Lu ák David Pokorný Jan B lohoubek (Gar.)	Z,ZK	5	3P+1C	Z	v
BI-VES.21	Embedded Systems Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	L	v
BI-VDC.21	Virtualization and Data Centers Ji í Kašpar Ji í Kašpar Ji í Kašpar (Gar.)	Z,ZK	5	2P+2C	L	v
BI-VIZ.21	Data Visualization Magda Friedjungová Magda Friedjungová Magda Friedjungová (Gar.)	KZ	5	3P	Z	v
BI-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	2P+2C	L	V

BI-VWM.21	Searching the Web and Multimedia Databases Ji í Novák, Tomáš Skopal Ji í Novák Tomáš Skopal (Gar.)	Z,ZK	5	2P+1C	L	V
BI-FEM.21	Fundamentals of Economics Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZRS.21	Basics of System Control Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZSB.21	Basics of System Security Marián Svetlík, Martin Šutovský, Dominik Novák, Ladislav Marko Simona Forn sek Simona Forn sek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZUM.21	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	5	2P+2C	L	V

Characteristics of the courses of this group of Study Plan: Code=BI-SI-VO.21 Name=Elective vocational Courses for a Bachelor Specialization BI-SI.21, version 2021

BI-EPP.21 Economic Business Processes	Z,ZK	5
The aim of the course is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic	and financial aspe	ects of business
in the market environment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of t	he company's life	cycle, from the
establishment of the company, through the management of property and capital structure, financing of the company, determining the cost function o	f the company and	d labor costs, to
evaluating the financial health of the company and its eventual rehabilitation or termination.		
BI-FBI.21 Financial Business Intelligence	Z,ZK	5
The aim of the course is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for busin	ess analysis, dete	rmining its value
and other indicators for comparison with other companies and management decision process at the tactical and strategic level. The second view is	management acco	ounting as a tool
for financial management and prediction of business development. Management accounting allows monitoring of the financial status and performance	of business activi	ties over several
accounting periods, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital a	nd to use value in	formation to
assess options related to future business decisions. The principles of management accounting, described in this course, are the basis of Business I	ntelligence module	es in business
information systems, decision support systems, and other knowledge-oriented systems.		
BI-PAI.21 Law and Informatics	ZK	5
The aim of the course is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge	of doing business	s in the Czech
Republic and will be alerted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding c	ontracts in real an	d Internet
environment, will know their responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able		
and open-source licenses. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protection	on against their mi	isuse. Students
will also be alerted to such behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses of	of real cases from	practice.
BI-MPP.21 Methods of interfacing peripheral devices	Z,ZK	5
The course is focused on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ	1 1	-
includes both PC side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of		-
drivers, simple application development, and APIs of selected devices.	· · · · · · , · ·	
BI-MVT.21 Modern Visualisation Technologies	Z,ZK	5
The goal of the course is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and at	1 1 1	-
high resolution displays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the ment		
and procedural visualization, scientific data visualization, and 3D model scanning.	ionoù toonnologio	o, namoly naolar
	Z,ZK	5
	1 1	-
Students will learn the internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T between user and administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rig	-	
processes, memory, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the l	-	
specific examples from practice.	nomeage nom an	
	Z,ZK	5
	1 1	-
Students will get acquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a		ex database and
web service systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of		-
BI-AG2.21 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 compulse	-	
delves into advances data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For El	iglish version of th	ne course see
BIE-AG2.21.		_
BI-ASB.21 Applied Network Security	Z,ZK	5
The aim of the course is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge ga		
security applications like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishi	ng the course stud	dent will get
knowledge of security applications in computer networks.		
BI-APS.21 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. Sp	-	-
pipelined instruction processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the	principles of instru-	ction processing
not only in scalar processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness	•	
program. The course further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory of	oherence and con	sistency in such
systems.		
BI-BEK.21 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		Alexandrian and a Rise as
theory students gain practical experience with running programs with reduced privilages and methods of appointing these privilages, since pet ever	-	-
theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not even	-	-
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir	y program needs to ng data and the rel	o run with lationships of
	y program needs to ng data and the rel	o run with lationships of
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir	y program needs to ng data and the rel	o run with lationships of
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	y program needs to ng data and the rel defense against th KZ	o run with lationships of nem. 5
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the BI-BIG.21 DB Technologies for Big Data	y program needs to ng data and the rel defense against th KZ e is focused practic	o run with lationships of nem. 5 cally so that after
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the BI-BIG.21 DB Technologies for Big Data Students will be introduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course	y program needs to ng data and the rel defense against th KZ s is focused practice e method of data p	o run with lationships of nem. 5 cally so that after processing (data

BI-EHA.21 Ethical Hacking	Z,ZK	5
The goal of the course is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vi	1 1	their possible
exploitation in computer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focu	s is on hands-on e	experience with
vulnerabilities testing and the following process of penetration test documentation.		1
BI-HWB.21 Hardware Security	Z,ZK	5
The course deals with hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the component modules, security features of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of H		,
attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including		-
for multi-factor authentication (biometrics). Students will understand methods of efficient implementations of ciphers.	5 11	
BI-IOT.21 Internet of Things	Z,ZK	5
The course focuses on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an	overview of senso	rs and actuators,
wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT arch		
areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development environme	nts (hardware - Al	RM, ESP, STM;
software - Arduino, Raspberry Pi OS).	771	F
BI-JPO.21 Computer Units Students deepen their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in deta	Z,ZK	5
organization of computer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using ap		
of multiplication. The organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, incl		-
correction for parallel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of co	ommunication of th	e 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 mic	roprogrammed pro	cessor simulator
and programmable hardware design kits (FPGA).		
BI-LA2.21 Linear Algebra 2	Z,ZK	5
Studenti si v tomto p edm tu rozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový		
Seznámíme se také s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou s bude numerická lineární algebra, kde si ukážeme potíže s ešením soustav lineárních rovnic na po íta i a možnosti, jak se s tímto problémem vypo	-	-
Ukážeme si také aplikace lineární algebry v r zných oborech.		
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, satisfia	1 1	alence, and the
logical consequence of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving,	are explained. This	s relates to the P
vs. NP problem and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and		ne syntactic
approach to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorem		
BI-MDF.21 Modern Data Formats	KZ	3
The goal of the course is to give an overview of commonly used data formats for typical types of data. There will be a description of each data type data type along with tools available to work with such data. After finishing the course, the students should know how to work with common data, e.g.		als used for that
BI-MGA.21 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 w	1 '	-
graphics and animation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to		
technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand t	he principle of ope	ration 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-PGR.21 Computer graphics programming	Z,ZK	5
After attending this curse, students can program a simple interactive 3D graphical application like a computer game or scientific visualization, desig		-
geometric details and materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles an such as graphical pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics and repres		
professional development, e.g., GPU programming and animations. They get used to techniques utilized in geometric modeling, modeling curves and s	•	
BI-PRS.21 Practical Statistics	KZ	5
The students will be introduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose	models fitting the	data. The course
will encompass regression and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical software and non-parametric methods.	ware R and will app	ply the studied
methods on data from real problems.		
BI-PNO.21 Practical Digital Design	KZ	5
Students get an overview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand and implementation technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern		
tools.	Tindustry-standard	d CAD design
BI-PJP.21 Programming Languages and Compilers	Z,ZK	5
Students learn basic compiling methods of programming languages. They are introduced to intermediate representations used in current compilers		1
create a specification of a translation of a text that conforms a given syntax, to a target code and also to create a compiler based on the specification		-
only a programming language but any text in a language generated by a given LL input grammar.		
BI-PGA.21 Programming of Graphic Applications	Z,ZK	5
The course will present the possibilities of current professional open-source tools for image editing, video editing, 3D animation (GIMP, Blender) and the source tools for image editing.		
data (3D scenes, mathematical data). Emphasis will be placed on the possibilities of further enhancement of the presented software tools, both usin by implementation of plugins.	ng built-in scripting	languages and
BI-PJS.21 JavaScript Programming	KZ	5
The course is an introduction to JavaScript programming. Students will also learn best practices and get acquai nted with tools that make code deve	1	1
BI-PYT.21 Python Programming	KZ	5
The aim of the course is to get acquainted with basic efficient control and data structures of the Python programming language for text and binary of		
between philosophy of programming in Python and in other programming languages will be explained. Each topic is prepared for students in the for	mat of a Jupyter n	otebook, which
enables greater accent to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a seme	ster work will be as	ssigned during
the semester.		
BI-PRR.21 Project management		5
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, a project, communication, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk		-
Gantt charts, resource schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for		-
deepening their knowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in		
also suitable for all those who will develop software or hardware in the form of team projects.		

BI-SIP.21	Network Programming	Z	5
	lamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level prog	ا ramming using B	SD sockets. The
second part is devoted	to designing communication protocols and their verification. The third part introduces the principles and applications of middl	eware technologie	es. The final part
introduces basic moder	n models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in co	omputer labs using	g a chosen
programming language			
BI-SPS.21	Administration of Computer Networks and Services	Z,ZK	5
	s to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administ		
	e course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained	by practical hand	is-on experience
with real network infrast		774	
BI-ML1.21	Machine Learning 1	Z,ZK	5
	is to introduce students to the basic methods of machine learning. They get theoretical understanding and practical working the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relations		
	fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimensi		
	s and scikit libraries in Python will be used.		
BI-ML2.21	Machine Learning 2	Z.ZK	5
The goal of this course	is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in	particular, learn k	ernel methods
and neural networks. In	the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction met	hods. Moreover, st	tudents get the
	orcement learning and natural language processing.		
BI-SVZ.21	Machine vision and image processing	Z,ZK	5
-	ecoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluat	-	
	lifferent types of camera systems and a variety of methods for image and video processing. The course is focused on practical	use of camera sys	stems for solving
	at the graduates may encounter.		
BI-SRC.21	Real-time systems	Z,ZK	5
	sic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issu ientally verified in computer labs. The course is mainly focused on embedded RT systems, therefore the design kits in the lab		
course.		are the same as	III UIE DIE-VES
BI-TAB.21	Applications of Security in Technology	Z,ZK	5
	is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stu	1 1	-
-	ins and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.	idente ger d'Dredd	
BI-TPS.21	Computer Networks Technologies	Z,ZK	5
	students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the phys	1 1	-
link layer. The lectures p	provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies and explain relevant physical principles.	nologies will be de	monstrated and
with the most important	ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Eth	iernet, modern wir	reless networks,
always with focus on high			
BI-TIS.21	Information Systems	Z,ZK	5
-	is to familiarise students with the information systems topic and information systems implementation principles. During the co		
-	y types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and oth f the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, wa		-
	prmation system implementation based on the project management principles. The emphasis is on the initial customer analys		
	er to implement any existing information system or to develop a new one from scratch. These factors determine the information	-	
	e information systems security, operation, support, maintenance, legislation impacts, and government information systems to		
BI-TUR.21	User Interface Design	Z,ZK	5
Students gain a basic o	verview of methods for designing and testing common user interfaces. They get experience to solve the problems where soft	1 1 1	oducts do not
communicate with the u	ser optimally, since the needs and characteristics of users are not taken into account during product development. Students	gain an overview	of methods that
bring users into the dev	elopment process to ensure optimal interface for them.		
BI-TWA.21	Design of Web Applications	Z,ZK	5
	b application development. Initially, the students become familiar with HTTP and its possibilities and partly with some propert		-
	resentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web application		
	te the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symf e demonstrated using a JavaScript language with library jQuery and possibly MV* framework React.	ony 2, Doctrine 2.	Developments
BI-UKB.21	Introduction to Cybersecurity	Z,ZK	5
	is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic concepts in modern approach to cybersecurity.	1 1	1
-	s, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace regulations.		, in cyberopaee
BI-VES.21	Embedded Systems	Z,ZK	5
-	n embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and emb	1	1
-	ramming methods, and applications. They get practical skills with development kits and tools.		, 0
BI-VDC.21	Virtualization and Data Centers	Z,ZK	5
The aim of the course is	s to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design	and implementatic	on of data center
	various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data	-	-
	uds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications		
-	operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, outa	-	
BI-VIZ.21	Data Visualization	KZ	5
	rerview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understa The as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preproce	-	
	in as data mining and machine learning, within the course, students will be introduced to exploratory data analysis, preproce uch as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications		-
	programming language.		
BI-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
-	the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and tech	1 1	1
	a networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practi	-	-
devices in the lab and le	earning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securi	ty.	

BI-VWM.21	Searching the Web and Multimedia Databases	Z,ZK	5
	•	,	-
•	iew about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous stora	•	
	tion about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from	1 0	
	arch in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web	search engines f	or the mentioned
data types (documents).			
BI-FEM.21	Fundamentals of Economics	Z,ZK	5
The course allows the stu	idents to discover basics of economic theory, which will then be used in subsequent courses of economics and manageme	nt. It contains a g	eneral overview
of fundamental microeco	nomic and macroeconomic topics.		
BI-ZRS.21	Basics of System Control	Z,ZK	5
The course gives an intro	duction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	cus our attention p	particularly on
control of engineering an	d physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript	ion methods of sy	stem models,
basic linear dynamic syst	ems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of cr	eating a descripti	on of the system
model, the basic linear dy	namic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give	n to sensors and	actuators in
control loops, issues of s	tability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industr	ial implementatio	n of continuous
and digital controllers and	d PLC control.	-	
BI-ZSB.21	Basics of System Security	Z,ZK	5
The goal of the course is	to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of fore	nsic analysis and	related topics
such as malware analysis	s or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of mo	dern operating sys	stems security,
as well as skills needed f	or independent work in the area of operating system security incident analysis.		
BI-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
Basic course on introduc	ion to artificial intelligence with emphasis on symbolic techniques. The design of an intelligent agent and the techniques nee	eded to create it w	/ill be discussed,
especially at the decision	-making level. The intelligent agent in the context of the course can be represented for example by a physical robot, but also	o by a non-physic	al entity, such
as a virtual assistant or a	character in a computer game. We will not only introduce the basics, but also show the current state-of-the-art during the c	ourse.	

List of courses of this pass:

	Name of the course	Completion	Credits
BI-3DT.1	3D Printing	KZ	4
active part in the lange	English language, preparation for the B2 level exam se corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement uage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both ate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by ind	the midterm and the	e final term
tests with the success h	class of the term.		ring the firs
BI-AAG.21	Automata and Grammars	Z.ZK	5
I	to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite	1 1 1	expressions
	context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know th iderstand the relationships between formal languages and automata. They are introduced to the Turing machine and complexity	•	I languages
BI-ACM	Programming Practices 1 This is a selective course for preparing talented student for representation in international programming contests.	KZ	5
BI-ACM2	Programming Practices 2 This is a selective course for preparing talented student for representation in international programming contests.	KZ	5
BI-ACM3	Programming Practices 3 This is a selective course for preparing talented student for representation in international programming contests.	KZ	5
BI-ACM4	Programming Practices 4 This is a selective course for preparing talented student for representation in international programming contests.	KZ	5
BI-ADU.21	Unix Administration	Z,ZK	5
between user and admi	ternal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. The nistrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights		
processes, memory, n	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kr specific examples from practice.		
BI-ADW.1	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kn		
	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kr specific examples from practice. Windows Administration	nowledge from the le	ectures on
BI-ADW.1 BI-AG1.21 The course covers the develops the knowledge	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kr specific examples from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK Z,ZK urriculum. It links and space co	ectures on 4 5 d partially
BI-ADW.1 BI-AG1.21 The course covers the develops the knowledge	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knowledge from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Algorithms and Graphs 1 e basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing of perform the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the	Z,ZK Z,ZK urriculum. It links and space co	ectures on 4 5 d partially
BI-ADW.1 BI-AG1.21 The course covers the develops the knowledge algorithm BI-AG2.21 This course, presente	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knowledge from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Algorithms and Graphs 1 e basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cr ge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the is. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic mathematics is an experimental structure of the student of th	Z,ZK Z,ZK urriculum. It links and e time and space comptotic notation. Z,ZK ry course BI-AG1.21	ectures on 4 5 d partially mplexity of 5 I. It further
BI-ADW.1 BI-AG1.21 The course covers the develops the knowledge algorithm BI-AG2.21 This course, presente	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the knowledge from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Algorithms and Graphs 1 e basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing or pe from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the is. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asy Algorithms and Graphs 2 d in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsion data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For English	Z,ZK Z,ZK urriculum. It links and e time and space comptotic notation. Z,ZK ry course BI-AG1.21	ectures on 4 5 d partially mplexity of 5 I. It further
BI-ADW.1 BI-AG1.21 The course covers the develops the knowledge algorithm BI-AG2.21 This course, presente delves into advances of	etwork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the known specific examples from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Algorithms and Graphs 1 e basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing of the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the is. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asy Algorithms and Graphs 2 d in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsion data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For Eng BIE-AG2.21. Algebra and Logic	Z,ZK Z,ZK urriculum. It links and e time and space comptotic notation. Z,ZK ry course BI-AG1.21 glish version of the comptone of th	4 5 d partially mplexity of 5 L It further course see

BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-ANGK	English language, contact preparation for the B2 level exam	Z	2
1	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 I	language instruction Meet the requirements for writing assignments - Summary, Abstract, Argumentation Paper Succeed in both th	ne midterm and the	final term
tests with the succe	ess rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by indi	vidual teachers du	ring the first
	class of the term.		
BI-APJ	Aplication Programming in Java	Z,ZK	4
	This course is presented in Czech. Advanced technologies in Java.		
BI-APS.21	Architectures of Computer Systems	Z,ZK	5
	n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec		
1	n processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the princ		
	processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of		
program. The cours	se further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory cohe systems.		incy in Such
BI-ARD	Interactive applications on Arduino	КZ	4
1	ned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applicat	1 1	
	ried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded s		•
	ay of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore	-	
	Software Engineering students.		
BI-ASB.21	Applied Network Security	Z,ZK	5
	rse is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine		with actual
	ons like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishing		
	knowledge of security applications in computer networks.		
BI-AVI.21	Algorithms visually	Z,ZK	4
	ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so		-
knowledge presente	ed in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&l	t;http://www.algovis	sion.org>)
	that make understanding the principles of algorithms easy.		
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
-	equainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and l		
	ice systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an examination of the systems.		
BI-BAP.21	Bachelor Thesis	Z	14
BI-BEK.21	Secure Code	Z,ZK	5
	arn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fa		-
	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
	ileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the		
BI-BIG.21		le deletise agailist	uleni.
		K 7	5
-	DB Technologies for Big Data roduced into the field of Big Data processing where populational (NoSOL) database engines are typically used today. The course is f	KZ	5 so that after
Students will be inti	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is f	ocused practically	so that after
Students will be intr finishing the course		ocused practically ethod of data proce	so that after essing (data
Students will be intr finishing the course	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is file students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me	ocused practically ethod of data proce	so that after essing (data
Students will be intr finishing the course	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is find a students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible metation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic	ocused practically ethod of data proce	so that after essing (data
Students will be intr finishing the course collection, transforr BI-BLE	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is fit a students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic of individual technologies will be supplemented with specific examples from practice.	ocused practically ethod of data proce al foundation and p Z,ZK	so that after essing (data presentation 4
Students will be into finishing the course collection, transforr BI-BLE The course exten	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is for e students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic of individual technologies will be supplemented with specific examples from practice. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those i offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph	ocused practically ethod of data proce al foundation and p Z,ZK nterested in 3D gra	so that after essing (data presentation 4 aphics and
Students will be intr finishing the course collection, transform BI-BLE The course exten- animation. It of BI-BPR.21	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is file students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic of individual technologies will be supplemented with specific examples from practice. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those i iffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph Bachelor project	ocused practically ethod of data proce al foundation and p Z,ZK nterested in 3D gra hics applications) c Z	so that after assing (data oresentation 4 aphics and aourse. 1
Students will be intr finishing the course collection, transform BI-BLE The course exten- animation. It of BI-BPR.21 1. At the beginnin	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is file students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic of individual technologies will be supplemented with specific examples from practice. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those i iffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph Bachelor project g of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the	ocused practically ethod of data proce al foundation and p Z,ZK nterested in 3D gra hics applications) c Z partial tasks that he	so that after assing (data orresentation 4 aphics and course. 1 e / she will
Students will be intr finishing the course collection, transforr BI-BLE The course extem animation. It of BI-BPR.21 1. At the beginnin perform during the	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is for e students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me mation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic of individual technologies will be supplemented with specific examples from practice. Blender ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those i iffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph Bachelor project g of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BRR at t	ocused practically ethod of data proce al foundation and p Z,ZK nterested in 3D gra hics applications) c Z partial tasks that he he end of the seme	so that after assing (data orresentation 4 aphics and aphics and acourse. 1 e / she will ester. 2. The
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nrococcing control	ation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda		
-	ling parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced t		-
in relational databa	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of datab optimizing database applications, distributed database systems, data stores.	oase systems, det	ugging and
BI-DML.21	Discrete Mathematics and Logic	Z,ZK	5
Students will get ad	equainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts for	n set theory will b	e explained.
Special attention is	paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cours	e also lays down t	the basics of
	combinatorics and number theory, with emphasis on modular arithmetics.		
BI-EHA.21	Ethical Hacking	Z,ZK	5
The goal of the co	purse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln	erabilities, and the	ir possible
exploitation in com	puter networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is	on hands-on expe	rience with
	vulnerabilities testing and the following process of penetration test documentation.		
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 sys	stems which are c	onnected to
	a database and are accessed through the web interface.		
BI-EJK	Enterprise Java and Kotlin	Z,ZK	4
	lvanced technologies in the Java and Kotlin programming languages. The focus is on technologies for developing enterprise informat		microservice
	architecture, that can be deployed to the cloud.		
BI-EP1.24	Effective programming 1	KZ	4
	The course is taught in Czech.		I
BI-EP2	Efficient Programming 2	KZ	4
	ficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving individ		-
	with the aim to choose the best one and avoid implementation errors.		,
BI-EPP.21	Economic Business Processes	Z,ZK	5
	rse is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic and		-
	onment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the		
	e company, through the management of property and capital structure, financing of the company, determining the cost function of the		,
	evaluating the financial health of the company and its eventual rehabilitation or termination.	o company and la	501 00010, 10
BI-FBI.21	Financial Business Intelligence	Z,ZK	5
	se is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for business	,	-
	s for comparison with other companies and management decision process at the tactical and strategic level. The second view is man		-
	ement and prediction of business development. Management accounting allows monitoring of the financial status and performance of b	-	-
	ds, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital and		
	ated to future business decisions. The principles of management accounting, described in this course, are the basis of Business Inte		
	information systems, decision support systems, and other knowledge-oriented systems.	0	
BI-FEM.21	Fundamentals of Economics		
	FUNDALIEURAIS OF FUNDAUCS	7 7K	5
The course allows		Z,ZK t contains a gene	5 ral overview
The course allows	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management.	,	-
	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics.	t contains a gene	ral overview
BI-FMU	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics. Financial and Management Accounting	t contains a gene	ral overview
BI-FMU The aim of the cour	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics. 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 par	t contains a gene Z,ZK ticular accounting	ral overview 5 operations,
BI-FMU The aim of the cour operations in accor	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics. 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 par unts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modificatio	t contains a gene Z,ZK ticular accounting n of bookkeeping,	5 operations, description
BI-FMU The aim of the cour operations in accor	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics. 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 par	t contains a gene Z,ZK ticular accounting n of bookkeeping,	5 operations, description
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BI-FMU The aim of the cour operations in accord of economic oper BI-GIT Students will be intre- even the intre- BI-GIT.21 This course is aimed BI-HAM This course introord network traffic are for analysis). The g BI-HAS This course is for standard BI-HMI BI-HWB.21 The course deals with modules, security for attacks and tamped BI-IDO.21 The course deals with covers the tools to	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics. Financial and Management Accounting res is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the para 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 manage Business Inteligence moduls in Business information systems. Version control system GIT roduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and practi mplementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git to SW Development Technologies dt at one of the rudimental team software development technology - version control. To be more specific, we will introduce students to from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use HW accelerated network traffic monitoring 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 cals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traffic level and to develop their practical abilities in this field. Hurman Aspects in Cryptography and Security students interested not only in technical scope of computer science, but also in making products usable - for users and for developers use their gained knowledge to design, plan and analyse their own projects in the context of huma	t contains a gene Z,ZK ticular accounting n of bookkeeping, ment accounting a KZ cally. In this partic erver administrator Z o Git, the informatic ource of informatic c on a hardware a Z,ZK s. Students of this Z,ZK ting principles of c ources, including so polications and re Z,ZK ems and services ng and deploying	ral overview 5 operations, description are base of 2 cular system ors. 3 ion manager 4 analysis of on and data and software 5 course can 3 ryptographic side-channel lated topics 5 The course software to

BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
	This course is presented in Czech.	1	
BI-IOT.21	Internet of Things	Z,ZK	5
	s on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an over		
wireless commun	ication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT architer	ctures for different	application
areas. Within the c	computer labs, students will gain practical experience with developing simple IoT systems using common development environments	(hardware - ARM,	ESP, STM;
	software - Arduino, Raspberry Pi OS).		
BI-JPO.21	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 v	, vith the internal str	ucture and
organization of con	nputer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using approp	riate codes for imp	lementation
of multiplication. Th	ne organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including	g codes for error de	etection and
correction for paral	lel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of comm	unication of the pro	ocessor with
the environment an	nd the architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micropro	ogrammed process	or simulator
	and programmable hardware design kits (FPGA).		
BI-KAB.21	Cryptography and Security	Z,ZK	5
	derstand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to		keys and
certificates in syste	ems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in app	lications. Within lab	os, students
-	actical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic proce		
BI-KOM.21	Conceptual Modelling	Z,ZK	5
	ised on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key te	· ·	-
	cify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological struc		
	/ learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent		
	ns of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO r		
	Il be taught. The course is designed with the respect to continuation in software implementations. Recommended optional follow-up c		in thotadon
			4
BI-KOT	Programing in Kotlin	Z,ZK	-
	n, statically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advar		
	Illy Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a l	-	ictional way
51.1/0.4	with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages)		
BI-KSA	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit	-	-
anthropological res	search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	h, history, death, e	tc) will be
	shown. The course is presented in Czech.		
BI-LA1.21	Linear Algebra 1	Z,ZK	5
	students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field		
	fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination of the concepts of	-	-
the connection w	rith linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenvectors and the second seco	values and eigenve	ectors of a
	matrix. We will also demonstrate some applications of these concepts in computer science.	1	1
BI-LA2.21	Linear Algebra 2	Z,ZK	5
Studenti si v tomto	p edm tu rozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový pros	tor v abstraktní ob	ecné form .
Seznámíme se ta	ké s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou graf	ikou. Dalším velký	m tématem
bude numerická lin	eární algebra, kde si ukážeme potíže s ešením soustav lineárních rovnic na poíta i a možnosti, jak se s tímto problémem vypoáda	tsd razem na roz	klady matic.
	Ukážeme si také aplikace lineární algebry v r zných oborech.		
BI-LOG.21	Mathematical Logic	Z,ZK	5
The course focuse	es on the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfiabilit	y, logical equivalen	ice, and the
logical consequence	ce of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are e	explained. This rela	ates to the P
vs. NP problem	and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and	I their models. The	syntactic
approact	h to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness the	eorems is explained	d.
BI-MA1.21	Mathematical Analysis 1	Z,ZK	5
We begin the cours	se 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 rea	sequences
and real functions of	of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functi	ons. This theoretica	al foundation
is then applied to ro	oot-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and	I solution of simple	optimization
problems (i.e., the i	ssue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical descript	ion of complexity of	f algorithms.
BI-MA2.21	Mathematical Analysis 2	Z,ZK	6
	tes the theme of analysis of real functions of a real variable initiated in BI-MA1 by introducing the Riemann integral. Students will lear		1
	on method. The next part of the course is devoted to number series, and Taylor polynomials and series. We apply Taylors theorem to the	-	
	escribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, an	-	-
	we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and I		-
	of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integ		-
BI-MDF.21	Modern Data Formats	KZ	3
	urse is to give an overview of commonly used data formats for typical types of data. There will be a description of each data type and	1	-
-	e along with tools available to work with such data. After finishing the course, the students should know how to work with common da		
BI-MGA.21	Multimedia and Graphics Applications	Z,ZK	5
	uainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for wor		1
	ation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to gra		
		•	
	y learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the p of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating		on anu use
			2
BI-MIT	Mikrotik technologies		
	on of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are con		
	vice providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the m		
and now to adminis	strate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer ne	etworks concepts li	ke protocols
1	and technologies of the data-link, network and transport layer of the OSI model.		

BI-ML1.21	Machine Learning 1	Z,ZK	5
-	course is to introduce students to the basic methods of machine learning. They get theoretical understanding and practical working k		
	dels in the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relationsh	-	
variance, and know	the fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimensiona demonstrations, pandas and scikit libraries in Python will be used.	i uata visualization	. in practical
BI-ML2.21		Z,ZK	5
	Machine Learning 2 purse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in pa		-
, e	ks. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction method		
	basic principles of reinforcement learning and natural language processing.	,	J
BI-MMP	Multimedia team project	KZ	4
	This course is presented in Czech.	1	1
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
The course is focus	ed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universa	al serial bus (USB).	The course
includes both PC s	ide and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USI	B devices, Linux ar	nd Windows
	drivers, simple application development, and APIs of selected devices.	7 71/	_
BI-MVT.21	Modern Visualisation Technologies urse is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augn	Z,ZK	5
-	lays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mention	-	
ingri recolution diop	and procedural visualization, scientific data visualization, and 3D model scanning.		anory naotai
BI-OOP.21	Object-Oriented Programming	Z,ZK	5
	rogramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		-
	t acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The empty		-
	for developing software, which includes testing, error handing, refactoring, and application of design pattern.		
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 poss	-	
	technology and on their solutions. The course will include the history of optical communications, an overview of passive components sators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system		
	e topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as		
	ncy transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters.		
	from practice.		
BI-ORL	Operations Research and Linear Programming	KZ	5
-	p introduce students to the issues of operational research and primarily to the practical application of linear programming as a fundation		-
	nal research primarily focuses on the use of engineering methods (with a mathematical background) to solve practical problems (suc	-	
BI-OSY.21	Operating Systems	Z,ZK	5
	a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread impead scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS moni		
	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS W		le lo design
BI-PA1.21	Programming and Algorithmics 1	Z,ZK	7
	ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, stru-		
statements, function	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for search	ing, sorting, and m	anipulating
	with linked lists and trees.		
BI-PA2.21	Programming and Algorithmics 2	Z,ZK	7
	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que	-	-
table). They lear	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e.g., template prog	ramming,
	copying/moving of objects, operator overloading, inheritance, polymorphism).	71/	F
BI-PAI.21	Law and Informatics urse is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge of	ZK	5
	If be alerted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding or	-	
	now their responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able to		
and open-source li	censes. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protection a	against their misus	e. Students
	ted to such behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses of	of real cases from p	practice.
BI-PGA.21	Programming of Graphic Applications	Z,ZK	5
	sent the possibilities of current professional open-source tools for image editing, video editing, 3D animation (GIMP, Blender) and their		-
data (3D scenes, n	nathematical data). Emphasis will be placed on the possibilities of further enhancement of the presented software tools, both using b by implementation of plugins.	uilt-in scripting lang	guages and
BI-PGR.21	Computer graphics programming	Z,ZK	5
	curse, students can program a simple interactive 3D graphical application like a computer game or scientific visualization, design the		
-	nd materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and ter		-
-	pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics and representi	-	
	pment, e.g., GPU programming and animations. They get used to techniques utilized in geometric modeling, modeling curves and surface	ces, and scientific v	visualization.
BI-PHP.1	Programing in PHP	KZ	4
	rught in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices		
development in l	PHP. The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register in their 3rd somester of study.	ror BIE-TWA.1. The	ey should
	register for this course in their 3rd semester of study.	7 71/	E
BI-PJP.21 Students learn ba	Programming Languages and Compilers asic compiling methods of programming languages. They are introduced to intermediate representations used in current compilers G	Z,ZK	5 ev learn to
	ion of a translation of a text that conforms a given syntax, to a target code and also to create a compiler based on the specification. T		-
	only a programming language but any text in a language generated by a given LL input grammar.		
BI-PJS.1	JavaScript Programming	KZ	4
	course is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development		
recommended for s	tudents of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for the	his course in their 4	th semester
	of study.		

BI-PJS.21	JavaScript Programming	KZ	5
The course is ar	n introduction to Javascript programming. Students will also learn best practices and get acquai nted with tools that make code develo	pment in Javascr	ipt easier.
BI-PJV	Programming in Java	Z,ZK	4
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		
BI-PKM	Introduction to mathematics	Z	4
	This course is presented in Czech.	7 71/	4
BI-PMA	Programming in Mathematica	Z,ZK	
Students will be wo	etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.	ing, rule-based pi	rogramming,
BI-PNO.21	Practical Digital Design	KZ	5
	verview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the		-
-	ion technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern in		
	tools.		
BI-PPA.21	Programming Paradigms	Z,ZK	5
	with basic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of par		
	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. Th		
on lambda calculu	is and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstru- such as C++ and Java.	eam programming	g languages
BI-PRR.21		Z.ZK	5
	Project management purse is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, analy	,	-
	cation, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk as		
	ource schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for stu		-
	nowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in large		
	also suitable for all those who will develop software or hardware in the form of team projects.		
BI-PRS.21	Practical Statistics	KZ	5
	e introduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose mod	-	
will encompass re	egression and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical software	R and will apply	the studied
	methods on data from real problems.		r .
BI-PS2	Programming in shell 2	Z,ZK	4
Students gain a ge	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In addition	on, they gain a de	eper insight
	into shell and some other particular scripting languages and will get practical experience with shell script programming.	7 71/	F
BI-PSI.21	Computer Networks ices students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local n	Z,ZK etworks and in the	5 e Internet as
	es will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced network		
	actically verify configurations and management of network devices in the lab within the environment of the operating systems Linux ar		
BI-PST.21	Probability and Statistics	Z,ZK	5
Students will learn	the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables.		
	om variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction t		
estimations of unk	known distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical	hypotheses and o	determining
	the statistical dependence of two or more random variables.		
BI-PYT.21	Python Programming purse is to get acquainted with basic efficient control and data structures of the Python programming language for text and binary data	KZ	5
	hy of programming in Python and in other programming languages will be explained. Each topic is prepared for students in the format		
	ccent to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a semester		
	the semester.		
BI-QAP	Quantum algorithms and programming	KZ	5
Course aims at givi	ing students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, or	ו which quantum f	technologies
	gorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developm		
on Python langua	ge. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VMM	and experience v	with Python
	might be an advantage. No previous knowledge of physics is assumed.		4
BI-QUA	Quality Assurance duces students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the context of	KZ	4
	will experience hands-on application testing using both manual and automated testing. At the end of the semester, the student should		
	n a set of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found		
BI-SAP.21	Computer Structure and Architecture	Z,ZK	5
	acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arith	,	1
memory, I/O comm	unication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple proces	sor is practically i	mplemented
	in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.		
BI-SCE1	Computer Engineering Seminar I	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to		
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
articles and other p	professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester.	s. The topics are r	new for each
BI-SCE2	Computer Engineering Seminar II	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to		1
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
	professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher		
	semester.		
BI-SEP	World Economy and Business	Z,ZK	4
	esented in Czech. The course introduces students of technical university to the international business. It does that predominantly by co		
and key regions of	world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as	indexes of econor	nic freedom,

	readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		in marviadar
BI-SIP.21	Network Programming	Z	5
	fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level program	nming using BSD s	ockets. The
	oted to designing communication protocols and their verification. The third part introduces the principles and applications of middlewa		
introduces basic	modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in co	mputer labs using	a chosen
DI CK I DI	programming language environment.	7 71	4
BI-SKJ.21 Students gain a g	Scripting Languages eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In additi	Z,ZK	ener insight
	into shell and some other particular scripting languages and will get practical experience with shell script programming.	on, they gain a det	oper morgine
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	irse will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal us	,	or's features
and efficient coope	ration of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view lin	nked to higher leve	l languages.
	This knowledge will be used during reverse engineering, optimization, and evaluation of code security.		
BI-SP1.21	Team Software Project 1	KZ	5
-	ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the nat teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teach		
-	ularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software art		
	and finished in the BIE-SP2 course.		
BI-SP2.21	Team Software Project 2	KZ	5
	s-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result		
	ollow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will work		eople. The
	er, in the role of the team and project leader, regularly consults with the team (at the seminars) the formal as well as material aspects		
BI-SPS.21	Administration of Computer Networks and Services rse is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrate	Z,ZK	5
	sers to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrate b. The course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained by		
	with real network infrastructure.		
BI-SQL.1	Language SQL, advanced	KZ	4
	h knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In pa		-
	queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point		
	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan ar ed. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora	-	-
	PostgreSQL.		rually off
BI-SRC.21	Real-time systems	Z,ZK	5
Students obtain t	he basic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issues	. Theoretical know	ledge from
lectures will be exp	perimentally verified in computer labs. The course is mainly focused on embedded RT systems, therefore the design kits in the lab ar	e the same as in th	ne BIE-VES
	course.		
BI-ST1	course. Network Technology 1	Z	3
BI-ST1	course. Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite	Z	3
BI-ST1 The subject is or	course. Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite CCNA1 - R&S Introduction to Networks.	Z d under the Cisco	3 Netacad -
BI-ST1	course. Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite	Z	3
BI-ST1 The subject is or	course. Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite CCNA1 - R&S Introduction to Networks. Network Technology 2	Z d under the Cisco	3 Netacad -
BI-ST1 The subject is or BI-ST2 BI-ST3 Students will furthe	course. Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite CCNA1 - R&S Introduction to Networks. Network Technology 2 This course is presented in Czech. Network Technology 3 re enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during E	Z d under the Cisco Z Z 3I-ST1 and BI-ST2	3 Netacad - 3 courses will
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BI-ST1 The subject is or BI-ST2 BI-ST3 Students will furthe get further exten BI-ST4 Students will furth BI-ST2 courses g beyond a simple Broadcast Multipl recoveries, and er BI-ST0 The student will lea BI-SVZ.21 Camera systems introduces students BI-SWI.21 Students get acqua their knowledge du using the visual la str BI-TAB.21 The goal of the co	Network Technology 1 iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredite CCNA1 - R&S Introduction to Networks. Network Technology 2 This course is presented in Czech. Network Technology 3 renhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during E ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pred simple topology, security, etc. Network Technology 4 er enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switching to further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pred further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased efficiency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network 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 nergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation network running. Storage and Filesystems	Z d under the Cisco Z Z BI-ST1 and BI-ST2 ctability, extension Z presented during I ency, predictability or ther type of netw firmware, perform on ways while main Z,ZK ving, as so as stor Z,ZK mage information. of camera system Z,ZK nsolidate and prac on experience with and testing. Within development. Z,ZK nts get a broader of security. KZ	3 Netacad - 3 Courses will beyond a 3 BI-ST1 and , extension vork (Non a password ntaining the 4 age scaling, 5 The course s for solving 5 titically verify CASE tools the course, 5 overview of 4

BI-TDP.21	Documentation and Presentation	KZ	3
The course is focu	sed on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically fi	nal university these	es. Students
	t of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically prese		
the teacher. The	course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first 14	days of teaching.	Within the
	exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.	771	4
BI-TEX	TeX and Typography sented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the		4
		course locuses on	typographic
BI-TIS.21	Information Systems	Z,ZK	5
-	burse is to familiarise students with the information systems topic and information systems implementation principles. During the court		-
-	xisting types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other		
The fundamer	tal part of the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, wa	ays of information s	systems
	nd information system implementation based on the project management principles. The emphasis is on the initial customer analysis,	-	-
	s better to implement any existing information system or to develop a new one from scratch. These factors determine the information sy	-	
BI-TJV.21	of the course information systems security, operation, support, maintenance, legislation impacts, and government information system	Z.ZK	5 sed.
-	Java Technology ide knowledge and skills for developing information systems and applications through concepts used in software development and exp	I ' I	-
	from Java language ecosystem. At the course end, the students are able to develop software systems in Java platform.		
BI-TPS.21	Computer Networks Technologies	Z,ZK	5
	luces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physica	I ' I	-
link layer. The lectu	ures provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies	gies will be demon	strated and
with the most impo	ortant ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethern	et, modern wireles	s networks,
	always with focus on high-speed networks.		
BI-TS1	Theoretical Seminar I	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic		
are treated individu	ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar	work with scientific	papers and
BI-TS2	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. Theoretical Seminar II	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	–	•
	ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a		
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		1 - 1
BI-TS3	Theoretical Seminar III	Z	4
Theoretical semina	ar 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	ually 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.		
		1	
BI-TS4	Theoretical Seminar IV	Z	4
Theoretical semina	Theoretical Seminar IV ar 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
Theoretical semina	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	al reading group. T	he students
Theoretical semina are treated individu	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	al reading group. T	he students papers and
Theoretical semina are treated individu BI-TUR.21	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. User Interface Design	al reading group. T work with scientific	he students papers and
Theoretical semina are treated individu BI-TUR.21 Students gain a b	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	al reading group. T work with scientific Z,ZK	he students papers and 5 ucts do not
Theoretical semina are treated individu BI-TUR.21 Students gain a b	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. User Interface Design basic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where software	al reading group. T work with scientific Z,ZK	he students papers and 5 ucts do not
Theoretical semina are treated individu BI-TUR.21 Students gain a b	Theoretical Seminar IV ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar. User Interface Design pasic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where softwar the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gai	al reading group. T work with scientific Z,ZK	he students papers and 5 ucts do not
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BI-VDC.21	Virtualization and Data Centers	Z,ZK	5
The aim of the cou	rse is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and	implementation of	data center
	h as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data cer	-	-
	rid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications.		
-	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, o	-	r
BI-VES.21	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 peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	led processors, the	ir integrated
BI-VHS		ZK	4
	Virtual game worlds tudents to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current stud	1 1	-
	the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. T	•	
	the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR device		eneried by
BI-VIZ.21	Data Visualization	KZ	5
	an overview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understandi		-
	eas such as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preprocess	•	
different kinds of da	ata such as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications of	selected methods t	o real-world
	examples in the Python programming language.		
BI-VMM	Selected Mathematical Methods	Z,ZK	4
	s with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then ad		
	r, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the w		le examine
	he linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interestin	<u> </u>	
BI-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
	upon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technolo	•	•
	al area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical	-	eal network
	vices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance		
BI-VR1	Virtual reality I	KZ	4
	ual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of		
The course locus	es on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves con and shared social activities.		j, emparny
BI-VR2	Virtual reality II	КZ	3
	virtual reality in virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The obje	1	-
	for computer science and gamification in various social metaverse and desktop engines.		applications
BI-VWM.21	Searching the Web and Multimedia Databases	Z.ZK	5
	ic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storag	1 ' 1	-
-	information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from		-
knowledge of simila	arity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web se	arch engines for the	e mentioned
	data types (documents).		
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
Intelligent embedd	ed system fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim of t	he course is to tea	ch students
modern humanoid	robot control and development of applications in a graphical development environment. Lectures provide fundamentals of motion cont	rol, sensor reading	, application
interfaces, robot na	avigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p	practical experience	e with these
	technologies.	· · · · · · · · · · · · · · · · · · ·	-
BI-ZNF	PHP Framework Nette - basics	KZ	3
Students will gain t	he basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech po	pular framework. I	he resulting
DI 701	knowledge should serve for the efficient creation of a web backend in PHP language.	1/7	
BI-ZPI	Process engineering	KZ	4
	fundamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles of p used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of busi	-	-
	ble of process engineering for information systems development is discussed as well as its importance in the overall context of inform		-
	an enterprise.		, ou alogy of
BI-ZRS.21	Basics of System Control	Z,ZK	5
	an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focus		
-	ering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description	-	-
basic linear dynam	ic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creat	ing a description of	f 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 ac	tuators in
control loops, issu	es 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	Z	10
	n once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or re		
	an of 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.		
	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 cor foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided int		
	exceeds the academic year's dead-line.		
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
	n once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or re	1 1	
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content.		
	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		
	foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided int		
	exceeds the academic year's dead-line.		
BI-ZS30	Bachelor internship abroad for 30 credits	Z	30
	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.	Before the
internship the De	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession	onal content and ex	tent 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

BH258.21 Beside of System Security Z.ZK 5 Beside the course is proved in modulation to be course in a security of some any system security. Z.ZK 5 BE200.12 Antibian intelligence of a security of some any system security. Z.ZK 5 BE200.12 Antibian intelligence of a security of some any system security. Z.ZK 4 BE200.12 Intelligence of a security of some any system security. Z.ZK 4 BE200.12 Intelligence of a security of some any system security. Z.ZK 4 BE200.12 Intelligence of a security of some any system security. Z.ZK 4 BE200.1 Intelligence of a security of some any system security. Z.ZK 4 BE200.1 Intelligence of a security of some any system security. Z.ZK 4 BE200.1 Intelligence of a security of some any system security. Z.ZK 4 BE200.1 Intelligence of a security of some any system security. Z.ZK 5 BE20.1 Intelligence of a security of some any system security. S.ZK 5 BE20.1 Intelligence of a security of some any system security. S.ZK <t< th=""><th></th><th>exceeds the academic year's dead-line.</th><th></th><th></th></t<>		exceeds the academic year's dead-line.		
such a melanes makes analysis or microlic response. After finality of sources source will got both hostscola and spreading system analysis. PI-ZUN 21 Artificial Intelligence Fundamentals PI-ZUN 21 Artificial Intelligence Fundamentals PI-ZUN 22K 5 PI-ZUN 21 PI-LINE CONTROL TO CONTROL TO CONTROL TO CONTROL TO CONTROL TO CONTROL PI-LINE CONTROL TO CONTROL TO CONTROL TO CONTROL TO CONTROL PI-LINE CONTROL TO CONTROL TO CONTROL TO CONTROL TO CONTROL PI-LINE CONTROL TO CONTROL TO CONTROL TO CONTROL TO CONTROL PI-LINE CONTROL TO CONT			,	-
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es a virtual essettant or a character in a computer gene. We will not only introduce the beats, but also drow the current state-of-the-off Lark (4 The ocurse is presented in Cardy, The Course is presented in C				
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	gid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ac		matting.
NI-IAM	Internet and Multimedia	Z.ZK	4
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	,	-
	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u	-	
	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effe		
the quality and late	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the	e scene up to the p	presentation
	for audience.		
NI-LSM	Statistical Modelling Lab	KZ	5
-	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p		
available information	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, and	-	properties.
	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi	-	
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
, ,	gramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where i plex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills		
	in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development no		
	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work of		
	ms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involver	- · ·	
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
-	emantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scott	•	-
	Introduction to category theory.		
NI-OLI	Linux Drivers	Z,ZK	4
The Linux operating	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po	werful processors	and FPGAs
	ability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developmer		lents. The
	urse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practica	al experience.	I
NI-PDD	Data Preprocessing	Z,ZK	5
	repare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data s		-
time series, etc., a	and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characterist	tics from images o	r from web
NI-PSD	pages. Public Services Design	KZ	4
	oduce students to specifics of UX, Service design and development for public sector. We will look into the design and development pi		
	nd designesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaboration	-	-
	Course is aimed at students-designers as well as clients.	·	
NI-PSL	Programming in Scala	Z,ZK	4
The course introdu	uces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature	es - e.g.pattern ma	atching and
advance standard li	ibrary Caple analysis to use of explications functional patterns of a LLL ist. Manada, etc. Caple is used by many neurorful frameworks and		
	ibrary. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and	libraries e.g. Play,	Cassandra,
	Scalaz, etc.		Cassandra,
NI-REV	Scalaz, etc. Reverse Engineering	Z,ZK	5
NI-REV Students will get ac	Scalaz, etc. Reverse Engineering quainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens before	Z,ZK pre and after the m	5 nain function
NI-REV Students will get ac is called. Students	Scalaz, etc. Reverse Engineering equainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens befor will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dedica	Z,ZK ore and after the m ated to reverse eng	5 nain function gineering of
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