Study plan

Name of study plan: Bachelor Specialization Management Informatics, 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 rudy branch: : Informatika chelor full-time 153 credits: 27					chtela,
	k: Compulsory courses in the program of credits of the block: 106 bock: PP					
2021 Requirement creat Requirement cou Credits in the gro Note on the If group: In B E of in p	b: Compulsory Courses of Bachelor Study Program dits in the group: In this group you have to gain 100 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 to ngineering, Computer Science, or Artificial Intelligence, enror study. If you plan to profile yourself in the Artificial Intelliger your 3rd semester of study. Otherwise, enroll in the course an to profile the specialization Artificial Intelligence or Web I	6 credits ete 20 cou anagement I neering, or W the specializa oll in the cou icce 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, (your 4th se e course E ter of study irse BI-AA	vorks and ne course Computer emester 8I-PST.21 y. If you
Code	bur 5th semester of study. Otherwise, enroll in the course BI Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members)	-PSI.21 in yo				Role
	Tutors, authors and guarantors (gar.)					
BI-AG1.21	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 (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 (Gar.)	Z,ZK	5	2P+1R+1C	z	PP
BI-KAB.21	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 finite automata, regular expressions,							
and regular grammars, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know the hierarchy of formal 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/stu	udijni/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	s 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	nctions. 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 sin	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		ate by parts and
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	o the computation	of elementary
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms	s, and its analysis	using the Master
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and	Hessian matrix, v	ve study the
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the in	ntegration of multiv	variate functions.
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	implementations,	race conditions,
critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS r	nonitoring. They a	re able to design
and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.		
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 1	-
well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced net		
practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS	-	
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	-	-
the statistical dependence of two or more random variables.		ia aotorining
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	1 1	-
statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for sear	-	
with linked lists and trees.	ching, sorting, and	Inampulating
	7 71/	7
BI-PA2.21 Programming and Algorithmics 2	Z,ZK	-
Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack,		-
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	igramming,
copying/moving of objects, operator overloading, inheritance, polymorphism).	7 71/	_
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	-	
memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple pr	ocessor is practica	ally implemented
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 comput		
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	computer power s	upply looks like
(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.		
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	nts to Git, the infor	mation manager
from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.		
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	lly final university	heses. Students
learn to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically p	resent it in front of	classmates and
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.		
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		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		
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	vel of advanced us	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		
Name of the block: Compulsory courses in the specialization		
Minimal number of credits of the block: 45		

The role of the block: PS

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

Name of the group: Compulsory Courses of Specialization Management Informatics, version 2021 Requirement credits in the group: In this group you have to gain 45 credits Requirement courses in the group: In this group you have to complete 9 courses Credits in the group: 45 Note on the group:

Code	(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	PS
BI-FBI.21	Financial Business Intelligence David Buchtela David Buchtela Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	PS
BI-KOM.21	Conceptual Modelling Robert Pergl, Marek B lohoubek Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	PS
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	PS
BI-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	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.)	KZ	5	2C	L	PS
BI-TIS.21	Information Systems Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-FEM.21	Fundamentals of Economics Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	Z	PS
Characteristics of the nformatics, version 2	e courses of this group of Study Plan: Code=BI-PS-MI.21 Name=C 2021	ompulsory C	ourses o	f Specia	lization Mar	nageme
1	conomic Business Processes			Z	Z,ZK	5 of business

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	cts 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 o	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	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	1 / 1	-
and other indicators for comparison with other companies and management decision process at the tactical and strategic level. The second view is	management acco	unting as a tool
for financial management and prediction of business development. Management accounting allows monitoring of the financial status and performance	•	°
accounting periods, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital a	ind to use value inf	ormation 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	s in business
information systems, decision support systems, and other knowledge-oriented systems.		
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 keeping abstract thinking and precise formulation skills using conceptual models.	y terms in a domair	n, the ability to
categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological s	tructural 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 repre	sentation in the Inte	ernet. They also
learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEM	IO 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-ZP	Ι.	
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	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 and	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	e to use commercia	al license types
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 mis	suse. 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 p	oractice.
BI-PRR.21 Project management		5
BI-PRR.21 Project management The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and	Z,ZK	-
	Z,ZK	agement in a
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and	Z,ZK nalysis, crisis mana assessment and n	agement in a nanagement,
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, ar project, communication, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk	Z,ZK nalysis, crisis mana assessment and n students who are i	agement in a nanagement, nterested in
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and 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	Z,ZK nalysis, crisis mana assessment and n students who are i	agement in a nanagement, nterested in
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and 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	Z,ZK nalysis, crisis mana assessment and n students who are i	agement in a nanagement, nterested in
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and 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.	Z,ZK halysis, crisis mana assessment and n students who are i large companies. T Z,ZK	agement in a management, nterested in The course is
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and 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-SWI.21 Software Engineering	Z,ZK nalysis, crisis mana assessment and n students who are i large companies. T Z,ZK y consolidate and p	agement in a nanagement, nterested in 'he course is 5 practically verify
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and 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-SWI.21 Software Engineering Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. The	Z,ZK nalysis, crisis mana assessment and n students who are i large companies. T Z,ZK y consolidate and p ds-on experience	agement in a nanagement, nterested in 'he course is 5 oractically verify with CASE tools
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, ar 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-SWI.21 Software Engineering Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. The their knowledge during the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hard	Z,ZK nalysis, crisis mana assessment and n students who are i large companies. T Z,ZK y consolidate and p ds-on experience v gn and testing. With	agement in a nanagement, nterested in 'he course is 5 oractically verify with CASE tools
The aim of the course is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, ar 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-SWI.21 Software Engineering Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. The their knowledge during the analysis and design of larger software projects that will be developed in the concurrent course BIE-SP1. Students get har using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design	Z,ZK nalysis, crisis mana assessment and n students who are i large companies. T Z,ZK y consolidate and p ds-on experience v gn and testing. With	agement in a nanagement, nterested in 'he course is 5 oractically verify with CASE tools
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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						
•	ıp: English Language Exam					
Requirement crea	dits in the group: In this group you have to gain at I	least 2 cre	dits (at	most 4	l)	
Requirement cou	rses in the group: In this group you have to comple	ete 1 cours	se			
Credits in the gro	up: 2					
0	BI-ANG, ending with an exam for two credits, is enrolled by s	students who	have co	mpleted	preparato	or English
	courses and have a credit from the BI-A2L course. bit			•	• •	•
group.	is enrolled by students who prepared for the exam independ	ently and do	not hav	e credit	from BI-A2	L. These
:	students must complete a credit paper before their own example	m. After pass	sing the	exam, th	e student	will also
	be recognized for the course BI-ANGS (Independent prepar	ation for the	English	exam) fo	or 2 credits	s.
	 The BIE-ECC course can be recognized for any activ	e semester a	after the	submiss	ion of a ex	xternal
	certificate at the level of at least B2 according to the Commo	on European	Framew	ork of R	eference.	
	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
BI-ANG1	English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	Z,ZK	2	2D	L	PJ
BIE-EEC	English language external certificate Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	4	2D	L	PJ
BI-ANG	English Language, Internal Certificate Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	ZK	2	2D	Z,L	PJ

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

Name of the block: Povinná t lesná výchova, sportovní kurzy Minimal number of credits of the block: 0 The role of the block: PT

Code of the group: BI-PT.21

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

Note on the group:

The student is obliged to successfully complete two courses of this group.

	9.04p.	, ,			0	
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: 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:

Note on the g						
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 (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era 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 Ji í Dan ek	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.)	КZ	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 (Gar.)	KZ	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 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	Z,ZK	4	2P+1C	L	V
BIE-CSI	Introduction to Computer Science 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	ZK	2	2P	Z,L	V
NI-MSI	Jan Fiala Jan Fiala Jan Fiala (Gar.) Mathematical Structures in Computer Science	Z,ZK	4	2P+1C	L	V
BI-MPP.21	Jan Starý Methods of interfacing peripheral devices	Z,ZK	5	2P+2C	Z	V
BI-MIT	Miroslav Skrbek Miroslav Škrbek Miroslav Skrbek (Gar.) Mikrotik technologies	KZ	3	1P+2C	Z	V
NI-MOP	Jan Fesl Jan Fesl Jan Fesl (Gar.) Modern Object-Oriented Programming in Pharo	KZ	4	3C	Z	V
BI-MVT.21	Jan Blizni enko Robert Pergl Robert Pergl (Gar.) Modern Visualisation Technologies	Z,ZK	5	2P+2C	 Z	V
BI-MMP	Ji í Chludil, Petr Pauš Petr Pauš Petr Pauš (Gar.) Multimedia team project	KZ	4	3C	 Z,L	v
BI-ORL	Zde ka echová Zde ka echová Zde ka echová (Gar.) Operations Research and Linear Programming	KZ	5	1P+2C	L	V
NI-OLI	Dušan Knop Dušan Knop Dušan Knop (Gar.)		4	2P+2C		
	Miroslav Skrbek, Jaroslav Borecký Jaroslav Borecký Miroslav Skrbek (Gar.) Programming Practices 1	Z,ZK			L	V
BI-ACM	Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Programming Practices 2	KZ	5	4C		V
BI-ACM2	Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	Z	V
BI-ACM3	Programming Practices 3 Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	V
BI-ACM4	Programming Practices 4 Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.)	KZ	5	4C	Z	V
BI-AND.21	Programming for the Android Operating System Jan Mottl, Jan Vep ek, Marek Kodr, 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 Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-PMA	Programming in Mathematica Zden k Buk Zden k Buk Zden k Buk (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PHP.1	Programing in PHP	KZ	4	3C	Z	V
BI-PS2	Programming in shell 2 Lukáš Ba inka	Z,ZK	4	2P+2C	L	V
NI-PDD	Data Preprocessing Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-PKM	Introduction to mathematics Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z	4		Z	V
NI-REV	Reverse Engineering Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Computer Engineering Seminar I Hana Kubátová Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V

BI-ST1 Network BI-ST2 Network BI-ST3 Network BI-ST4 Network BL-SK 21 Scrip	puter Engineering Seminar II Kubátová Hana Kubátová Hana Kubátová (Gar.) vork Technology 1 randru Moucha Alexandru Moucha (Gar.) vork Technology 2 randru Moucha Alexandru Moucha (Gar.)	ZZ	4	2C 2C	L,Z Z	V V
BI-ST1 Alexa BI-ST2 Network Alexa Alexa BI-ST3 Network BI-ST4 Network BL-SK121 Scrip	randru Moucha Älexandru Moucha (Gar.) rork Technology 2		3	2C	7	V 1
BI-ST3 Alexa BI-ST3 Netwo Alexa BI-ST4 Netwo Alexa BL-SK 21 Scrip		7			-	v
BI-ST4 Alexa BI-ST4 Netw Alexa BI-SK 21 Scrip		Z	3	3C	L	v
BI-ST4 Network Alexa	rork Technology 3 andru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-SK 21 Scrip	vork Technology 4 andru Moucha Alexandru Moucha (Gar.)	Z	3	2C	L	v
	pting Languages Ba inka, Jan Ž árek Lukáš Ba inka Jan Ž árek (Gar.)	Z,ZK	4	2+2	L	V
	hine Oriented Languages	Z,ZK	4	2P+2C	L	V
	d Economy and Business áš Evan	Z,ZK	4	2P+2C	L	V
BI-SEP World	d Economy and Business š Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	V
NI-SYP Parsi	ing and Compilers anoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	Z	v
BI-GIT Versi	ion control system GIT	KZ	2	16P	Z,L	V
	Pulc ems Engineering	Z	0	2C	Z	v
Christo	oph Kirsch Christoph Kirsch Christoph Kirsch (Gar.)		-	20		
Lubo	sical Education oš Neuman Ji í Drnek (Gar.)	Z	1		L,Z	V
	sical education	Z	0	0+2	Z,L	V
	sical Education	Z	0	0+2	Z	V
	sical education	Z	0	0+2	Z,L	V
TV2 Physi	sical Education	Z	0	0+2	L	V
TV2K1 Phys	sical Education 2	Z	1		L,Z	V
TVKLV Phys	sical Education Course	Z	0	7dní	L	V
TVKZV Phys	sical Education Course	Z	0	7dní	Z	V
DI-IOI	o retical Seminar I o Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
	oretical Seminar II o Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.)	Z	4	2C	L	V
BI-TS3 Theo	pretical Seminar III j Suchý, Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BLTS4 Theo	j p retical Seminar IV j Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	L	V
BI-TDA Test of	driven architecture	KZ	4	2P+1C	Z,L	v
NI-TSP Testi	ing and Reliability Fišer Martin Da hel Petr Fišer (Gar.)	Z,ZK	5	2P+2C	Z	V
	ity Assurance : Kodr, Martin Pilný, Kate ina Kalášková Kate ina Kalášková Marek Gar.)	KZ	4	3C	Z	V
	demic writing áš Nová ek	Z	2	10B	Z	V
BI-CCN Com	piler Construction oph Kirsch Christoph Kirsch (Gar.)	Z,ZK	5	2P+1C	L	V
BI-TEX TeX a	and Typography Díšák Petr Olšák Petr Olšák (Gar.)	Z,ZK	4	2P+1C	L	V
BI-EHD Introd	duction to European Economic History	Z,ZK	3	2P+1C	Z,L	V
BI-KSA Cultu Tomáš	ural and Social Anthropology š Houdek, Alena Libánská, Jakub Šenovský Jakub Šenovský Alena ská (Gar.)	ZK	2	2P	Z,L	v
BI-ULI Introc	duction to Linux k Muziká, Petr Zemánek, Jan Žárek Zden k Muziká Zden k já (Gar.)	Z	2	4D	Z	v
BI-OPT Introd	duction to Optical Networks	Z,ZK	4	2P+1C	Z	V
NI-VCC Virtua	alization and Cloud Computing š Vondra, Jan Fesl Tomáš Vondra Tomáš Vondra (Gar.)	Z,ZK	5	2P+1C	L	V
BI-VHS Virtua	al game worlds ek Richtr	ZK	4	2P+2C	Z	V
BI-VR1 Virtua	a l reality l Pauš, Petr Klán Petr Klán Petr Klán (Gar.)	KZ	4	2P+2C	L,Z	V
BI-VR2 Virtua	lal reality II Klán Petr Klán Petr Klán (Gar.)	KZ	3	1P+2C	L	V
BI-VAK 21 Selec	cted Applications of Combinatorics	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.)	КZ	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 presente	d 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 complement	ts other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the compute	r science that exte	end substantially
knowledge presented in	BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.or	g <http: td="" www.al<=""><td>govision.org>)</td></http:>	govision.org>)
that make understandin	g the principles of algorithms easy.		
BI-A2L	English language, preparation for the B2 level exam	Z	2
The content of the cours	se corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achieveme	nt - students are	due to: -Take an
active part in the langua	age instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both	the midterm and	the final term
tests with the success ra	ate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by i	ndividual teacher	s during the first
class of the term.			
BI-APJ	Aplication Programming in Java	Z,ZK	4
This course is presented	d in Czech. Advanced technologies in Java.		
NI-AFP	Applied Functional Programming	KZ	5
This course is presented	d in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel function	al programming la	inguages are on
the rise nowadays and t	he functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mast	ering this paradio	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	I to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the clas	sical tasks from t	he areas of state
space search, multi-age	ent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorit	hms and the neu	ral networks, will
be presented as well.			
BI-BLE	Blender	Z,ZK	4
The course extends know	wledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those	interested in 3D	graphics and
animation. It offers a con	mplete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graphic	s applications) co	ourse.
NI-DSP	Database Systems in Practes	Z,ZK	4
This course is presented	d in Czech.		
BI-STO	Storage and Filesystems	Z,ZK	4
The student will learn pr	inciples and current solutions of storage systems architecture. The module explains principles of data store, protection, and a	rchiving, as so as	storage scaling,
load balancing and high	availability.		
NI-PSD	Public Services Design	KZ	4
The course will introduc	e students to specifics of UX, Service design and development for public sector. We will look into the design and developmen	t process from th	e perspective of
suppliers (devs and des	ignesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaboration	on with client repr	esentatives.
	ents-designers as well as clients		

BIE-DIF	Differential equations	Z,ZK	5
This course provides a f	oundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essentiation	al solution method	ls like separation
	ms on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered		
	lowed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application	-	
	ions (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODI	Es and PDEs, Incl	uding implicit
· · ·	ods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.	7 71/	4
NI-DZO	Digital Image Processing	Z,ZK	4
	comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical a interactive applications provide batter understanding of basis the statistical background that is	-	
	interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is sing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDF		
	raction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray c	-	-
	ossible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, a		
NI-DDM	Distributed Data Mining	KZ	4
	e-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hand		-
	ork Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementation		0
	re other algorithms. The course is prezented in czech language.		
BI-EP1.24	Effective programming 1	KZ	4
The course is taught in		1	
BI-EP2	Efficient Programming 2	KZ	4
Continuation of Efficient	t Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving ind	ividual problems a	are discussed,
with the aim to choose t	the best one and avoid implementation errors.		
BI-ANGK	English language, contact preparation for the B2 level exam	Z	2
The content of the cours	se corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievene	ent - students are	due to: -Take an
active part in the langua	age instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both	the midterm and	the final term
tests with the success r	ate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by	individual teacher	s during the first
class of the term.			
BI-EJA	Enterprise Java	Z,ZK	4
The course is on advan	ced technologies in the Java programming language. The focus is on technologies for development of enterprise information	systems which ar	e connected to
a database and are acc	essed through the web interface.		
BI-EJK	Enterprise Java and Kotlin	Z,ZK	4
The course is on advan	ced technologies in the Java and Kotlin programming languages. The focus is on technologies for developing enterprise infor	mation systems w	ith microservice
architecture, that can be	e deployed to the cloud.		
BI-FMU	Financial and Management Accounting	Z,ZK	5
The aim of the course is	s explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the	particular accour	nting operations,
	and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modifica		
	based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage	jement accounting	g are base of
-	oduls in Business information systems.		-
BI-HAM	HW accelerated network traffic monitoring	KZ	4
	students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. T		
	datory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as		
	of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network t	rame on a narowa	are and software
· · ·	ir practical abilities in this field.	7 71/	0
BI-HMI This course is presente	History of Mathematics and Informatics	Z,ZK	3
		1/7	4
BI-ARD	Interactive applications on Arduino for students of first grade of headeder stude on introduction to embedded systems. Students will leave how to design simple appl	KZ	•
	for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple appl peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded		
	PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefor		
Software Engineering s			
NI-IAM	Internet and Multimedia	Z,ZK	4
	cused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes a	· · ·	
	als (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practic	-	
	ns. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the		
the quality and latency of	of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording	g the scene up to	the presentation
for audience.			
BIE-CSI	Introduction to Computer Science	Z	2
	lass on Elementary Computer Science for broad audiences: bachelor students in computer science, students majoring in othe	er fields but intere	sted in computer
science, high-school stu	udents, anybody with a background in basic math and the desire to understand the absolute basics of computer science. The	goal of the class	is to introduce
and relate basic princip	les of computer science for students to understand, early on, what computer science is, why things such as high-level progra	mming languages	and tools are
	and even how, on a basic yet representative and practically relevant level. After taking the class, students are able to answer	-	-
	tions about themselves such as which courses to take next and which books to follow up with, ideally realizing if they are inter-	erested in comput	er science more
than expected, or even			
FITE-EHD	Introduction to European Economic History	Z,ZK	3
	a selection of themes from the European economic history. It gives the student basic knowledge about forming of the global e		-
	tory. As European countries have been dominant actors in this process it focuses predominantly on their roles in the econom	-	-
	to fragmentation of the Middle Ages, from destruction of WWII to the current affairs, the development of modern financial inst		
	economic history of particular European countries but rather the impact of trade and role of particular events, institutions and a mixture of lecture and discussion.	a organizations in	TIISIUI Y. CIASS
v		Z	2
BIE-IMA2 Students refresh and ex	Introduction to Mathematics 2 (tend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they a		
examples.	and anomougo of oromoniary remained and men properties. Oragents understand basic mathematical principles diff they d		ion in particular
oxumpico.			

BI-CS2	C# language and data access	KZ	4
	ata access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Mic	rosoft platform. Th	he students will
get to know objects use	d to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current te	chnologies such a	as LINQ - a set
	and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQI		
	ther objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data		-
(ORM). This part of the (XML description).	course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Mo	odel, Storage Mod	lel and Mapping
BI-CS3	Language C# - design of web applications	KZ	4
	Language C# - design of web application s	1	
	Il learn to create WebAPI and to use it by client programs.		nem possibilities
BI-SQL.1	Language SQL, advanced	KZ	4
	wledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. I	1	l program unites,
triggers, recursive queri	es, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the po	oint of view of spec	ialized database
	clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan	-	-
	res will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora	acle DBMS and pa	artially on
PostgreSQL.		1/7	
BI-QAP	Quantum algorithms and programming	KZ	5
	udents hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanic ns showing advantages and limitations of quantum computing. During tutorials students work in open-source software devel		-
-	iowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VI	-	
	No previous knowledge of physics is assumed.		, ,
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	s put on the effect	ive use of the
available information an	d its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms,	and analyses of t	heir properties.
	t 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	Z,ZK	5
	nts interested not only in technical scope of computer science, but also in making products usable - for users and for develop	ers. Students of t	his course can
-	dge to design, plan and analyse their own projects in the context of human-centered security.		
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	s of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Sco	at model of lambda	a calculus.
Introduction to category BI-MPP.21	-	Z,ZK	5
	Methods of interfacing peripheral devices n methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ		-
	nd peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of U		
	on development, and APIs of selected devices.		
BI-MIT	Mikrotik technologies	KZ	3
The main motivation of	the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are	commonly used b	y the small and
	providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the		
	and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer	er networks conce	pts like protocols
-	data-link, network and transport layer of the OSI model.		
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, wh 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 developmen	-	-
	bject programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to wo		
technologies in terms of	f semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involve	vement in the Pha	ro Consortium.
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
The goal of the course i	s to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and au	igmented reality, v	isualization on
	(e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the ment	ioned technologie	s, namely fractal
	ation, scientific data visualization, and 3D model scanning.		
BI-MMP	Multimedia team project	KZ	4
This course is presente		1/7	r
BI-ORL	Operations Research and Linear Programming oduce students to the issues of operational research and primarily to the practical application of linear programming as a fur	KZ	5
	imarily focuses on the use of engineering methods (with a mathematical background) to solve practical problems (such as m		ation technique.
NI-OLI	Linux Drivers	Z,ZK	4
	tem is an important operating system for personal computer and also for embedded systems. Systems on chip and combining		
increase the variability of	of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developm	ent for master's st	udents. The
course provides knowle	dge of Linux operating system architecture, principles of development of various types drivers, including practical experience	<i>).</i>	
BI-ACM	Programming Practices 1	KZ	5
This is a selective cours	e for preparing talented student for representation in international programming contests.		
BI-ACM2	Programming Practices 2	KZ	5
	e for preparing talented student for representation in international programming contests.		1
BI-ACM3	Programming Practices 3	KZ	5
	e for preparing talented student for representation in international programming contests.		_
BI-ACM4	Programming Practices 4	KZ	5
	e for preparing talented student for representation in international programming contests.	1/7	A
BI-AND.21 This course is presente	Programming for the Android Operating System	KZ	4

BI-CS1 Programming in C#	KZ	4
The goal of the course is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundament		
operators, arrays, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class of constructors, methods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debug		
well as work with files are emphasized.		j , j ,
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).	1/7	4
BI-PJS.1 JavaScript Programming Main goal of the course is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development	KZ ent in Javascript. Th	4 ne course is
recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register		
of study.	1	
BI-KOT Programing in Kotlin	Z,ZK	4
Kotlin is a modern, statically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of a The language is fully Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development		
with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).		
NI-PSL Programming in Scala	Z,ZK	4
The course introduces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language fe advance standard library. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful framework		-
Scalaz, etc.	s and ibraries e.g.	riay, Cassariura,
BI-PMA Programming in Mathematica	Z,ZK	4
Students will be working with modern technical and scientific software. Students will learn how to use different programming styles (functional prog	ramming, rule-base	ed programming,
etc.), how to create dynamic interactive applications and visualisations, data processing and presentations. BI-PHP.1 Programing in PHP	KZ	4
The course is taught in Czech. Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practice	1	-
development in PHP. The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register		
register for this course in their 3rd semester of study.		
BI-PS2 Programming in shell 2	Z,ZK	4 deeper insight
Students gain a general overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In a into shell and some other particular scripting languages and will get practical experience with shell script programming.	iddition, they gain a	deeper insigni
NI-PDD Data Preprocessing	Z,ZK	5
Students learn to prepare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various of		-
time series, etc., and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extraction of characteristic problems in individual projects - e.g., extracteristic problems in individual projects - e.g., extracteristic problems in individual projects - e.g., extracteristic problems	teristics from image	es or from web
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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 optim	nal use of microproc	cessor's features
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of v	iew linked to higher	level languages.
This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	1	
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	, , ,	
and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as v		
corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the forr readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.	I OF DISCUSSIONS DAS	sed on individual
	Z,ZK	4
BI-SEP World Economy and Business This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly		
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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 knowledg	,	-
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	practically. 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 service of the student service of the servic	er 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 principle	es 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 ta	king the class, stud	lents are able to
understand the difference between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what	concurrency 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 c	lassical 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	is 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 c	lassical 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	e is 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 c	lassical 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	is 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 c		
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course	e is 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-TDA Test driven architecture	KZ	4
The course is focused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that		
world. This course has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occu		-
NI-TSP Testing and Reliability	Z,ZK	5
Students will gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able t		
the intuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems w	ith built-in-self-test e	equipment. They
will be able to compute, analyze, and control the reliability and availability of the designed circuits.		
BI-QUA Quality Assurance	KZ	4
This course introduces students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the control of a tester is in tester		
development and will experience hands-on application testing using both manual and automated testing. At the end of the semester, the student s		
analysis, design a set of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs fou		
FI-TOP Academic writing	Z	2
Publishing is an important and required part of research activity. It is not only about obtaining research results but also about applying them in the	-	-
publications can be useful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the		
write a scientific article, what parts such an article should have, and how the peer review process works. Students will also try their hand at presenting of the comparison o	-	-
else's article. The course 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 enrolled students.	er. Dates will be det	ermined based
	7 71/	F
BI-CCN Compiler Construction	Z,ZK	5 students to
This is an introductory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic princip understand the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching ther	-	
		4
BI-TEX TeX and Typography This course is presented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of	Z,ZK	4 s on typographic
rules.		
	7 71/	<u> </u>
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).	71/	
BI-KSA Cultural and Social Anthropology	ZK	2 oxomplos from
The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the di anthropological research from our "evotic" cultures (topics; kinship religion social evolution migration globalization material culture language		-
anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language,	neann, msiory, dea	in, etc) Will De
shown. The course is presented in Czech.		

BI-ULI Introduction to Linux	Z	2
Students become familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and becon	ne familiar with ba	sic commands
and techniques of a Unix-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
Students get basic overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on practical utilization in Internet and in network infrastructures.	oossible problems	with deployment
of optical network technology and on their solutions. The course will include the history of optical communications, an overview of passive compone	nts (optical fibres,	multiplexors,
dispersion compensators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission sy	/stems). The cours	se will also cover
the most up-to-date topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such	h as the accurate t	time on Internet,
ultrastable frequency transfer, 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.	1	
NI-VCC Virtualization and Cloud Computing	Z,ZK	5
Students will gain knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and	-	
acquainted with virtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to eff		
performance parameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effect		
management of complex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical sk	liis in the use of mo	odern integration
and development tools (Continuous integration and development).	71/	4
BI-VHS Virtual game worlds	ZK	4
The course leads students to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current	-	
complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.	1. The course can i	be followed by
	V7	4
BI-VR1 Virtual reality I	KZ	
Introduction to Virtual 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 of		
and shared social activities.		king, empairiy
	KZ	3
	1	-
Continuation of the course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The for computer science and gamification in various social metaverse and desktop engines.	Subjective is to deve	elop applications
	7	2
BI-VAK.21 Selected Applications of Combinatorics	Z	3
The course aims to introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the local frame applications to theoretical computer science and combinatorics and introduce some here the science and applications and applications and applications and introduce some here the science and applications are the science are the science and applications are the science are the s		
issue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some b with the active participation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical)		
will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optin		
also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.	inzation and more.	otudento wii
BI-VMM Selected Mathematical Methods	Z,ZK	4
The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then	1 1	-
properties. Further, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the		
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
Classical theory of recursive functions and effective computability.	, 2,21	-
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		-
internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
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		
employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divide	•	
exceeds the academic year's dead-line.	,	
BI-ZS20 Bachelor internship abroad for 20 credits	Z	20
Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	1	1
internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes		
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 v	veeks 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 divide	d into two subjects	s if the internship
exceeds the academic year's dead-line.		
BI-ZS30 Bachelor internship abroad for 30 credits	Z	30
Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	on. Before the
internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profes	sional content and	d extent of the
internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits	correspond to 4 w	veeks 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 divide	d into two subjects	s if the internship
exceeds the academic year's dead-line.		
BI-ZIVS Intelligent Embedded System Fundamentals	KZ	4
Intelligent embedded system 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 control and development of applications in a graphical development environment. Lectures provide fundamentals of motion of		
interfaces, robot navigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to g	jet practical experi	ence with these
technologies.		
BI-ZPI Process engineering	KZ	4
Students will learn fundamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	-	
learn basics of the used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of	-	-
CASE tools. The role of process engineering for information systems development is discussed as well as its importance in the overall context of inf	ormation and busi	ness strategy of
an enterprise.		-
BI-ZNF PHP Framework Nette - basics	KZ	3
Students will gain the basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czec	h popular framewo	ork. The resulting
knowledge should serve 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 in Czech.		

BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presented	d in Czech.		
BI-3DT.1	3D Printing	KZ	4

Code of the group: BI-MI-VO.21 Name of the group: Elective vocational Courses for a Bachelor Specialization BI-MI.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-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-HWB.21	Hardware Security Jií Bu ek Jií Bu ek Jií Bu ek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-IOT.21	Internet of Things 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 (Gar.)	KZ	3	1P+1C	Z	V
FIT-ITI	Modern IT infrastructure	Z,ZK	5	2P+1C	Z,L	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš 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-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	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.)	КZ	5	2P+2C	Z	V
BI-PJP.21	Programming Languages and Compilers Jan Janoušek, Tomáš Pecka Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	V
BI-PPA.21	Programming Paradigms Jan Janoušek, Tomáš Pecka, Petr Máj, Tomáš Jakl Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+2R	Z	V
BI-PGA.21	Programming of Graphic Applications Ji í Chludil, Radek Richtr 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.)	КZ	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.)	ΚZ	5	3C	Z,L	v
BI-SIP.21	Network Programming Jan Fesl Jan Fesl (Gar.)	Z	5	2P+2C	Z	V
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.)	ΚZ	5	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 (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-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	v
BI-TPS.21	Computer Networks Technologies Vladimír Smotlacha, Josef Koumar Vladimír Smotlacha Vladimír Smotlacha (Gar.)	Z,ZK	5	2P+2S	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-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	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 (Gar.)	ΚZ	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-ZRS.21	Basics of System Control Kate ina Hyniová Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-ZSB.21	Basics of System Security Marián Svetlik, 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 (Gar.)	Z,ZK	5	2P+2C	L	v

			•
The course is focused o	n methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ	ersal serial bus (L	JSB). The course
includes both PC side a	nd peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of l	JSB devices, Linu	ix and Windows
drivers, simple application	on development, and APIs of selected devices.		
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
The goal of the course is	s to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and au	igmented reality,	visualization on
high resolution displays	(e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the ment	ioned technologie	s, namely fractal
and procedural visualization	ation, scientific data visualization, and 3D model scanning.		
BI-ADU.21	Unix Administration	Z,ZK	5
Students will learn the in	ternal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T	hey will understan	d the differences
between user and admir	nistrator roles. They will get theoretical and practical knowledge of user management and administration, of users access righ	nts, file systems, c	lisk subsystems,
processes, memory, net	work services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the k	nowledge from th	e lectures on
specific examples from	practice.		
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
Students will get acquai	nted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a	nd backup compl	ex database and
web service systems. Th	ne principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of	a web server.	

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 compuls	ory course BI-AG1	.21. It further
delves into advances data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For E	nglish version of th	e 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 gr	ained in course BI-	
security applications like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finish		
knowledge of security applications in computer networks.	0	U
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	1 ' 1	-
pipelined instruction processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the		-
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	Unerence 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 getti	-	-
theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not ever		
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of security	ng data and the rel	lationships of
security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	defense against th	nem.
BI-BIG.21 DB Technologies for Big Data	KZ	5
Students will be introduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course	is focused practic	ally so that after
finishing the course students were able to choose suitable tools (mostly open source) and techniques design and implement a simplest reproducible	e method of data p	rocessing (data
collection, transformation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theo		
of individual technologies will be supplemented with specific examples from practice.		
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	-
exploitation in computer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus		•
	s is on nanus-on ex	xperience with
vulnerabilities testing and the following process of penetration test documentation.		
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 o	perating principles	of cryptographic
modules, security features of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HV	V resources, includ	ing side-channel
attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology includin	g applications and	related topics
for multi-factor authentication (biometrics). Students will understand methods of efficient implementations of ciphers.		
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	1 · · ·	s 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		
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 deta		-
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, inclu	•	
correction for parallel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of co		
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 micro	oprogrammed proc	cessor simulator
and programmable hardware design kits (FPGA).	r	
BI-LA2.21 Linear Algebra 2		
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	Z,ZK	5
Studenti si v tonto p edini tu tozsi i zinalosti z p edini tu bi-LAT, kue se pracovalo pouze s vektory ve tonni. In-tic i sel. zue si zavedenie vektorovy	1 1	
Student si v tomo p edin tu tozsi i znalosi z p edin tu bi-za, kue se pracovalo pouze s vektory ve tomo i natio i sel zue si zavedene vektory Seznámíme se také s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou g	prostor v abstraktn	ní obecné form .
	prostor v abstraktn grafikou. Dalším ve	ní obecné form . Ikým tématem
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Seznámíme se také s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou g 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 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	prostor v abstraktn grafikou. Dalším ve ádat s d razem na Z,ZK bility, logical equiva	ní obecné form . Ikým tématem a rozklady matic. 5 alence, and the
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BI-PRS.21	Practical Statistics	KZ	5
The students will be intr	oduced 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
	ion and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical softw	are R and will app	bly the studied
methods on data from r			
BI-PNO.21	Practical Digital Design	KZ	5
e e	w of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the hologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern		
tools.	nnologies FFGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern	industry-standard	I CAD design
BI-PJP.21	Programming Languages and Compilers	Z,ZK	5
	mpiling methods of programming languages. They are introduced to intermediate representations used in current compilers	1 1	-
	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 lar	guage but any text in a language generated by a given LL input grammar.		
BI-PPA.21	Programming Paradigms	Z,ZK	5
The course deals with b	asic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of	particular approa	ches. Functional
	and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming		
	I on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mair	nstream programm	ning languages
such as C++ and Java.		774	
BI-PGA.21	Programming of Graphic Applications	Z,ZK	5
	the possibilities of current professional open-source tools for image editing, video editing, 3D animation (GIMP, Blender) and tl ematical data). Emphasis will be placed on the possibilities of further enhancement of the presented software tools, both usin		
by implementation of pl		ig built in scripting	languages and
BI-PJS.21	JavaScript Programming	KZ	5
	uction 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
	s to get acquainted with basic efficient control and data structures of the Python programming language for text and binary data	1 1	-
	programming in Python and in other programming languages will be explained. Each topic is prepared for students in the forr		
enables greater accent	to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a semes	ter work will be as	signed during
the semester.			
BI-SIP.21	Network Programming	Z	5
	amental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level prog		
	to designing communication protocols and their verification. The third part introduces the principles and applications of middl	-	-
	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-SP2.21	Team Software Project 2	KZ	5
-	experience with the iterative development process while working on a large-scale software project. The first iteration is the re-		
	up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will we a team and project leader, regularly consults with the team (at the cominarc) the formal as well as material associate of their as		people. The
	e team and project leader, regularly consults with the team (at the seminars) the formal as well as material aspects of their s	Solution.	
	Administration of Computer Networks and Convises	7 77	F
BI-SPS.21	Administration of Computer Networks and Services	Z,ZK	5
The aim of the course i	s to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administration	rated under the op	erating systems
The aim of the course is Linux and Windows. The	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	rated under the op	erating systems
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BI-TWA.21 Design of Web Applications	Z,ZK	5
The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some proper	ies of language de	escribing the
structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web application		
modern libraries facilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Syml	ony 2, Doctrine 2.	Developments
on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework React.		
BI-IDO.21 Introduction to DevOps	Z,ZK	5
The course deals with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of	systems and serv	ices. The course
covers the tools to support software development, testing and compilation. It also focuses on tools for automating infrastructure management and but	uilding and deploy	ing software to
the Cloud. It is an introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acqua	nted with modern	technologies
used in practice.		
BI-UKB.21 Introduction to Cybersecurity	Z,ZK	5
The goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic of	overview of threats	in cyberspace
and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace regulations.		
BI-VES.21 Embedded Systems	Z,ZK	5
Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and emb	edded processors	, their integrated
peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.		
BI-VDC.21 Virtualization and Data Centers	Z,ZK	5
The aim of the course is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design	and implementation	on of data center
infrastructure, such as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data	center technologie	s from private
to public and hybrid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud application	 Students will un 	derstand the
design, validation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, outa	iges, and data los	ses.
BI-VIZ.21 Data Visualization	KZ	5
The course offers an overview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understa	nding data, their d	content and their
application in areas such as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preproce	ssing, and ways o	f visualizing
different kinds of data such as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications	of selected method	ods to real-world
examples in the Python programming language.		
BI-VPS.21 Selected Topics in Computer Networking	Z,ZK	5
The course builds upon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and tech	nologies used in m	odern computer
networks from local area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practi	cal experience wit	th real network
devices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securi	iy.	
BI-VWM.21 Searching the Web and Multimedia Databases	Z,ZK	5
Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous stora	age of documents.	In particular,
students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction fro	m web pages. The	y get detailed
knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web	search engines fo	or the mentioned
data types (documents).		
BI-ZRS.21 Basics of System Control	Z,ZK	5
The course gives an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	cus our attention p	particularly on
control of engineering and 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 systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of c	reating a description	on of the system
model, the basic linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give	on to sensors and	actuators in
control loops, issues of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the indust	ial implementation	n of continuous
and digital controllers and 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		
such as malware analysis 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 for independent work in the area of operating system security incident analysis.		
BI-ZUM.21 Artificial Intelligence Fundamentals	Z,ZK	5
Basic course on introduction to artificial intelligence with emphasis on symbolic techniques. The design of an intelligent agent and the techniques ne	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 als	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	ourse.	

List of courses of this pass:

Code	Name of the course	Completion	Credits
BI-3DT.1	3D Printing	KZ	4
BI-A2L	English language, preparation for the B2 level exam	Z	2
The content of the	course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement	students are due	to: -Take an
active part in the	anguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed 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-AAG.21	Automata and Grammars	Z,ZK	5
Students are introd	uced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite a	automata, regular e	expressions,
and regular gramm	ars, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know the	hierarchy of forma	l languages
and the	ey understand the relationships between formal languages and automata. They are introduced to the Turing machine and complexity	classes P and NP.	
BI-ACM	Programming Practices 1	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		

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	KZ	5
BI-ADU.21	This is a selective course for preparing talented student for representation in international programming contests. Unix Administration	Z,ZK	5
	ne internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They		-
between user and a	dministrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights,	file systems, disk	subsystems,
processes, memor	ry, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kn specific examples from practice.	owledge from the	lectures on
BI-ADW.1	Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-AG1.21	Algorithms and Graphs 1	Z,ZK	5
	s the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cu		
	ledge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the ithms. The course also follows up knowledge from BI MA1.21, the practical upage of asymptotic mathematics, in particular, the asymptotic mathematics is particular.		omplexity of
BI-AG2.21	ithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic mathematics in particular, the asymptotic mathematics and Braphs 2	Z,ZK	5
	Auguritations and Graphs 2 ented in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulsor	· · ·	-
	es data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For Eng BIE-AG2.21.		
BI-ALO	Algebra and Logic The course extends and deepens the study of topics touched upon in the basic course in logic.	Z,ZK	4
BI-AND.21	Programming for the Android Operating System	KZ	4
BI-ANG	This course is presented in Czech. English Language, Internal Certificate	ZK	2
DI-ANG	Course information and teaching materials can be found at https://moodle-vyuka.cvut.cz/course/search.php?search=BI-AN	1	2
BI-ANG1	English Language Examination without Preparatory Courses	Z,ZK	2
BI-ANGK	English language, contact preparation for the B2 level exam	Z	2
-	course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement		e to: -Take an
active part in the la	anguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both the	ne midterm and th	e final term
tests with the succe	ss rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by ind	ividual teachers d	uring the first
51.451	class of the term.		
BI-APJ	Aplication Programming in Java This course is presented in Czech. Advanced technologies in Java.	Z,ZK	4
BI-APS.21	Architectures of Computer Systems	Z,ZK	5
	the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spe		
	processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the prin processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness o	•	
,	e further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory cohe		
	systems.		
BI-ARD	Interactive applications on Arduino	KZ	4
	ned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applica		-
	ried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded s y 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
	se is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine		1
security application	ons like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishin	g the course stud	ent will get
51 0 / 5 /	knowledge of security applications in computer networks.		
BI-AVI.21	Algorithms visually	Z,ZK	4
	nents other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so d in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&		-
knowledge presenter	that make understanding the principles of algorithms easy.	a,mp.//www.aigov	ision.orgagi,)
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
	quainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and		1
web servi	ce systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an exar	nple of a web serv	ver.
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 for a statistical event into a solution of a solution of the		-
-	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every leges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing		
	latabase 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	KZ	5
	oduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is	1	-
-	students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible m		
collection, transform	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.	al foundation and	presentation
BI-BLE	Blender	Z,ZK	4
	s knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those	-	-
animation. It of	fers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming grap	hics applications)	course.

BI-BPR.21	Bachelor project	Z	1
1. At the beginnin	g of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the	partial tasks that he	e / she will
	semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at t		
	enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvu		-
· ·	I 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 top		
has reserved is fori	nulated more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the assignation of the semester.	gnment so that the a	assignment
BI-CCN	Compiler Construction	Z,ZK	5
This is an introd	uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles	of compilers for stu	udents to
understa	ind the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching	theme of the class	ŝ.
BI-CS1	Programming in C#	KZ	4
-	urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental co		
	s, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class def		-
constructors, meth	ods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging	and exception proc	cessing, as
	well as work with files are emphasized.		
BI-CS2	C# language and data access	KZ	4
	and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Micros	•	
° ,	is used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current tech		
	rying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQL (L	-	
). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data u	e .	
	f the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Mode (XML description).	, Storage Model an	id mapping
BI-CS3	Language C# - design of web applications	KZ	4
The students will be	introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overview of	of the development	possibilities
	on thisplatform. They will learn to create WebAPI and to use it by client programs.	r	
BI-DBS.21	Database Systems	Z,ZK	5
	oduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lear	-	
	constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with the		
	lation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda		
	Iling parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced to a supervision of data the second statement of the second st		-
In relational databa	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of datal optimizing database applications, distributed database systems, data stores.	base systems, debu	ugging and
		7 71/	
BI-DML.21	Discrete Mathematics and Logic equainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts fro	Z,ZK	5
-	paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cours	-	-
	combinatorics and number theory, with emphasis on modular arithmetics.	e also lays down il	
		7 7K	5
BI-EHA.21	Ethical Hacking	Z,ZK	5 r possible
The goal of the c	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln	erabilities, and thei	r possible
The goal of the c	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln puter networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is	erabilities, and thei	r possible
The goal of the c exploitation in con	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln aputer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is vulnerabilities testing and the following process of penetration test documentation.	erabilities, and thei on hands-on exper	r possible rience with
The goal of the c	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln puter networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is	erabilities, and thei	r possible
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The goal of the c exploitation in con BI-EHD BI-EJA	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln aputer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is vulnerabilities testing and the following process of penetration test documentation. Introduction to European Economic History This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	erabilities, and their on hands-on exper Z,ZK Z,ZK	r possible rience with 3 4
The goal of the c exploitation in con BI-EHD BI-EJA	Ethical Hacking ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln opputer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is vulnerabilities testing and the following process of penetration test documentation. Introduction to European Economic History This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Enterprise Java	erabilities, and their on hands-on exper Z,ZK Z,ZK	r possible rience with 3 4
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of economic operations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of management accounting are base of

·	Business Inteligence moduls in Business information systems.	Ū	
BI-GIT	Version control system GIT	KZ	2
	troduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pract		-
	implementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git s	_	
BI-GIT.21 This course is aim	SW Development Technologies ed at one of the rudimental team software development technology - version control. To be more specific, we will introduce students to	C Git the information	3
	from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use		on managor
BI-HAM	HW accelerated network traffic monitoring	KZ	4
	duces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. Th	e monitoring and a	analysis of
	mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a s		
for analysis). The g	goals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traff	ic on a hardware a	nd software
BI-HAS	level and to develop their practical abilities in this field.	774	5
	Human 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 developer	Z,ZK	-
	use their gained knowledge to design, plan and analyse their own projects in the context of human-centered security.		
BI-HMI	History of Mathematics and Informatics	Z,ZK	3
	This course is presented in Czech.		I
BI-HWB.21	Hardware Security	Z,ZK	5
	ith hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the operative		
-	eatures of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HW res	-	
attacks and tampe	ering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including a for multi-factor authentication (biometrics). Students will understand methods of efficient implementations of ciphers.	pplications and rel	ated topics
BI-IDO.21	Introduction to DevOps	Z,ZK	5
	with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of syst		1
	o support software development, testing and compilation. It also focuses on tools for automating infrastructure management and build		
the Cloud. It is an	introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquaint	ed with modern tee	chnologies
	used in practice.		
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
DUIOTO	This course is presented in Czech.	7 74	_
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 ication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT archited		
	computer labs, students will gain practical experience with developing simple IoT systems using common development environments		
	software - Arduino, Raspberry Pi OS).	(- / - /
	software - Ardunio, Raspberry Fr OS).		
BI-JPO.21	Computer Units	Z,ZK	5
Students deepen	Computer Units their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail v	with the internal str	ucture and
Students deepen organization of con	Computer Units their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail v mputer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using approp	vith the internal str riate codes for imp	ucture and lementation
Students deepen organization of con of multiplication. Th	Computer Units their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail w mputer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using approp ne organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including	vith the internal str riate codes for imp g codes for error de	ucture and lementation etection and
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BI-LOG.21	Mathematical Logic	Z,ZK	5
The course focuse	s 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	ce, and the
	ce of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are	-	
-	and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and		-
	h to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness the		
BI-MA1.21	Mathematical Analysis 1	Z,ZK	5
-	se by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers.		
	of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functions that find a sequences and functions of authors (applied) and farmulation are the distributed of the second variable of the second v		
	ot-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and ssue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical descript		
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	· · ·	-
	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, ar	•	
	we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and l		-
analytical method of	of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integ	ration of multivariat	te functions.
BI-MDF.21	Modern Data Formats	KZ	3
The goal of the co	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	the data formats u	sed for that
data typ	e along with tools available to work with such data. After finishing the course, the students should know how to work with common date	ita, e.g. on the Web).
BI-MGA.21	Multimedia and Graphics Applications	Z,ZK	5
Students get acq	uainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for wor	king with images, v	
graphics and anima	ation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to gra	phic formats, and c	ompression
technologies. The	y learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the	principle of operation	on 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-MIT	Mikrotik technologies	KZ	3
	on of the subject stands in the introduction of the RouterOS operating system and some network Mikrotik technologies which are cor		
	vice providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the m	<i>,</i> 1	
and how to adminis	trate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the previous knowledge of elementary computer not the subject requires the subject requir	etworks concepts lik	ke protocols
	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.		. In practical
BI-ML2.21	Machine Learning 2	Z,ZK	5
The goal of this of		· · ·	-
-	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in pa	rticular, learn kerne	el methods
-	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in pakes. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction methods.	rticular, learn kerne	el methods
and neural networ	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in parks. 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.	rticular, learn kerne ds. Moreover, stude	el methods ents get the
-	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in parks. 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. Multimedia team project	rticular, learn kerne	el methods
and neural networ BI-MMP	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in parks. 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. Multimedia team project This course is presented in Czech.	rticular, learn kerne ds. Moreover, stude KZ	el methods ents get the 4
and neural networ BI-MMP BI-MPP.21	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in parks. 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. Multimedia team project This course is presented in Czech. Methods of interfacing peripheral devices	rticular, learn kerne ds. Moreover, stude KZ Z,ZK	el methods ents get the 4 5
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and neural networ BI-MMP BI-MPP.21 The course is focus includes both PC s	Aurse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in parks. 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. Multimedia team project This course is presented in Czech. Methods of interfacing peripheral devices sed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universistie and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USI drivers, simple application development, and APIs of selected devices.	rticular, learn kerne ds. Moreover, stude KZ Z,ZK al serial bus (USB). 3 devices, Linux an	el methods ents get the 4 5 The course id Windows
and neural networ BI-MMP BI-MPP.21 The course is focus includes both PC s BI-MVT.21	Aurse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in particular, 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. Multimedia team project This course is presented in Czech. Methods of interfacing peripheral devices Sed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universative and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USI	rticular, learn kerne ds. Moreover, stude KZ Z,ZK al serial bus (USB). 3 devices, Linux an Z,ZK	el methods ants get the 4 5 The course ad Windows 5
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Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, queue, enlargeable array, list, se 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 programming, copying/moving of objects, operator overloading, inheritance, polymorphism).
copying moving of objects, operation overloading, initiation, polyine printing.
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 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 contracts in real and 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 to use commercial license type
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 against their misuse. 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 real cases from practice.
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 their use for visualization of specif
data (3D scenes, mathematical data). Emphasis will be placed on the possibilities of further enhancement of the presented software tools, both using built-in scripting languages an
by implementation of plugins.
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, design the scene, add textures imitatin
geometric details and materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in computer graphic: such as graphical pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics and representing solid fundamentals for you
professional development, e.g., GPU programming and animations. They get used to techniques utilized in geometric modeling, modeling curves and surfaces, and scientific visualization
BI-PHP.1 Programing in PHP KZ 4
The course is taught in Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices and will use tool that eases
development in PHP. The course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should
register for this course in their 3rd semester of study.
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 GNU and LLVM. They learn to
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. The compiler can translate no
only a programming language but any text in a language generated by a given LL input grammar.
BI-PJS.1 JavaScript Programming KZ 4
Main goal of the course is an introduction to Javascript programming. Students will learn also best practices and will use tool that eases development in Javascript. The course is
recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for this course in their 4th semester
of study.
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 development in Javascript 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.
BI-PMA Programming in Mathematica Z,ZK 4
Students will be working with modern technical and scientific software. Students will learn how to use different programming styles (functional programming, rule-based programming etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.
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 the basics of the VHDL language
and implementation technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern industry-standard CAD design
tools.
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 approaches. Functional programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The principles are demonstrate
on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages.
such as C++ and Java.
BI-PRR.21 Project management Z,ZK 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, analysis, crisis management in a
project, communication, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk assessment and management,
Gantt charts, resource schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for students who are interested in deepening their knowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in large companies. The course is
also suitable for all those who will develop software or hardware in the form of team projects.
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 R and will apply the studied
methods on data from real problems. BI-PS2 Programming in shell 2 Z,ZK 4
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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 data processing. The differences between philosophy of programming in Python and in other programming languages will be explained. Each topic is prepared for students in the format of a Jupyter notebook, whic enables greater accent to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a semester work will be assigned during
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the semester. BI-QAP Quantum algorithms and programming KZ 5
BI-QAP Quantum algorithms and programming KZ 5 Course aims at giving students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, on which quantum technologi
are based, and algorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software development kit Qiskit, which is base
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-VMM and experience with Python
might be an advantage. No previous knowledge of physics is assumed.
BI-QUA Quality Assurance KZ 4
This course introduces students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the context of different types of software
development and will experience hands-on application testing using both manual and automated testing. At the end of the semester, the student should be prepared to perform a te
analysis, design a set of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found in the product under test.
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 arithmetic-logic unit, controllers, memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple processor is practically implemented.
in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.
BI-SCE1 Computer Engineering Seminar I Z 4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to failures and attacks. Studen
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 work 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 teachers. The topics are new for eachers
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 to failures and attacks. Student are approached individually within the subject is work with scientific
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semester.
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 comparing individual countrie
and key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedo
corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of discussions based on individu
readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.
BI-SIP.21 Z 5
The course covers fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming using BSD sockets. The
second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of middleware technologies. The final part introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in computer labs using a chosen
programming language environment.
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 addition, they gain a deeper insight
into shell and some other particular scripting languages and will get practical experience with shell script programming.
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 use of microprocessor's feature
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view linked to higher level language
This knowledge will be used during reverse engineering, optimization, and evaluation of code security.
BI-SP1.21 Team Software Project 1 KZ 5
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teacher, in the role of the team ar
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Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teacher, in the role of the team ar project leader, regularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software artefact will be further developed and finished in the BIE-SP2 course. BI-SP2.21 Team Software Project 2 KZ 5 Students gain hands-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result of the BIE-SP1 course project However, in this follow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will work in teams of 4-6 people. The
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BI-ST2	Network Technology 2	Z	3
	This course is presented in Czech.		-
BI-ST3	Network Technology 3 r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during B	Z	3
	ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, predi		
<u>.</u>	simple topology, security, etc.	<i>,,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,
BI-ST4	Network Technology 4	Z	3
	er enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switching		
-	ot further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased efficient topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completely		
	e Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and switch		-
recoveries, and en	nergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation	on ways while mai	ntaining the
	network running.	7 74	4
BI-STO	Storage and Filesystems rn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archi	Z,ZK ving as so as stor	ade scaling
	load balancing and high availability.	g,	-99,
BI-SVZ.21	Machine vision and image processing	Z,ZK	5
	are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate in	-	
introduces students	to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical use problems of practice that the graduates may encounter.	of camera system	is for solving
BI-SWI.21	Software Engineering	Z,ZK	5
	inted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They co ring the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hands-c		
-	nguage UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design a	-	
stu	idents also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their	development.	
BI-TAB.21	Applications of Security in Technology	Z,ZK	5
The goal of the co	urse is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stude	-	overview of
BI-TDA	cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware a Test driven architecture	KZ	4
	used on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that ar		
world. This co	urse has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occu	r in the semester p	project.
BI-TDP.21	Documentation and Presentation	KZ	3
	ed on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically fin of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically prese	-	
	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		
	exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.		
BI-TEX	TeX and Typography	Z,ZK	4
I his course is pres	ented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the c rules.	course focuses on	typographic
BI-TIS.21	Information Systems	Z,ZK	5
-	urse is to familiarise students with the information systems topic and information systems implementation principles. During the course	se, students are in	
	tisting types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other the tall part of the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, was		
	d information system implementation based on the project management principles. The emphasis is on the initial customer analysis,		
	better to implement any existing information system or to develop a new one from scratch. These factors determine the information sy	-	-
	f the course information systems security, operation, support, maintenance, legislation impacts, and government information system		1
BI-TJV.21	Java Technology de knowledge and skills for developing information systems and applications through concepts used in software development and exp	Z,ZK	5
The goal is to provid	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
	ices students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical	-	
-	res provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technolo rtant ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethern	-	
with the most impo	always with focus on high-speed networks.	et, modern wireles	ss networks,
BI-TS1	Theoretical Seminar I	Z	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic		
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a v other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	work with scientific	papers and
BI-TS2	Theoretical Seminar II	Z	4
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic		1 -
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a v	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	7	4
BI-TS3	Theoretical Seminar III r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	Z al reading group 1	4 The students
	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a v		
	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
	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a v		
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		, spore and

BI-TUR.21	User Interface Design	Z,ZK	5
Students gain a b	asic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where software	are and other produ	ucts do not
communicate with	the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gain	n an overview of m	nethods that
	bring users into the development process to ensure optimal interface for them.		1
BI-TWA.21	Design of Web Applications	Z,ZK	5
	of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some propertie		-
	and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications,		
modern libraries fa	acilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony		velopments
	on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework React		
BI-TZP.21	Technological Fundamentals of Computers	Z,ZK	5
	ainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer st		
	oduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to redu		
limits to the maxim	num operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a com	nputer power supp	IY IOOKS IIKE
	(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.	7 71/	
BI-UKB.21	Introduction to Cybersecurity	Z,ZK	5
I he goal of the co	urse is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over		cyberspace
	and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace rec		
BI-ULI	Introduction to Linux	Z	2
Students become	familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become f		commands
	and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (te		_
BI-UOS.21	Unix-like Operating Systems	KZ	5
	systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu		
	uters and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic propert		-
	eads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level c		
	e to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting in		1
BI-VAK.21	Selected Applications of Combinatorics	Z	3
	introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the bi		
	ions to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic		
	ticipation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) info		
will select probler	ns to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimization	ation and more. St	udents will
	also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.		_
BI-VDC.21	Virtualization and Data Centers	Z,ZK	5
	rse is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and	-	
	th as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data cer	-	-
I to public and hyp			
	rid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications.		
design, valid	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or	utages, and data lo	osses.
design, valid BI-VES.21	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or Embedded Systems	utages, and data lo	osses. 5
design, valid BI-VES.21	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or Embedded Systems esign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedd	utages, and data lo	osses. 5
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	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 knowledge should serve for the efficient creation of a web backend in PHP language.	pular framework. T	he resulting
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	•	
	ole of process engineering for information systems development is discussed as well as its importance in the overall context of information	•	•
	an enterprise.		
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	s our attention part	ticularly on
control of enginee	ering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descriptior	methods of syste	m models,
basic linear dynam	ic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creati	ng 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
	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 professio		
	y courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits corr		
employment with a	foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided interested and line	o two subjects if th	e internsnip
DI 7000	exceeds the academic year's dead-line.	7	00
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20
	i 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 professio		
	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 into		
employment mara	exceeds the academic year's dead-line.		e internerne
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		
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professio		
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 corr	espond to 4 weeks	s 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 int	o two subjects if th	e internship
	exceeds the academic year's dead-line.		
BI-ZSB.21	Basics of System Security	Z,ZK	5
The goal of the co	burse is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forensi	c analysis and rela	ted topics
		e analyere and ren	aleu lopica
such as malware a	analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of moder		
	as well as skills needed for independent work in the area of operating system security incident analysis.	n operating systen	ns security,
BI-ZUM.21	as well as skills needed for independent work in the area of operating system security incident analysis. Artificial Intelligence Fundamentals	n operating systen	ns security, 5
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BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4			
Students are introd	uced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical	al tasks from the ar	eas of state			
space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithms and the neural networks, will be presented as well.						
FI-TOP	Academic writing	Z	2			
	portant and required part of research activity. It is not only about obtaining research results but also about applying them in the form of	of publication. Writi	ng scientific			
publications can be	e useful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the cou	rse, students will le	earn how to			
write a scientific art	icle, what parts such an article should have, and how the peer review process works. Students will also try their hand at presenting an	article and reviewir	ng someone			
else's article. The	course will be taught in blocks, with one lecture at the beginning of the semester and one practicum in the middle of the semester. Da	ates will be determine	ined based			
	on the availability of enrolled students.	771				
FIT-ITI	Modern IT infrastructure	Z,ZK	5			
FIT-SEP	World Economy and Business	Z,ZK	4			
-	sented in Czech. The course introduces students of technical university to the international business. It does that predominantly by co world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as					
	nomic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form of di					
contraption and coo	readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		in marriadai			
FITE-EHD	Introduction to European Economic History	Z,ZK	3			
	Locs a selection of themes from the European economic history. It gives the student basic knowledge about forming of the global eco	· · ·	-			
	in history. As European countries have been dominant actors in this process it focuses predominantly on their roles in the economic		-			
area of Roman Em	pire to fragmentation of the Middle Ages, from destruction of WWII to the current affairs, the development of modern financial instituti	ons is deciphered.	The course			
does not cover de	tailed economic history of particular European countries but rather the impact of trade and role of particular events, institutions and c	organizations in his	tory. Class			
	meetings will consist of a mixture of lecture and discussion.					
NI-AFP	Applied Functional Programming	KZ	5			
This course is pres	ented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional p	rogramming langua	ages are on			
the rise nowadays	and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, master	ing this paradigm I	pecomes a			
	necessary competence of a software engineer: the theory and especially the practice.	· · · · · · · · · · · · · · · · · · ·				
NI-DDM	Distributed Data Mining	KZ	4			
	state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands of	-	-			
data processing fra	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations a	nd will be capable	to propose			
	approaches to parallelize other algorithms. The course is prezented in czech language.	771	4			
NI-DSP	Database Systems in Practes	Z,ZK	4			
	This course is presented in Czech.	7 71				
NI-DZO	Digital Image Processing	Z,ZK	4			
	ents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical alg e an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is als		-			
-	processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR					
	abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray conv	-	-			
	gid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ac					
NI-IAM	Internet and Multimedia	Z,ZK	4			
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq					
presentation of AV	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u	ise case scenarios	of real-time			
audiovisual transn	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effe	ect of various comp	ponents on			
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		4			
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4			
	ogramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where aplex 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			
	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po					
	ability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver development	-				
со	urse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practication	al experience.				
NI-PDD	Data Preprocessing	Z,ZK	5			
Students learn to p	repare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data s	ources, such as im	ages, texts,			
time series, etc., and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characteristics from images or from web						
	pages.					
NI-PSD	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 p		-			
suppliers (devs and designesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaboration with client representatives.						
	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. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and	libraries e.g. Play,	Cassandra,
	Scalaz, etc.		
NI-REV	Reverse Engineering	Z,ZK	5
•	equainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens before		
	will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dedica	•	
	ten in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be de		- 1
debuggers and de	bugging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the computer	malware scene. T	he focus of
	the course is on the seminars, where students will solve practically oriented tasks from the real world.		
NI-SYP	Parsing and Compilers	Z,ZK	5
The module builds u	upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge of va	rious variants and	applications
	of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
NI-TSP	Testing and Reliability	Z,ZK	5
•	knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prej		· · ·
the intuitive path se	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu	ilt-in-self-test equip	pment. They
	will be able to compute, analyze, and control the reliability and availability of the designed circuits.		_
NI-VCC	Virtualization and Cloud Computing	Z,ZK	5
•	n knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and	•	
•	rtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie		•
	rameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effecti mplex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills ir		-
management of cor	and development tools (Continuous integration and development).	I the use of model	millegration
NI-VYC		Z,ZK	4
	Classical theory of recursive functions and effective computability.	۲,۷۲	4
TV1	Physical Education	Z	0
		Z	-
TV2	Physical Education		0
TV2K1	Physical Education 2	Z	1
TVK1	Physical Education	Z	1
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
TVV	Physical education	Z	0
TVV0	Physical education	Z	0
	information and http://bila/niha.gv/ut.az/an/EE.html		

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2025-07-12, time 08:11.