## Study plan

### Name of study plan: Bachelor Specialization Computer Engineering, in Czech, 2024

Garantor of the si Program of study Type of study: Ba Required credits: Elective courses Sum of credits in Note on the plan: akademického ro	guaranteed by the department: Welcome page tudy branch: : Informatika chelor full-time 153 credits: 27					g. Hana
	k: Compulsory courses in the program of credits of the block: 106 ock: PP					
2021	p: BI-PP.21 p: Compulsory Courses of Bachelor Study Program dits in the group: In this group you have to gain 100		s, pres	ented i	n Czech,	version
•	rses in the group: In this group you have to comple		rses			
Credits in the gro						
group: B E o ir p	you plan to profile the specialization Information Security, Manternet, 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 f study. If you plan to profile yourself in the Artificial Intelligence or your 3rd semester of study. Otherwise, enroll in the course lan to profile the specialization Artificial Intelligence or Web B our 5th semester of study. Otherwise, enroll in the course Bl	neering, or W he specializa II in the court ce specializa BI-PSI.21 in Engineering,	Veb Engi ation Con rse BI-PS ation, en your 5th enroll in	neering, mputer ( SI.21 in y roll in th n semes n the cou	enroll in th Graphics, ( your 4th se e course E ter of stud rse BI-AA	ne course Computer emester BI-PST.21 y. If you
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				Role
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 <b>Jan Holub</b> 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-MA1.21	Mathematical Analysis 1 Pavel Hrabák, Tomáš Kalvoda, Ivo Petr, Petr Olšák, Pavel Paták <b>Tomáš</b> Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	5	2P+1R+1C	L	PP
BI-MA2.21	Mathematical Analysis 2 Pavel Hrabák, Tomáš Kalvoda, Ivo Petr, Petr Olšák, Pavel Paták <b>Tomáš</b> Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	6	3P+2C	Z	PP
BI-OSY.21	Operating Systems Petr Zemánek, Ji í Kašpar, Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík, Ladislav Vagner <b>Pavel Tvrdík</b> Michal Štepanovský (Gar.)	Z,ZK	5	2P+1R+1L	L	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-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-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-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-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-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-GIT.21	SW Development Technologies Petr Pulc, Robin Ob rka Robin Ob rka Petr Pulc (Gar.)	Z	3	2P	Z	PP
BI-TDP.21	<b>Documentation and Presentation</b> Ond ej Guth, Petra Pavlí ková, Dana Vynikarová, Alena Libánská, Tomáš Nová ek <b>Dana Vynikarová</b> Dana Vynikarová (Gar.)	KZ	3	2P+2C	Z,L	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

# 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 b	asics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing o	urriculum. It links	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	e complexity of
algorithms. The course	also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic nota	tion.	
BI-AAG.21	Automata and Grammars	Z,ZK	5
Students are introduced	to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of fini	ite automata, regu	Ilar expressions,
and regular grammars,	context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know	the hierarchy of fo	ormal languages
and they understand the	relationships between formal languages and automata. They are introduced to the Turing machine and complexity classes I	<sup>D</sup> and NP.	
BI-BAP.21	Bachelor Thesis	Z	14
BI-BPR.21	Bachelor project	Z	1
1. At the beginning of th	e 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 sem	ester 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 ente	rs 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 sigr	ed 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 formulat	ed 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	t the assignment
can be supplemented a	nd 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	irn to design smal	l databases
(including integrity cons	traints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with	the SQL language	e, as well as with
its theoretical foundation	- the relational database model. They learn the principles of normalizing a relational database schema. They understand the fu	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	s 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 da	atabase systems,	debugging and
optimizing database ap	plications, distributed database systems, data stores.		
BI-DML.21	Discrete Mathematics and Logic	Z,ZK	5
Students will get acquai	nted 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 num	per theory, with emphasis on modular arithmetics.		
BI-KAB.21	Cryptography and Security	Z,ZK	5
Students will understand	d the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able t	o use cryptograph	nic keys and
certificates in systems b	ased on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in a	pplications. Withir	n labs, students
will gain practical skills i	n using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedure	s of cryptanalysis.	
BI-LA1.21	Linear Algebra 1	Z,ZK	5
We will introduce studer	nts to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field	ld of real and con	nplex numbers
and also over finite field	s. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elir	mination method (	GEM) and show
the connection with line	ar manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eiger	nvalues and eiger	vectors of a
matrix. We will also dem	ionstrate some applications of these concepts in computer science.		

BI-MA1.21 Mathematical Analysis 1	Z,ZK	5
We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine number	ers. Then we study	real sequences
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of fu	inctions. This theor	etical foundation
is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation	and solution of 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 deservation and methods of mathematical deservation and methods of mathematical deservations.	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	learn how to integr	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 to	to the computation	of elementary
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms	-	-
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and		
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the i	_	
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	-	
critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS r	nonitoring. They ar	e 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		
well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced net	-	. Students
practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS		
BI-PST.21 Probability and Statistics	Z,ZK	5
Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable	-	
models of random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction		-
estimations of unknown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statist	ical hypotheses ar	nd determining
the statistical dependence of two or more random variables.		
BI-PA1.21   Programming and Algorithmics 1	Z,ZK	7
Students gain the ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, s	-	
statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for sear	ching, sorting, and	d manipulating
with linked lists and trees.		-
BI-PA2.21 Programming and Algorithmics 2	Z,ZK	7
Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack,		-
table). They learn these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming copying/moving of objects, operator overloading, inheritance, polymorphism).	(e.g., template pro	igramming,
	771	5
BI-SAP.21 Computer Structure and Architecture Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of ar	Z,ZK	5
memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple pi	-	
in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.	000000113 practice	any implemented
BI-TZP.21 Technological Fundamentals of Computers	Z,ZK	5
Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computers		-
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to r		
limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a		•
(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.		
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	-	-
from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.		nation manager
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	1 1	-
learn to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically p		
the teacher. The course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first		
exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.		5
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	1 1	-
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		-
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: 35		

The role of the block: PS

Code of the group: BI-PI-PS.24

Name of the group: Compulsory Courses for Bachelor Specialization Computer Engineering, version 2024 Requirement credits in the group: In this group you have to gain 35 credits Requirement courses in the group: In this group you have to complete 7 courses Credits in the group: 35 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-APS.21	Architectures of Computer Systems Michal Štepanovský, Pavel Tvrdík Michal Štepanovský Pavel Tvrdík (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-JPO.21	Computer Units Pavel Kubalík Pavel Kubalík (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-PNO.21	Practical Digital Design Martin Novotný Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	PS
BI-SRC.21	Real-time systems Hana Kubátová, Ji í Vysko il Jaroslav Borecký Hana Kubátová (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-VES.21	Embedded Systems Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	L	PS
BI-ZRS.21	Basics of System Control Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	5	2P+2C	Z	PS

# Characteristics of the courses of this group of Study Plan: Code=BI-PI-PS.24 Name=Compulsory Courses for Bachelor Specialization Computer Engineering, version 2024

BI-APS.21	Architectures of Computer Systems	Z,ZK	5
Students will learn the c	onstruction principles of internal architecture of computers with universal processors at the level of machine instructions. Sp	ecial emphasis is	given on the
pipelined instruction pro	cessing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the p	orinciples of instru	ction processing
not only in scalar proces	sors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness (	of the sequential r	nodel of the
program. The course fur	ther elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory c	oherence and cor	sistency in such
systems.			
BI-JPO.21	Computer Units	Z,ZK	5
Students deepen their b	asic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in deta	il with the internal	structure and
organization of compute	r units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using app	propriate codes fo	r implementation
of multiplication. The org	anization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, inclu	iding codes for eri	or detection and
correction for parallel an	d serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of cou	mmunication of th	e processor with
the environment and the	architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micro	oprogrammed pro	cessor simulator
and programmable hard	ware design kits (FPGA).		
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
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	ISB). 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-PNO.21	Practical Digital Design	KZ	5
Students get an overvie	w of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand	the basics of the \	/HDL language
and implementation tech	nnologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern	industry-standard	d CAD design
tools.			
BI-SRC.21	Real-time systems	Z,ZK	5
Students obtain the bas	ic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issu	es. Theoretical kn	owledge from
lectures will be experime	entally verified in computer labs. The course is mainly focused on embedded RT systems, therefore the design kits in the lab	are the same as	in the BIE-VES
course.			
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	s, their integrated
peripheral circuits, prog	amming methods, and applications. They get practical skills with development kits and tools.		
BI-ZRS.21	Basics of System Control	Z,ZK	5
The course gives an intr	oduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	cus our attention	oarticularly on
control of engineering a	nd physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript	tion methods of sy	vstem models,
basic linear dynamic sys	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of c	reating a descripti	on of the system
	lynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give		
• •	stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the indust	rial implementatio	n of continuous
and digital controllers ar	nd PLC control.		

Name of the block: Compulsory elective courses Minimal number of credits of the block: 10 The role of the block: PV

Code of the group: BI-PI-PV-BEZ.24

Name of the group: Compulsory Elective courses of Bc. specialization Computer Engineering, field of security, v. 2024

Requirement credits in the group: In this group you have to gain at least 5 credits (at most 15) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) Credits in the group: 5 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADU.21	<b>Unix Administration</b> Zden k Muziká , Petr Zemánek, Miroslav Prágl <b>Zden k Muziká</b> Zden k Muziká (Gar.)	Z,ZK	5	2P+2C	L	PV
BI-BEK.21	Secure Code Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	2P+2C	L	PV
BI-EHA.21	Ethical Hacking Ji í Dostál, Martin Kolárik, Andrej Šimko <b>Ji í Dostál</b> Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	PV

# Characteristics of the courses of this group of Study Plan: Code=BI-PI-PV-BEZ.24 Name=Compulsory Elective courses of Bc. specialization Computer Engineering, field of security, v. 2024

BI-ADU.21	Unix Administration	Z.ZK	5
Students will learn the ir	ternal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T	· ·	d the differences
between user and admi	nistrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rigl	nts, file systems, o	lisk subsystems,
processes, memory, ne	twork 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-BEK.21	Secure Code	Z,ZK	5
The students will learn h	ow to assess security risks and how to take them into account in the design phase of their own code and solutions. After gettin	ng familiar with the	threat modeling
theory, students gain pr	actical experience with running programs with reduced privileges and methods of specifying these privileges, since not ever	/ program needs	to run with
administrator privileges	Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir	ng data and the re	lationships of
security and database s	systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	defense against t	hem.
BI-EHA.21	Ethical Hacking	Z,ZK	5
The goal of the course	s to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vu	Inerabilities, and	heir possible
exploitation in computer	networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus	is on hands-on e	xperience with
vulnerabilities testing ar	nd the following process of penetration test documentation.		

#### Code of the group: BI-PI-PV-TEO.24

Name of the group: Compulsory Elective Theoretical Courses of Bachelor's Specialization Computer Engineering, v. 2024

Requirement credits in the group: In this group you have to gain at least 5 credits (at most 15) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) Credits in the group: 5

#### Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-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	PV
BI-PJP.21	Programming Languages and Compilers Jan Janoušek, Tomáš Pecka Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	PV
BI-ZUM.21	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	5	2P+2C	L	PV

# Characteristics of the courses of this group of Study Plan: Code=BI-PI-PV-TEO.24 Name=Compulsory Elective Theoretical Courses of Bachelor's Specialization Computer Engineering, v. 2024

BI-LA2.21	Linear Algebra 2	Z,ZK	5
Studenti si v tomto p ed	m 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 p	prostor v abstraktr	ní obecné form .
Seznámíme se také s p	ojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou g	rafikou. Dalším ve	elkým tématem
bude numerická lineárn	algebra, kde si ukážeme potíže s ešením soustav lineárních rovnic na po íta i a možnosti, jak se s tímto problémem vypo a	ádat s d razem na	a rozklady matic.
Ukážeme si také aplikad	e lineární algebry v r zných oborech.		
BI-PJP.21	Programming Languages and Compilers	Z,ZK	5
Students learn basic co	mpiling methods of programming languages. They are introduced to intermediate representations used in current compilers	GNU and LLVM. T	hey 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	n. The compiler ca	an translate not
only a programming lan	guage but any text in a language generated by a given LL input grammar.		
BI-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
Basic course on introdu	ction to artificial intelligence with emphasis on symbolic techniques. The design of an intelligent agent and the techniques nee	eded to create it w	vill be discussed,
especially at the decision	n-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 c	ourse.	

#### 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.24

### Name of the group: Physical Education, version 2024

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

#### Characteristics of the courses of this group of Study Plan: Code=BI-PT.24 Name=Physical Education, version 2024

TV1	Physical Education	Z	0
TVV	Physical education	Z	0
TVK1	Physical Education	Z	1
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKZV	Physical Education Course	Z	0
TVKLV	Physical Education Course	Z	0

Name of the block: Povinná zkouška z angli tiny Minimal number of credits of the block: 2 The role of the block: PJ

Code of the group: BI-ZKA.21

Name of the group: English Language Exam

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

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

Credits in the group: 2

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ANG1	English Language Examination without Preparatory Courses Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	Z,ZK	2	2D	L	PJ
BIE-EEC	English language external certificate Zden k Muziká <b>Zden k Muziká</b> 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	n be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in E	nglish comparable	e 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: Elective courses

## Code of the group: BI-V.2021 Name of the group: Purely Elective Courses of Bachelor Programme Informatics, version from 2021/22 till 2024/25

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-ALO	Algebra and Logic Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era Lud k Ku era (Gar.)	Z,ZK	4	2P+1C	L	V
BI-A2L	English language, preparation for the B2 level exam Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	L	V
BI-APJ	Aplication Programming in Java 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 Martin Ka er (Gar.)	KZ	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-ANGK	English language, contact preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	Z,L	V
BI-EJA	Enterprise Java Ji í Dan ek	Z,ZK	4	2P+2C	L	V
BI-EJK	Enterprise Java and Kotlin Ji í Dan ek <b>Ji í Dan ek</b> Ji í 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 <b>Tomáš ejka</b> 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.)	кz	4	3C	L	V
NI-IAM	Internet and Multimedia <i>Ji í Melnikov</i>	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	<b>C# language and data access</b> Pavel Št pán <b>Pavel Št pán</b> Pavel Št pán (Gar.)	KZ	4	0P+3C	Z	V

BI-CS3	Language C# - design of web applications	KZ	4	3C	Z	V
BI-SQL.1	Pavel Št pán Pavel Št pán Pavel Št pán (Gar.) Language SQL, advanced	KZ	4	3C	L	V
BI-QAP	Michal Valenta Michal Valenta Michal Valenta (Gar.) Quantum algorithms and programming	KZ	5	1P+2C	Z	V
NI-LSM	Tomáš Kalvoda, Ivo Petr Ivo Petr Ivo Petr (Gar.) Statistical Modelling Lab	KZ	5	3C	L	v
	Kamil Dedecius         Kamil Dedecius         Kamil Dedecius (Gar.)           Human Aspects in Cryptography and Security					
BI-HAS	Ivana Trummová Ivana Trummová Ivana Trummová (Gar.) Managerial Psychology	Z,ZK	5	2P+1C	Z	V
NI-MPL	Jan Fiala <b>Jan Fiala</b> Jan Fiala (Gar.)	ZK	2	2P	Z,L	V
NI-MSI	Mathematical Structures in Computer Science Jan Starý	Z,ZK	4	2P+1C	L	V
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MIT	Mikrotik technologies Jan Fesl Jan Fesl Jan Fesl (Gar.)	ΚZ	3	1P+2C	Z	V
NI-MOP	Modern Object-Oriented Programming in Pharo Jan Blizni enko Robert Pergl Robert Pergl (Gar.)	KZ	4	3C	Z	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MMP	Multimedia team project Zde ka echová Zde ka echová Zde ka echová (Gar.)	KZ	4	3C	Z,L	V
BI-ORL	Operations Research and Linear Programming	KZ	5	1P+2C	L	V
NI-OLI	Dušan Knop <b>Dušan Knop</b> Dušan Knop (Gar.) Linux Drivers	Z,ZK	4	2P+2C	L	V
BI-ACM	Miroslav Skrbek, Jaroslav Borecký Jaroslav Borecký Miroslav Skrbek (Gar.) Programming Practices 1	KZ	5	4C	L	V
FIT-ACM1	Tomáš Valla Tomáš Valla Tomáš Valla (Gar.) Programming Practices 1	KZ	5	4C		v
-	Tomáš Valla Programming Practices 2					
FIT-ACM2	Ond ej Suchý Programming Practices 2	KZ	5	4C	Z	V
BI-ACM2	Ond ej Suchý, Tomáš Valla <b>Tomáš Valla</b> Tomáš Valla (Gar.)	KZ	5	4C	Z	V
FIT-ACM3	Programming Practices 3 Ond ej Suchý	KZ	5	4C	L	V
BI-ACM3	Programming Practices 3 Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	V
FIT-ACM4	Programming Practices 4 Ond ej Suchý	KZ	5	4C	Z	V
BI-ACM4	Programming Practices 4 Ond ej Suchý, Tomáš Valla <b>Tomáš Valla</b> Ond ej Suchý (Gar.)	KZ	5	4C	Z	V
FIT-ACM5	Programming Practices 5 Ond ej Suchý	KZ	5	4C	L	V
FIT-ACM6	Programming Practices 6 Ond ei Suchý	KZ	5	4C	L	V
BI-AND.21	Programming for the Android Operating System	KZ	4	3C	L	V
BI-CS1	Jan Mottl, Jan Vep ek, Marek Kodr, Petr Šíma Jan Mottl Marek Kodr (Gar.) Programming in C#	KZ	4	3C	L,Z	V
DI-COT	Paveľ Št pán, Helena Wallenfelsová <b>Helena Wallenfelsová</b> Pavel Št pán (Gar.)	ΝZ	4	30	L,Z	V
BI-PJV	Programming in Java Miroslav Balík, Jan Blizni enko, Ji í Borský, Jan Zimolka Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PJS.1	JavaScript Programming Old ich Malec	KZ	4	3C	L	V
BI-KOT	Programing in Kotlin Ji í Dan ek <b>Ji í Dan ek</b> Ji í Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
NI-PSL	Programming in Scala	Z,ZK	4	2P+1C	Z	V
BI-PMA	Ji í Ďan ek <b>Ji í Dan ek</b> Ji í Dan ek (Gar.) Programming in Mathematica	Z,ZK	4	2P+2C	Z,L	V
BI-PHP.1	Zden k Buk Zden k Buk Zden k Buk (Gar.) 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	Z	4		Z	V
NI-REV	Tomáš Kalvoda <b>Tomáš Kalvoda</b> Tomáš Kalvoda (Gar.) Reverse Engineering	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Josef Kokeš Josef Kokeš Josef Kokeš (Gar.) Computer Engineering Seminar I	Z,2.1	4	2C	L,Z	v
	Hana Kubátová Hana Kubátová Hana Kubátová (Gar.)	4	-	20	۲,۲	v

BI-ST1     Network       BI-ST2     Network       BI-ST3     Network       BI-ST4     Network       BL-SK121     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
	<b>pting Languages</b> Ba inka, Jan Ž árek <b>Lukáš Ba inka</b> 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 <b>retical Seminar I</b> o Knop, Ond ej Suchý, Tomáš Valla <b>Tomáš Valla</b> 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 <b>retical Seminar IV</b> j Suchý, Tomáš Valla <b>Tomáš Valla</b> 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
	<b>ity Assurance</b> : Kodr, Martin Pilný, Kate ina Kalášková <b>Kate ina Kalášková</b> 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 <b>Petr Olšák</b> 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 <b>Jakub Šenovský</b> Alena ská (Gar.)	ZK	2	2P	Z,L	v
BI-ULI Introc	duction to Linux k Muziká, Petr Zemánek, Jan Žárek <b>Zden k Muziká</b> 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 <b>l reality l</b> Pauš, Petr Klán <b>Petr Klán</b> 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	<b>Computability</b> Jan Starý <b>Jan Starý</b> 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.)	KZ	4	2C	Z	v
BI-ZWU	Introduction to Web and User Interfaces Lukáš Ba inka Lukáš Ba inka Jakub Klímek (Gar.)	Z,ZK	4	2P+2C	L	V
BI-3DT.1	<b>3D Printing</b> Miroslav Hron ok, Tomáš Sýkora <b>Tomáš Sýkora</b> 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

BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
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	ISB). The course
includes both PC side a	nd peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of	USB devices, Linu	x and Windows
drivers, simple applicati	on development, and APIs of selected devices.		
TV1	Physical Education	Z	0
TVV	Physical education	Z	0
TVK1	Physical Education	Z	1
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKZV	Physical Education Course	Z	0
TVKLV	Physical Education Course	Z	0
BI-ADW.1	Windows Administration	Z,ZK	4
This course is presented	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 computer	er 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.c	org <http: td="" www.al<=""><td>govision.org&gt;)</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
	se corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievem		
	ge instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both		
	ate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by	individual teacher	s during the first
class of the term.			
BI-APJ	Aplication Programming in Java	Z,ZK	4
	d in Czech. Advanced technologies in Java.		
NI-AFP	Applied Functional Programming	KZ	5
	d in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel function		0 0
	he functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mas	stering this paradio	gm becomes a
	of a software engineer: the theory and especially the practice.		
BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the cla		
be presented as well.	ent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algor	ithms and the neu	rai networks, will
	Dlandar	7 71/	4
BI-BLE	Blender Blender Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for thos	Z,ZK	-
	mplete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graphi		
NI-DSP		Z,ZK	4
This course is presented	Database Systems in Practes	Ζ,ΖΝ	4
BI-STO	Storage and Filesystems	Z.ZK	4
	inciples and current solutions of storage systems architecture. The module explains principles of data store, protection, and a	1 '	-
load balancing and high		archiving, as so as	storage searing,
NI-PSD	Public Services Design	KZ	4
-	e students to specifics of UX, Service design and development for public sector. We will look into the design and developme	1	·
	ignesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaborat	-	
	ents-designers as well as clients.	-1	

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
The C# language and data access course objective is to introduce students several data access technologies - database, XML, NoSQL - on the Mic	I I	•
get to know objects used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current te	-	
of features for querying and updating data, integrated directly with the .NET platform languages, which enable LINQ use with Objects, XML and SQI	•	
and LINQ to SQL). Another objective is the Entity Framework - an object-relational mapper that enables .NET developers to work with relational data		
(ORM). This part of the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Mo		-
(XML description).	, 0	
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 overvi	I I	•
on thisplatform. They will learn to create WebAPI and to use it by client programs.		nem possibilities
	KZ	4
BI-SQL.1 Language SQL, advanced	I I	-
Module is based on knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In	-	
triggers, recursive queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the polytopic structure like indexes elevers index approximization. Executing a second additional constructions are used to be a second additional construction and a second additional constructions.		
structures like indexes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan		-
will be discussed. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Oracle DBMS.	acle DBINS and pa	artially on
PostgreSQL.		
BI-QAP Quantum algorithms and programming	KZ	5
Course aims at giving students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanic	s, on which quant	um technologies
are based, and algorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software develo	opment kit Qiskit,	which is based
on Python language. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VI	VM and experience	e with Python
might be an advantage. No previous knowledge of physics is assumed.		
NI-LSM Statistical Modelling Lab	KZ	5
The subject is oriented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is	s put on the effecti	ve use of the
available information and 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.
At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesis).	-	
BI-HAS Human Aspects in Cryptography and Security	Z,ZK	5
This course is for students interested not only in technical scope of computer science, but also in making products usable - for users and for develop		-
use their gained knowledge to design, plan and analyse their own projects in the context of human-centered security.		
	ZK	2
NI-MPL Managerial Psychology		
NI-MSI Mathematical Structures in Computer Science	Z,ZK	4
Mathematical semantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scot	tt model of lambda	a calculus.
Introduction to category theory.		
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 of	commonly used by	/ the small and
middle internet service providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the	e metallic, optical	or wireless links
and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary compute		ots like protocols
		ots like protocols
and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer and technologies of the data-link, network and transport layer of the OSI model.	er networks conce	ots like protocols
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FIT-ACM5 Programming Practices 5	KZ	5
This is a selective course for preparing talented student for representation in international programming contests.	1/7	
FIT-ACM6 Programming Practices 6 This is a selective course for preparing talented student for representation in international programming contests.	KZ	5
BI-AND.21 Programming for the Android Operating System	KZ	4
This course is presented in Czech.	1/7	
BI-CS1   Programming in C# The goal of the course is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamenta	KZ	4 des of variables.
operators, arrays, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class de		
constructors, methods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugg well as work with files are emphasized.	ing and exceptior	processing, as
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-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 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	-	
of study.		
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 ad- The language is fully Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of		
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 fea advance standard library. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks		
Scalaz, etc.		, , - , - , - , - , - , - , - ,
BI-PMA Programming in Mathematica	Z,ZK	4
Students will be working with modern technical and scientific software. Students will learn how to use different programming styles (functional progra etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.	amming, rule-base	ed programming,
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		
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.T	hey should
BI-PS2     Programming in shell 2	Z,ZK	4
Students gain a general overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In ad		-
into shell and some other particular scripting languages and will get practical experience with shell script programming.	, , , , , ,	5
NI-PDD Data Preprocessing	Z,ZK	5
Students learn to prepare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data for further processing and analysis.		-
time series, etc., and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characte pages.	ristics from image	es or from web
BI-PKM Introduction to mathematics	Z	4
This course is presented in Czech.	· 	
NI-REV Reverse Engineering Students will get acquainted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens	Z,ZK	5
is called. Students will understand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is de-		
applications written in C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be of		
debuggers and debugging work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compute the source is on the computed to the source is one to the	ter malware scene	e. The focus of
the course is on the seminars, where students will solve practically oriented tasks from the real world. BI-SCE1 Computer Engineering Seminar I	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance	1	1
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	the subject is wor	k with scientific
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	chers. The topics	are new for each
BI-SCE2 Computer Engineering Seminar II	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance	1	-
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of		
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea semester.	chers. The topics	are new for each
BI-ST1 Network Technology 1	Z	3
The subject is oriented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredit	1	1
CCNA1 - R&S Introduction to Networks.		1
BI-ST2 Network Technology 2	Z	3
BI-ST3     Network Technology 3	Z	3
Students will further enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented duri	1	-
get further extended in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pre	dictability, extens	ion beyond a
simple topology, security, etc.	Z	<b>^</b>
BI-ST4   Network Technology 4 Students will further enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switchi	1	a 3 ing BI-ST1 and
BI-ST2 courses got further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased ef		-
beyond a simple topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a complete	ly other type of ne	etwork (Non
Broadcast Multiple Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and swit	-	-
recoveries, and emergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitig network running.	auon ways while	maintaining the
······································		

BI-SKJ.21	Scripting Languages	Z,ZK	4
Students gain a genera	al overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In ad	1 '	deeper insight
into shell and some oth	ner particular scripting languages and will get practical experience with shell script programming.		
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optima		
	on of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie	w linked to higher	level languages.
	used during reverse engineering, optimization, and evaluation of code security.		
FIT-SEP	World Economy and Business	Z,ZK	4
	ed in Czech. The course introduces students of technical university to the international business. It does that predominantly by d economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as we		
	to development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form		
	to take bachelor level of this course BIE-SEP as a prerequisite.		
BI-SEP	World Economy and Business	Z,ZK	4
	ed in Czech. The course introduces students of technical university to the international business. It does that predominantly by	· · ·	dual countries
and key regions of worl	d economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as we	II as indexes of eco	onomic freedom,
	nic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form	of discussions bas	sed on individual
-	to take bachelor level of this course BIE-SEP as a prerequisite.		
NI-SYP	Parsing and Compilers	Z,ZK	5
	n the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge	of various variants	and applications
	introduced to special applications of parsers, such as incremental and parallel parsing.		
BI-GIT	Version control system GIT	KZ	2
	uced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pr on details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git serve		articular system
BIE-SEG		Z	0
	Systems Engineering class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles	-	Ű,
	or and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After tak		
	nce between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what co	•	
	rocesses and threads synchronize efficiently to overcome concurrency for communication.	•	
TV2K1	Physical Education 2	Z	1
BI-TS1	Theoretical Seminar I	Z	4
Theoretical seminar is	intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	ssical reading gro	up. The students
are treated individually	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course i	s a work with scie	ntific papers and
other scholarly literatur	re. The capacity is limited by the the potentials of the teachers of the seminar.	-	
BI-TS2	Theoretical Seminar II	Z	4
	intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla		-
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course i	s a work with scie	ntific papers and
	re. The capacity is limited by the the potentials of the teachers of the seminar.	7	4
BI-TS3	Theoretical Seminar III		4
	intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course i		
	re. The capacity is limited by the the potentials of the teachers of the seminar.	S a work with Sole	
BI-TS4	Theoretical Seminar IV	Z	4
	intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla		
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course i		
other scholarly literatur	re. 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	are well known in	the DevOps
	a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur	in the semester p	-
NI-TSP	Testing and Reliability	Z,ZK	5
-	vledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to		-
	tization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with	n built-in-self-test e	equipment. They
	e, analyze, and control the reliability and availability of the designed circuits.	1/7	4
BI-QUA	Quality Assurance students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the contex	KZ	4
	experience hands-on application testing using both manual and automated testing. At the end of the semester, the student sho		
	of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found		-
FI-TOP	Academic writing	Z	2
-	ant and required part of research activity. It is not only about obtaining research results but also about applying them in the fo	1	1
publications can be us	eful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the	course, students v	will learn how to
	, what parts such an article should have, and how the peer review process works. Students will also try their hand at presenting		-
	se will be taught in blocks, with one lecture at the beginning of the semester and one practicum in the middle of the semester.	. Dates will be det	ermined based
on the availability of er			
BI-CCN	Compiler Construction	Z,ZK	5
	class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principle	•	students to
	and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching theme		Α
BI-TEX	TeX and Typography ad 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.	so in orean. This course gives basies of programming in text (plain text, context, ratex, optex, ruatex). To second part of	110 000130 10005C	S Shi typographic
BI-EHD	Introduction to European Economic History	Z,ZK	3
	ed in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).		

BI-KSA Cultural and Social Anthropology	ZK	2
The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the	e diversity of the world	- examples from
anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language	ge, health, history, deat	th, etc) will be
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 be	ecome 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,		-
of optical network technology and on their solutions. The course will include the history of optical communications, an overview of passive comp		
dispersion compensators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission)		-
the most up-to-date topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications,		
ultrastable frequency transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their paran		
	leters. Students will so	ive real lasks
		_
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	-	
acquainted with virtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and	to efficiently operate ar	nd optimize the
performance parameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most of	effective technology to	day for the
management of complex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practic	al skills in the use of mo	odern integration
and development tools (Continuous integration and development).		
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 cur		e is furthermore
complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual		-
the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.		
	KZ	4
BI-VR1   Virtual reality I		-
Introduction to Virtual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and require		
The course focuses on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves	es computational thinl	king, empathy
and shared social activities.		
BI-VR2 Virtual reality II	KZ	3
Continuation of the course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars.	The objective is to deve	elop applications
for computer science and gamification in various social metaverse and desktop engines.	-	
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		-
issue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce so		
with the active participation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoret	,	
will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms,	optimization and more.	Students will
also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.		
BI-VMM Selected Mathematical Methods	Z,ZK	4
		-
BI-VMM Selected Mathematical Methods	then address Fourier s	eries and their
BI-VMM Selected Mathematical Methods The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We	then address Fourier s the wavelet transform	eries and their
BI-VMM Selected Mathematical Methods The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We properties. Further, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discus the linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting example	then address Fourier s is the wavelet transforr es.	eries and their n. We examine
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BI-VMM         Selected Mathematical Methods           The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We properties. Further, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discus the linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting example           NI-VYC         Computability           Classical theory of recursive functions and effective computability.           BI-ZS10         Bachelor internship abroad for 10 credits           Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific ar internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the printernship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 cm	then address Fourier s as the wavelet transforr es. Z,ZK d/or research institution rofessional content and edits correspond to 4 w	eries and their n. We examine 4 10 n. Before the d extent of the veeks of full-time
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BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
This course is presente	d in Czech.		
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presente	d in Czech.		
BI-3DT.1	3D Printing	KZ	4

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

Name of the group: Elective vocational Courses for a Bachelor Specialization BI-PI.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 <b>Zden k Muziká</b> 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 <b>Ji í Dostál</b> Ji í Dostál (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 (Gar.)	KZ	5	2P+2C	Z,L	V
BI-EPP.21	Economic Business Processes David Buchtela David Buchtela Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	L,Z	V
BI-EHA.21	Ethical Hacking Ji í Dostál, Martin Kolárik, Andrej Šimko <b>Ji í Dostál</b> Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	V
BI-FBI.21	Financial Business Intelligence David Buchtela David Buchtela Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	V
BI-HWB.21	Hardware Security Jif Bu ek Jif Bu ek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-IOT.21	Internet of Things Viktor erný, Lenka Kosková Tísková Lenka Kosková Tísková Lenka Kosková Tísková (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-KOM.21	Conceptual Modelling Robert Pergl, Marek B lohoubek Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-LOG.21	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová Kate ina Trlifajová (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 Ivan Šime ek	Z,ZK	5	2P+1C	Z,L	V
BI-MVT.21	Modern Visualisation Technologies Ji ( Chludil, Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MGA.21	Multimedia and Graphics Applications Ji í Chludil, Lukáš Ba inka, Jan Buriánek, Šimon Tan v Lukáš Ba inka Ji í Chludil (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-OOP.21	Object-Oriented Programming Filip K ikava, Petr Máj, Filip íha <b>Filip K ikava</b> 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 Petr Novák (Gar.)	КZ	5	1P+2C	L	V
BI-PAI.21	Law and Informatics Zden k Ku era, Št pánka Havlíková, Dominik Vítek, Martin Samek, Ji í Maršál, Michal Mat jka Št pánka Havlíková Zden k Ku era (Gar.)	ZK	5	2P+2C	L	V
BI-PJP.21	Programming Languages and Compilers Jan Janoušek, Tomáš Pecka Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	V
BI-PPA.21	Programming Paradigms Jan Janoušek, Tomáš Pecka, Petr Máj, Tomáš Jakl <b>Jan Janoušek</b> 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.)	KZ	5	3C	L	V
BI-PYT.21	<b>Python Programming</b> Martin Šlapák, Ji í Hanuš, Ond ej Bouchala, Mohamed Bettaz, Jan Šafa ík <b>Martin Šlapák</b> Martin Šlapák (Gar.)	ΚZ	5	3C	Z,L	V
BI-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	V
BI-SIP.21	Network Programming Jan Fesl Jan Fesl Jan Fesl (Gar.)	Z	5	2P+2C	Z	V
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	V
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.)	ΚZ	5	2C	L	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.)	KZ	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-TAB.21	Applications of Security in Technology Ji í Dostál, Jan B lohoubek, Martin Kolárik, Martin Pozd na <b>Ji í Dostál</b> 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 Stanislav Kuznetsov	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
TVV	Physical education	Z	0	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TVKLV	Physical Education Course	Z	0	7dní	L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V
BI-TIS.21	Information Systems Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-TUR.21	User Interface Design Jan Schmidt Jan Schmidt Jan Schmidt (Gar.)	Z,ZK	5	2P+2C	L	V
BI-TWA.21	Design of Web Applications David Bernhauer David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-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-VDC.21	Virtualization and Data Centers Ji í Kašpar <b>Ji í Kašpar</b> Ji í Kašpar (Gar.)	Z,ZK	5	2P+2C	L	V
BI-VIZ.21	Data Visualization Magda Friedjungová Magda Friedjungová Magda Friedjungová (Gar.)	KZ	5	3P	Z	V
BI-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	2P+2C	L	V
BI-VWM.21	Searching the Web and Multimedia Databases Ji í Novák, Tomáš Skopal <b>Ji í Novák</b> Tomáš Skopal (Gar.)	Z,ZK	5	2P+1C	L	V
BI-FEM.21	Fundamentals of Economics Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZSB.21	Basics of System Security Marián Svetlík, Martin Šutovský, Dominik Novák, Ladislav Marko Simona Forn sek Simona Forn sek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5	2P+2C	L	V
	Pavel Surynek Pavel Surynek Pavel Surynek (Gar.)					

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

BI-ADU.21	Unix Administration	Z,ZK	5
	ternal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. T	,	-
	inistrator roles. They will get theoretical and practical knowledge of user management and administration, of users access right	-	
	twork services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the k	-	-
specific examples from		Ū	
BI-BEK.21	Secure Code	Z,ZK	5
	now to assess security risks and how to take them into account in the design phase of their own code and solutions. After gettir	, ,	1
	actical experience with running programs with reduced privileges and methods of specifying these privileges, since not every	-	-
administrator privileges	. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securir	ng data and the re	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 tl	nem.
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, vu	Inerabilities, and t	heir possible
exploitation in compute	r networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus	s is on hands-on e	xperience with
vulnerabilities testing a	nd the following process of penetration test documentation.		
BI-PJP.21	Programming Languages and Compilers	Z,ZK	5
Students learn basic co	mpiling methods of programming languages. They are introduced to intermediate representations used in current compilers	GNU and LLVM. T	hey learn to
create a specification o	f a translation of a text that conforms a given syntax, to a target code and also to create a compiler based on the specification	n. The compiler ca	in translate not
only a programming lar	guage but any text in a language generated by a given LL input grammar.		
BI-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
Basic course on introdu	ction 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	on-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 c	course.	
TVV	Physical education	Z	0
TVV0	Physical education	Z	0
TVKZV	Physical Education Course	Z	0
TVKLV	Physical Education Course	Z	0
BI-MVT.21		Z,ZK	5
	Modern Visualisation Technologies is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and au		-
-	(e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the ment		
	ation, scientific data visualization, and 3D model scanning.	loned technologie	s, namely nacial
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
	inted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a		-
	he principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of		
BI-AG2.21	Algorithms and Graphs 2	Z,ZK	5
	in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulso	· · ·	-
	ata structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For Er	-	
BIE-AG2.21.			
BI-ASB.21	Applied Network Security	Z.ZK	5
-	s to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge ga		-
	e the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishi		
	pplications in computer networks.		John Will got
BI-BIG.21	DB Technologies for Big Data	KZ	5
	ced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course	1	1
	dents were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible		
-	on/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theor		
	es will be supplemented with specific examples from practice.		
BI-EPP.21	Economic Business Processes	Z,ZK	5
	s to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic	,	1
	ent of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of t	-	
	mpany, through the management of property and capital structure, financing of the company, determining the cost function o		
	health of the company and its eventual rehabilitation or termination.		,
BI-FBI.21	Financial Business Intelligence	Z,ZK	5
	s to acquaint students primarily with financial accounting as a tool for recording business operations and documents for busin		1
	comparison with other companies and management decision process at the tactical and strategic level. The second view is r	-	-
	nt and prediction of business development. Management accounting allows monitoring of the financial status and performance	-	-
-	ables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital a		
	to future business decisions. The principles of management accounting, described in this course, are the basis of Business li		
	ecision support systems, and other knowledge-oriented systems.	0	
BI-HWB.21	Hardware Security	Z,ZK	5
	ardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the op		1
	es of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HW		
-	with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including		-
	cation (biometrics). Students will understand methods of efficient implementations of ciphers.		
BI-IOT.21	Internet of Things	Z,ZK	5
	an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an o		1
	n technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT arch		
	uter labs, students will gain practical experience with developing simple IoT systems using common development environment		
software - Arduino, Ras		-	- *

BI-KOM.21	Conceptual Modelling	Z,ZK	5
	on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key		-
	correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological si	•	
	rn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data repres f enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEM		-
	rse is designed with the respect to continuation in software implementations. Recommended optional follow-up course: BI-ZPI		BEIMIN HOLALION
BI-LOG.21	Mathematical Logic	Z,ZK	5
	the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfiat	· · ·	-
logical consequence of	f formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, a	re explained. This	relates to the P
	olean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, an		e syntactic
	ical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorems	· · · · · · · · · · · · · · · · · · ·	
BI-MDF.21	Modern Data Formats	KZ	3
-	is to give an overview of commonly used data formats for typical types of data. There will be a description of each data type a		ats used for that
	ols available to work with such data. After finishing the course, the students should know how to work with common data, e.g.		5
FIT-ITI	Modern IT infrastructure time-invariable range of software or hardware, this subject tries to explain the issue as a whole and in the context of the time. A	Z,ZK	-
-	a complex whole, the individual parts of which must be reconciled from different aspects of the view using current technologie		
	tinuous and economically optimal operation.		
BI-MGA.21	Multimedia and Graphics Applications	Z,ZK	5
Students get acquainte	d with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for we	orking with image	s, videos, 3D
	will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to		
	rn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand th	e principle of ope	ration and use
	cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.	7 71/	r
BI-OOP.21	Object-Oriented Programming mming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate togeth	Z,ZK	5 essing In this
	quainted with the main principles of object-oriented programming and design, used in modern programming languages. The el		-
s	e, which includes testing, error handing, refactoring, and application of design pattern.	inpriation of on prat	
BI-PGR.21	Computer graphics programming	Z,ZK	5
After attending this cur	se, students can program a simple interactive 3D graphical application like a computer game or scientific visualization, desigr		extures imitating
geometric details and n	naterials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and	l terms used in co	mputer graphics,
	line, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics and represe	-	-
	ent, e.g., GPU programming and animations. They get used to techniques utilized in geometric modeling, modeling curves and su		
BI-PRS.21	Practical Statistics	KZ	5
	roduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose is sion and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical softw	-	
methods on data from			by the studied
BI-PAI.21	Law and Informatics	ZK	5
	is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge		-
Republic and will be al	erted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding co	ontracts in real an	d Internet
	their responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able		
	ses. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protection	-	
	such behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses of		
BI-PPA.21	Programming Paradigms basic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of	Z,ZK	5 ches Eurctional
	n and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming		
	d on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mair		
such as C++ and Java			
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 the		
	ematical data). Emphasis will be placed on the possibilities of further enhancement of the presented software tools, both usin	g built-in scripting	languages and
by implementation of p			_
BI-PJS.21	JavaScript Programming luction to Javascript programming. Students will also learn best practices and get acquai nted with tools that make code devei	KZ	5 rint oppior
BI-PYT.21		KZ	5
	Python Programming is to get acquainted with basic efficient control and data structures of the Python programming language for text and binary da		
	programming in Python and in other programming languages will be explained. Each topic is prepared for students in the forr		
	to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a semes		
the semester.			
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, an	alysis, crisis man	agement in a
	n, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk		•
	schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for adge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in l		
	se who will develop software or hardware in the form of team projects.	arge companies.	
BI-SIP.21	Network Programming	Z	5
	damental 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		
	rn 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		<b></b>	_
BI-SWI.21	Software Engineering	Z,ZK	5
	ed with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They		
	the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get han uge UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design of the students are used to be a supersonal students and the students are used to be a supersonal students.		
	eoretical basis in the field of project management, estimation of costs of software projects, and methods of their development	-	
<b>v</b>			

	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 ru	
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 te	
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 de	veloped
and finished in the BIE-SP2 course.	<i>г</i>
BI-SP2.21   Team Software Project 2   KZ   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	5
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	
teacher, in the role of the team and project leader, regularly consults with the team (at the seminars) the formal as well as material aspects of their solution.	. 1110
BI-SPS.21 Administration of Computer Networks and Services Z,ZK	5
The aim of the course is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrated under the operating	-
Linux and Windows. The course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained by practical hands-on ex	
with real network infrastructure.	
BI-ML1.21 Machine Learning 1 Z,ZK	5
The goal of this course is to introduce students to the basic methods of machine learning. They get theoretical understanding and practical working knowledge of regression a	and
classification models in the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relationships between model bias	
variance, and know the fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimensional data visualization. In	practical
demonstrations, pandas and scikit libraries in Python will be used.	_
BI-ML2.21   Machine Learning 2   Z,ZK	5 theda
The goal of this course is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in particular, learn kernel m and neural networks. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction methods. Moreover, students	
basic principles of reinforcement learning and natural language processing.	gerine
BI-SVZ.21 Machine vision and image processing Z,ZK	5
Camera systems are becoming a common part of life by being universally available. Related to this phenomenon is the need to process and evaluate image information. The	-
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 of camera systems for	
problems of practice that the graduates may encounter.	0
BI-TAB.21 Applications of Security in Technology Z,ZK	5
The goal of the course is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Students get a broader over	view of
cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.	
BI-TJV.21 Java Technology Z,ZK	5
The goal is to provide knowledge and skills for developing information systems and applications through concepts used in software development and experience with libraries a	and tools
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
The course introduces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical layer with the overlap	
link layer. The lectures provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies will be demonstrated and the second	
with the most important ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethernet, modern wireless n always with focus on high-speed networks.	etworks,
BI-TIS.21 Information Systems Z,ZK	
The goal of this course is to familiarise students with the information systems topic and information systems implementation principles. During the course, students are introd	5
	5 uced to
	uced to
"on the market" existing types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other types of information systems the fundamental part of the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, ways of information systems	uced to stems.
"on the market" existing types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other types of information sy	uced to stems.
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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 techn	, nologies used in n	nodern computer
networks from local are	a networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practi	cal experience wi	ith real network
devices in the lab and le	earning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securit	ty.	
BI-VWM.21	Searching the Web and Multimedia Databases	Z,ZK	5
Students get basic over	view 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 inform	ation about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from	m web pages. The	ey get detailed
knowledge of similarity s	search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web	search engines f	ior the mentioned
data types (documents)			
BI-FEM.21	Fundamentals of Economics	Z,ZK	5
The course allows the s	tudents to discover basics of economic theory, which will then be used in subsequent courses of economics and manageme	nt. It contains a g	eneral overview
of fundamental microec	onomic and macroeconomic topics.		
BI-ZSB.21	Basics of System Security	Z,ZK	5
The goal of the course i	s to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of fore	nsic analysis and	related topics
such as malware analys	sis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of mod	dern operating sy	stems security,
as well as skills needed	for independent work in the area of operating system security incident analysis.		
		-	-

### 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 co	urse 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 lan	nguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both the	he midterm and the	e final term
tests with the success	s rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by ind class of the term.	ividual teachers du	ring the first
BI-AAG.21	Automata and Grammars	Z,ZK	5
Students are introduc	ed to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite a	automata, regular e	expressions
and regular grammars	s, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know the	hierarchy of forma	al languages
and they	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
- 1	This is a selective course for preparing talented student for representation in international programming contests.	1	-
BI-ACM2	Programming Practices 2	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		
BI-ACM3	Programming Practices 3	KZ	5
DI / IOINIO	This is a selective course for preparing talented student for representation in international programming contests.	112	0
BI-ACM4	Programming Practices 4	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		0
BI-ADU.21		Z,ZK	5
1	Unix Administration internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They		1
Students will learn the	internal structure of the OMAX operating system, with the administration of its basic subsystems and with the security principles. They	will understand the	unierences
botwoon upor and adv	ministrator roles. They will get theoretical and practical knowledge of user management and administration, of users appear rights	file overeme diek	whowatama
	ministrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights,		
	, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the kn		
processes, memory,	, 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 le	ectures on
	r, 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. Windows Administration		
BI-ADW.1	r, 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. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	owledge from the le	ectures on 4
BI-ADW.1 BI-AG1.21	r, 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. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753). Algorithms and Graphs 1	owledge from the le	ectures on 4
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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
	rn the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec	,	-
	on processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the princ		
	r processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of		
	se 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
The subject is desig	gned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applicat	ions for modern pr	ogrammable
	aried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded s		
not only on displ	ay of a PC. Thanks to possible control on higher (objective) layer, this platform is frequently used for artist performance and therefore	is suitable even fo	or Web and
	Software Engineering students.	/	
BI-ASB.21	Applied Network Security	Z,ZK	5
	urse is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine tions like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishing		
	knowledge of security applications in computer networks.		ant will get
BI-AVI.21	Algorithms visually	Z,ZK	4
	ements other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer sc	,	1
	ed in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&l		
	that make understanding the principles of algorithms easy.		
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
Students will get a	cquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and l		atabase and
web serv	vice systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an exam	ple of a web serv	er.
BI-BAP.21	Bachelor Thesis	Z	14
BI-BEK.21	Secure Code	Z,ZK	5
The students will le	earn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fa	miliar with the thre	eat modeling
	s gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
	vileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing		
	database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and th	-	1
BI-BIG.21	DB Technologies for Big Data	KZ	5
	troduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is for the students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me		
-	mation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic		
	of individual technologies will be supplemented with specific examples from practice.		procontation
BI-BLE	Blender	Z,ZK	4
The course exter	nds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those in	•	aphics and
animation. It	offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graph	nics applications)	course.
BI-BPR.21	Bachelor project	Z	1
-	ng of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the		
	semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at the second se		
	r enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvul d 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		
	mulated more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the assig		
	can be supplemented and approved at the end of the semester.		abolgrinion
BI-CCN	Compiler Construction	Z,ZK	5
	luctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles		1
understa	and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching	theme of the class	ss.
BI-CS1	Programming in C#	KZ	4
The goal of the co	urse is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental co	onstruction, types	of variables,
	s, loops, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class def		0,
constructors, meth	nods, properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debugging	and exception pro	ocessing, 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 ts used to retrieve data - Connection, Command, Data Reader and DataAdapter v ADO.NET. Next, they will learn to use current techn	•	
	erving 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		
	of the course introduces Code First, Database First, Model First approaches. The students will also get to know the Conceptual Model		-
	(XML description).		
BI-CS3	Language C# - design of web applications	KZ	4
The students will b	e introduced to current technologies in web application development on the .NET platform. They will acquire a comprehensive overview of	of the developmen	t possibilities
	on thisplatform. They will learn to create WebAPI and to use it by client programs.		1
BI-DBS.21	Database Systems	Z,ZK	5
	roduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lear	-	
	constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with the		
	dation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the funda Illing parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduced t		
	ases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of database		-
	optimizing database applications, distributed database systems, data stores.		
L			

BI-DML.21	Discrete Mathematics and Logic	Z,ZK	5	
Students will get ac	quainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts fro	1 '	-	
-	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.			
BI-EHA.21	Ethical Hacking	Z,ZK	5	
	burse 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			
	vulnerabilities testing and the following process of penetration test documentation.			
BI-EHD	Introduction to European Economic History	Z,ZK	3	
	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	],		
BI-EJA	Enterprise Java	Z,ZK	4	
	dvanced technologies in the Java programming language. The focus is on technologies for development of enterprise information system	· ·	onnected to	
	a database and are accessed through the web interface.			
BI-EJK	Enterprise Java and Kotlin	Z,ZK	4	
	lvanced technologies in the Java and Kotlin programming languages. The focus is on technologies for developing enterprise informat	1 '	nicroservice	
	architecture, that can be deployed to the cloud.			
BI-EP1.24	Effective programming 1	KZ	4	
1	The course is taught in Czech.			
BI-EP2	Efficient Programming 2	KZ	4	
Continuation of Eff	ficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving indivi	dual problems are	discussed,	
	with the aim to choose the best one and avoid implementation errors.			
BI-EPP.21	Economic Business Processes	Z,ZK	5	
The aim of the cour	rse is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic and	d financial aspects	of business	
in the market envir	onment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the	company's life cyc	le, from the	
establishment of the	e company, through the management of property and capital structure, financing of the company, determining the cost function of th	e company and lat	oor costs, to	
	evaluating the financial health of the company and its eventual rehabilitation or termination.			
BI-FBI.21	Financial Business Intelligence	Z,ZK	5	
	se is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for business		-	
	s for comparison with other companies and management decision process at the tactical and strategic level. The second view is mar	-	-	
-	ement and prediction of business development. Management accounting allows monitoring of the financial status and performance of I			
	ds, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital an			
assess options rel	ated to future business decisions. The principles of management accounting, described in this course, are the basis of Business Inte	elligence modules i	n business	
	information systems, decision support systems, and other knowledge-oriented systems.	7 71/		
BI-FEM.21	Fundamentals of Economics	Z,ZK	5	
The course allows	the students to discover basics of economic theory, which will then be used in subsequent courses of economics and management. of fundamental microeconomic and macroeconomic topics.	It contains a gener	al overview	
	or jungamental microeconomic and macroeconomic topics.			
		7 71/	r -	
BI-FMU	Financial and Management Accounting	Z,ZK	5	
The aim of the cour	Financial and Management Accounting se is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the pa	rticular accounting	operations,	
The aim of the cour operations in accou	Financial and Management Accounting se is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the pa unts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modification	rticular accounting on of bookkeeping,	operations, description	
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BI-IOT.21	Internet of Things	Z,ZK	5
	view of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an over		
	nologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT architec		
areas. Within the computer lat	os, students will gain practical experience with developing simple IoT systems using common development environments	(hardware - ARM,	ESP, STM;
	software - Arduino, Raspberry Pi OS).		_
BI-JPO.21	Computer Units	Z,ZK	5
	knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail w		
	and processors and their interactions with the environment, including accelerating arithmetic-logic units and using appropri- ion of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, including	-	
	al data transmissions. They will also get acquainted with the methodology of controller design, with the principles of commu	-	
	ecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micropro	-	
	and programmable hardware design kits (FPGA).	grammed proceed	
BI-KAB.21	Cryptography and Security	Z,ZK	5
	mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to		1
	on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in appl		-
will gain practical skills	in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic process	dures of cryptanaly	ysis.
BI-KOM.21	Conceptual Modelling	Z,ZK	5
1	eloping abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key tel	rms in a domain, tl	he ability to
categorize and specify correct	relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological struct	tural modeling in th	ne OntoUML
	to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represent		
learn the foundations of enterp	rise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO m	nethod and the BP	MN notation
-	The course is designed with the respect to continuation in software implementations. Recommended optional follow-up co	ourse: BI-ZPI.	
BI-KOT	Programing in Kotlin	Z,ZK	4
	styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advan		
	npliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a r		nctional way
	rith minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages)		-
BI-KSA	Cultural and Social Anthropology	ZK	2
	s to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversity		-
anthropological research from	our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health	n, history, death, ei	tc) will be
	shown. The course is presented in Czech.	7 71/	-
BI-LA1.21	Linear Algebra 1	Z,ZK	5
	the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field vill present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimina	-	
	anifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenv		-
	matrix. We will also demonstrate some applications of these concepts in computer science.		
BI-LA2.21	Linear Algebra 2	7 71/	
		Z.ZK	5
	ا ozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový pros	Z,ZK tor v abstraktní ob	-
Studenti si v tomto p edm tu r		tor v abstraktní ob	ecné form .
Studenti si v tomto p edm tu r Seznámíme se také s pojmen	ozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový pros	tor v abstraktní ob ikou. Dalším velkýr	ecné form . m tématem
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variance, and know the fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimensional data visualization. In practical demonstrations, pandas and scikit libraries in Python will be used.

BI-ML2.21	demonstrations, pandas and scikit libraries in Python will be used.		
	Machine Learning 2	Z,ZK	5
-	purse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in particularly in the supervised learning scenario, they, in particularly in the supervised learning scenario.		
and neural networl	ks. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction method basic principles of reinforcement learning and natural language processing.	ls. Moreover, stude	nts get the
BI-MMP	Multimedia team project	KZ	4
	This course is presented in Czech.		-
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
	ed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universa		
includes both PC s	ide and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USE drivers, simple application development, and APIs of selected devices.	3 devices, Linux an	d Windows
BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
	urse is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and augm		
-	lays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentione	-	
	and procedural visualization, scientific data visualization, and 3D model scanning.		
BI-OOP.21	Object-Oriented Programming	Z,ZK	5
	rogramming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		-
course students ge	t acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The emph for developing software, which includes testing, error handing, refactoring, and application of design pattern.	asis is on practical	techniques
BI-OPT	Introduction to Optical Networks	Z,ZK	4
	overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on possi	· · ·	
-	technology and on their solutions. The course will include the history of optical communications, an overview of passive components	-	
	sators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission system	,	
•	e topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as		
ultrastable freque	ncy transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters. from practice.	Students will solve	real tasks
BI-ORL	Operations Research and Linear Programming	KZ	5
	p introduce students to the issues of operational research and primarily to the practical application of linear programming as a fundar		
-	nal research primarily focuses on the use of engineering methods (with a mathematical background) to solve practical problems (suc	-	-
BI-OSY.21	Operating Systems	Z,ZK	5
	a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread imp		
critical regions, thre	ead scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS monit	<b>o</b> ,	e to design
	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS W		7
BI-PA1.21	Programming and Algorithmics 1 ability to formulate algorithms for solving basic problems and write them in the C language. They understand data types (simple, struc	Z,ZK	7
-	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searchi		
,,	with linked lists and trees.		
BI-PA2.21	Programming and Algorithmics 2	Z,ZK	7
		<u>∠,∠r</u>	7
	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que	eue, enlargeable ari	ay, list, set,
	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e	eue, enlargeable ari	ay, list, set,
table). They lear	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e copying/moving of objects, operator overloading, inheritance, polymorphism).	eue, enlargeable an e.g., template progr	ay, list, set, amming,
table). They learn	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e copying/moving of objects, operator overloading, inheritance, polymorphism). Law and Informatics	eue, enlargeable an e.g., template progr ZK	ay, list, set, amming, 5
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BI-PJV	Programming in Java	Z,ZK	4
BI-PKM	This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z	4
DI-PKIVI	Introduction to mathematics This course is presented in Czech.	Ζ.	4
BI-PMA	Programming in Mathematica	Z,ZK	4
Students will be wo	orking with modern technical and scientific software. Students will learn how to use different programming styles (functional programm	ning, rule-based pr	ogramming,
BI-PNO.21	etc.), how to create dynamic interactive applications and visualisations, data processing and presentations. Practical Digital Design	KZ	5
	verview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the	I	-
	on technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern in		
	tools.	7 71/	
BI-PPA.21	Programming Paradigms vith basic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of par	Z,ZK	5 Eunctional
	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The		
on lambda calculu	is and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr such as C++ and Java.	eam programming	languages
BI-PRR.21	Project management	Z,ZK	5
	purse is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, anal cation, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk as		
	ource schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for st		-
deepening their k	nowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in lar	ge companies. The	e course is
	also suitable for all those who will develop software or hardware in the form of team projects.	1/7	
BI-PRS.21 The students will be	Practical Statistics e introduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose mod	KZ dels fitting the data	5 The course
	gression and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical software	•	
	methods on data from real problems.		
BI-PS2	Programming in shell 2	Z,ZK	4
Students gain a ge	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In additi into shell and some other particular scripting languages and will get practical experience with shell script programming.	on, they gain a dee	eperinsigni
BI-PSI.21	Computer Networks	Z,ZK	5
	ces students to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in local r		
	es will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced netw actically verify configurations and management of network devices in the lab within the environment of the operating systems Linux a	-	Students
BI-PST.21	Probability and Statistics	Z,ZK	5
	the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. T	· · ·	apply basic
	om variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction	-	-
esumations of unk	known distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical the statistical dependence of two or more random variables.	r hypotheses and d	letermining
BI-PYT.21	Python Programming	KZ	5
	urse is to get acquainted with basic efficient control and data structures of the Python programming language for text and binary data		
	hy of programming in Python and in other programming languages will be explained. Each topic is prepared for students in the format ccent to individual student work. Before each lab, students pass a short test on the last week topic. Four homeworks plus a semester		
enables greater a	the semester.	work will be assig	neu uunng
BI-QAP	Quantum algorithms and programming	KZ	5
• •	ing students hands-on experience with quantum computers and their programming. We focus on fundaments of quantum mechanics, o	•	•
-	gorithms showing advantages and limitations of quantum computing. During tutorials students work in open-source software developr ge. Knowledge of linear algebra at the level of BI-LA1 and BI-LA2 (or BI-LIN) is necessary. Previous completion of BI-MA2 or BI-VMM		
	might be an advantage. No previous knowledge of physics is assumed.		
BI-QUA	Quality Assurance	KZ	4
	duces students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the context of		
	vill experience hands-on application testing using both manual and automated testing. At the end of the semester, the student should n a set of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found		
BI-SAP.21	Computer Structure and Architecture	Z,ZK	5
-	acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of arith	-	
memory, I/O comm	unication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple proces in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.	ssor is practically ir	nplemented
BI-SCE1	Computer Engineering Seminar I	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to		
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the	-	
articles and other p	professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester.	rs. The topics are n	iew for each
BI-SCE2	Computer Engineering Seminar II	Z	4
The Seminar of Co	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to		
	idividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher	-	
	semester.	110 topios are 11	.cm ior Gault
BI-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		
	readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		marridudi
L			

The course covers	Network Programming	Z	5
	fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level program		
	oted to designing communication protocols and their verification. The third part introduces the principles and applications of middlewa modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in con-	-	-
	programming language environment.	inputer labs using t	Chosen
BI-SKJ.21	Scripting Languages	Z,ZK	4
	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In additional structures is a structure of a	· · ·	
	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
	rrse will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal us	•	
and efficient coope	ration of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view lir This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	iked to higher level	languages.
BI-SP1.21	Team Software Project 1	KZ	5
-	ands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the	1	
	nat teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teach		
project leader, regu	larly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software art	efact will be further	developed
<b>DI 0</b> 00 04	and finished in the BIE-SP2 course.		
BI-SP2.21	Team Software Project 2	KZ	5
-	Is-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result ollow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will work		
	er, in the role of the team and project leader, regularly consults with the team (at the seminars) the formal as well as material aspects		
BI-SPS.21	Administration of Computer Networks and Services	Z,ZK	5
The aim of the cou	rse is to deepen the theoretical knowledge of network technologies and protocols in the environment of network servers administrated	d under the operati	ng systems
Linux and Windows	. The course syllabus requires the knowledge at the level of courses BIE-PSI, BIE-VPS, and BIE-OSY. Practical skills will be gained by	practical hands-on	experience
	with real network infrastructure.		
BI-SQL.1	Language SQL, advanced	KZ	4
	I knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In pa gueries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of		
	exes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan an		
will be discusse	d. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Ora	Icle DBMS and par	tially on
	PostgreSQL.		
BI-SRC.21	Real-time systems	Z,ZK	5
	he basic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issues.		-
lectures will be exp	perimentally verified in computer labs. The course is mainly focused on embedded RT systems, therefore the design kits in the lab are course.	e the same as in th	e die-veo
BI-ST1	Network Technology 1	Z	3
	iented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredited	- 1	-
	CCNA1 - R&S Introduction to Networks.		
BI-ST2	Network Technology 2	Z	3
	This course is presented in Czech.		
BI-ST3	Nistere de Telebra de seu O		
	Network Technology 3	Z	3
	r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during B	I-ST1 and BI-ST2	courses will
	r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during B ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, predi	I-ST1 and BI-ST2	courses will
get further extend	r enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during B ded in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, predi simple topology, security, etc.	I-ST1 and BI-ST2 c	courses will beyond a
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the teacher. The course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first 14 days of teaching. Within the exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed.

BI-TEX	TeX and Typography	Z,ZK	4
This course is presented in Czech. This course g	gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the cour rules.	irse focuses on t	ypographic
BI-TIS.21	Information Systems	Z,ZK	5
-	s with the information systems topic and information systems implementation principles. During the course, s		
	their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other type		-
-	ntroduction to key ideas of an information system selection, evaluation of information system benefits, ways o nentation based on the project management principles. The emphasis is on the initial customer analysis, cus	-	
	ting information system or to develop a new one from scratch. These factors determine the information system	-	-
	tems security, operation, support, maintenance, legislation impacts, and government information systems to		
BI-TJV.21	Java Technology	Z,ZK	5
1	eveloping information systems and applications through concepts used in software development and experie	· · · · · · · · · · · · · · · · · · ·	
from Java langua	age 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
The course introduces students with basic and	advanced technologies, components, and interfaces of contemporary computer networks at the physical la	yer with the ove	rlap to the
	lations of these technologies and explain relevant physical principles. In the labs, the respective technologies		
with the most important ones students will get ha	hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethernet, r	modern wireless	networks,
	always with focus on high-speed networks.	-	
BI-TS1	Theoretical Seminar I	Z	4
	ich want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re-		
-	with interesting topics from the latest research in the area. Therefore, an integral part of the course is a worl scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	k with scientific	Japers anu
BI-TS2	Theoretical Seminar II	Z	4
I	ich want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re	- 1	-
	with interesting topics from the latest research in the area. Therefore, an integral part of the course is a worl		
-	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	ich want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re	eading group. Th	ne 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 worl	k with scientific	papers and
	scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS4	Theoretical Seminar IV	Z	4
	ich want to come in deeper contact with contemporary theoretical computer science. It is mostly a classical re		
-	with interesting topics from the latest research in the area. Therefore, an integral part of the course is a worl	k with scientific	papers and
	scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	7 71/	-
BI-TUR.21   Students gain a basic overview of methods for	User Interface Design designing and testing common user interfaces. They get experience to solve the problems where software a	Z,ZK	5 cts do not
-	needs and characteristics of users are not taken into account during product development. Students gain ar	-	
		n overview of me	ethods that
		n overview of me	ethods that
	bring users into the development process to ensure optimal interface for them.		5
BI-TWA.21		Z,ZK	5
BI-TWA.21 BI-TWA	bring users into the development process to ensure optimal interface for them. Design of Web Applications	Z,ZK f language desc	5 ribing the
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BI-VES.21	Embedded Systems	Z,ZK	5
Students learn to de	sign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedo peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	led processors, the	ir integrated
BI-VHS	Virtual game worlds	ZK	4
	tudents to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current stud	1	-
	the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. T	-	
	the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devi	ces.	-
BI-VIZ.21	Data Visualization	KZ	5
	n overview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understandi		
	as such as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preproces		-
different kinds of da	ta such as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications of	selected methods t	o real-world
	examples in the Python programming language.	7 71/	
BI-VMM	Selected Mathematical Methods	Z,ZK	4
-	s with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then ad		
	r, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the w ne linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interestir		/e examine
BI-VPS.21	Selected Topics in Computer Networking	Z.ZK	5
-	pon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technology	· ·	-
	al area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical	-	-
	vices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance	-	
BI-VR1	Virtual reality I	KZ	4
	al Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of	I	munication.
	es on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves con		
	and shared social activities.		
BI-VR2	Virtual reality II	KZ	3
Continuation of the	course Virtual Reality I. The new course focuses on collaborative telepresence, spatial computing and social life of avatars. The obje	ctive is to develop	applications
	for computer science and gamification in various social metaverse and desktop engines.		
BI-VWM.21	Searching the Web and Multimedia Databases	Z,ZK	5
Students get basi	c overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storag	e of documents. In	particular,
	nformation about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from		
knowledge of simila	rity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web se	arch engines for the	e mentioned
	data types (documents).		
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
	ed system fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim of t robot control and development of applications in a graphical development environment. Lectures provide fundamentals of motion cont		
i modern numanoid i			
	vigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p		
interfaces, robot na	vigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p technologies.	practical experience	e with these
interfaces, robot na BI-ZNF	avigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p technologies. PHP Framework Nette - basics	KZ	e with these
interfaces, robot na BI-ZNF	vigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p technologies.	KZ	e with these
interfaces, robot na BI-ZNF	avigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p technologies. PHP Framework Nette - basics ne basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech po	KZ	e with these
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BI-ZSB.21	Basics of System Security	Z,ZK	5
	ourse is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forens		
Such as maiware	analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of mode as well as skills needed for independent work in the area of operating system security incident analysis.	m operating system	ns security,
BI-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
	troduction to artificial intelligence with emphasis on symbolic techniques. The design of an intelligent agent and the techniques needed		
	decision-making level. The intelligent agent in the context of the course can be represented for example by a physical robot, but also		entity, such
	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 d		4
BI-ZWU	Introduction to Web and User Interfaces This course is presented in Czech.	Z,ZK	4
BIE-CSI	Introduction to Computer Science	Z	2
This is an introduc	tory class on Elementary Computer Science for broad audiences: bachelor students in computer science, students majoring in other fi	elds but interested	in computer
-	iool students, anybody with a background in basic math and the desire to understand the absolute basics of computer science. The g		
	principles of computer science for students to understand, early on, what computer science is, why things such as high-level program y are, and even how, on a basic yet representative and practically relevant level. After taking the class, students are able to answer no		
	questions about themselves such as which courses to take next and which books to follow up with, ideally realizing if they are interest		
	than expected, or even less than before.	•	
BIE-DIF	Differential equations	Z,ZK	5
	es a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential s theorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered wi		
	vision of existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODE's are covered with ysis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world applicatio		
	I equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODEs	-	
	and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
BIE-EEC	English language external certificate	Z	4
The BIE-ECC cour	rse can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in Engl the B2 level of the Common European Framework of Reference for Languages.	ish comparable to c	or exceeding
BIE-IMA2	Introduction to Mathematics 2	7	2
	and extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are a		
	examples.		
BIE-SEG	Systems Engineering	Z	0
	tory class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles of		
· ·	cessor and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After taking difference between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what co		
	parallelism, and how processes and threads synchronize efficiently to overcome concurrency for communication.		2000010
BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	duced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classic	al tasks from the ar	reas of state
space search, mul	ti-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm		
-	be presented as well.	ns and the neural no	etworks, will
FI-TOP	be presented as well. Academic writing	ns and the neural no	etworks, will
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NI-AFP	Applied Functional Programming	KZ	5
	sented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional p	I I	-
	s and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, master		-
	necessary competence of a software engineer: the theory and especially the practice.		
NI-DDM	Distributed Data Mining	KZ	4
	n state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands (		=
	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations a	-	-
adia proceeding in	approaches to parallelize other algorithms. The course is prezented in czech language.		to proposo
NI-DSP	Database Systems in Practes	Z,ZK	4
N-DOI	This course is presented in Czech.	2,21	-
NI-DZO		Z,ZK	4
	Digital Image Processing		-
	ents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical alg	-	-
	re an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is also		
	processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR	•	0
	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, and		-
NI-IAM	Internet and Multimedia	Z,ZK	4
The NI-IAM cours	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	uisition of AV signa	als (input),
presentation of AV	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u	use case scenarios	of real-time
audiovisual transr	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the eff	ect of various comp	ponents on
the quality and late	ency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording th	e scene up to the p	oresentation
	for audience.		
NI-LSM	Statistical Modelling Lab	KZ	5
The subject is ori	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p	but on the effective	use of the
available informati	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, an	d analyses of their	properties.
	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi	is).	
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	pgramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where	I I	-
	nplex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills	•	
	in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development n		
	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work of		
	rms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involven		
-			
NI-MPL	Managerial Psychology	ZK	2
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
Mathematical se			
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	Introduction to category theory.	t model of lambda	calculus.
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NI-OLI	Introduction to category theory.	Z,ZK	4
NI-OLI The Linux operatin	Introduction to category theory. Linux Drivers	Z,ZK	4 and FPGAs
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NI-VYC	Computability	Z,ZK	4
·	Classical theory of recursive functions and effective computability.		•
TV1	Physical Education	Z	0
TV2	Physical Education	Z	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

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2025-08-20, time 18:03.