Study plan

Name of study plan: Bachelor Specialization Computer Systems and Virtualization, in Czech, 2021

Garantor of the st Program of study Type of study: Ba Required credits: Elective courses of Sum of credits in Note on the plan: akademického ro	juaranteed by the department: Welcome page sudy branch: : Informatika chelor full-time 153 credits: 27					g. Pavel
	k: Compulsory courses in the program of credits of the block: 106 ock: PP					
2021 Requirement creat Requirement cou Credits in the gro Note on the If group: In B E of in p	b: Compulsory Courses of Bachelor Study Program dits in the group: In this group you have to gain 100 rses in the group: In this group you have to comple	6 credits ete 20 cou anagement I neering, or W the specializa oll in the cou icce specializa BI-PSI.21 in Engineering,	rses nformati Veb Engi ation Co rse BI-P ation, en your 5th enroll ir	cs, Com neering, mputer C SI.21 in y roll in th n semest n the cou	puter Netw enroll in th Graphics, C your 4th se e course E ter of study rse BI-AA	vorks and 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 Jan Holub Jan Holub (Gar.)	Z,ZK	5	2P+2C	Z	PP
BI-BAP.21	Bachelor Thesis Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BI-BPR.21	Bachelor project Zden k Muziká Zden k Muziká (Gar.)	Z	1	0P+0C	Z,L	PP
BI-DBS.21	Database Systems Michal Valenta, Jan Blizni enko, Ji í Hunka, Monika Borkovcová, Jan Matoušek, Pavel K íž, Št pán Pechman, Dominik Roudný, Jan Bittner, Ji í Hunka Michal Valenta (Gar.)	Z,ZK	5	2P+2R+1L	L	PP
BI-DML.21	Discrete Mathematics and Logic Ji ina Scholtzová, Daniel Dombek, Jan Sp vák Daniel Dombek Jan Sp vák (Gar.)	Z,ZK	5	2P+1R+1C	Z	PP
BI-KAB.21	Cryptography and Security Ivana Trummová, Tomáš Rabas, Tomáš Zahradnický, Ji í Bu ek, Martin Jure ek, Josef Kokeš, Róbert Lórencz, Julia Plotnikova, David Pokorný, Róbert Lórencz Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	L	PP
BI-LA1.21	Linear Algebra 1 Lud k Kleprlík, Jakub Krásenský, Karel Klouda Lud k Kleprlík Karel Klouda (Gar.)	Z,ZK	5	2P+1R+1C	Z	PP

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

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

BI-AG1.21 Algorithms and Graphs 1	Z,ZK	5			
The course covers the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing of	urriculum. It links a	and partially			
develops the knowledge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the	ne time and space	complexity of			
algorithms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic notat	tion.				
BI-AAG.21 Automata and Grammars	Z,ZK	5			
Students are introduced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of fini	ite automata, regu	lar expressions,			
and regular grammars, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know	the hierarchy of fo	ormal languages			
and they understand the relationships between formal languages and automata. They are introduced to the Turing machine and complexity classes F	P and NP.				
BI-BAP.21 Bachelor Thesis	Z	14			
BI-BPR.21 Bachelor project	Z	1			
1. At the beginning of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the	e partial tasks tha	t he / she will			
perform during the semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR	at the end of the	semester. 2. The			
external supervisor enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvut.cz/student/studijni/formulare)					
The completed and signed form must be delivered in person or by email to the SZZ coordinator, who will arrange for the credit to be granted. 3. If the topic of the work that the studen					
has reserved is formulated more generally, the tasks assigned to him by the supervisor for the semester should be aimed primarily at fine-tuning the a	ssignment so that	the assignment			
can be supplemented and approved at the end of the semester.					
BI-DBS.21 Database Systems	Z,ZK	5			
Students are introduced to the database engine architecture and typical user roles. They are briefly introduced to various database models. They lea	rn to design smal	databases			
(including integrity constraints) using a conceptual model and implement them in a relational database engine. They get a hands-on experience with t	the SQL language	, as well as with			
its theoretical foundation - the relational database model. They learn the principles of normalizing a relational database schema. They understand the fun	ndamental concep	ots of transaction			
processing, controlling parallel user access to a single data source, as well as recovering a database engine from a failure. They are briefly introduce	ed to special ways	of storing data			
in relational databases with respect to speed of access to large quantities of data. This introductory-level course does not cover: Administration of data	tabase systems,	debugging and			
optimizing database applications, distributed database systems, data stores.					
BI-DML.21 Discrete Mathematics and Logic	Z,ZK	5			
Students will get acquainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts	from set theory w	ill be explained.			
Special attention is paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The co	ourse also lays do	wn the basics of			
combinatorics and number theory, with emphasis on modular arithmetics.					
BI-KAB.21 Cryptography and Security	Z,ZK	5			
Students will understand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to	o use cryptograph	ic keys and			
certificates in systems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in a	pplications. Withir	labs, students			
will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedures	s of cryptanalysis.				
BI-LA1.21 Linear Algebra 1	Z,ZK	5			
We will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the fie	ld of real and con	plex numbers			
and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elin	mination method (GEM) and show			
the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eiger	nvalues and eigen	vectors of a			
matrix. We will also demonstrate some applications of these concepts in computer science.					

BI-MA1.21 Mathematical Analysis 1		
	Z,ZK	5
We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers and its properties.	-	
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of f is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation		
problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical des		
BI-MA2.21 Mathematical Analysis 2	Z,ZK	6
The course completes the theme of analysis of real functions of a real variable initiated in BI-MA1 by introducing the Riemann integral. Students will	1 · · 1	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 the computation	of elementary
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithm		°
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, an		-
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the	- <u> </u>	
BI-OSY.21 Operating Systems 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 threa	Z,ZK	5
critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS	· · · · · · · · · · · · · · · · · · ·	,
and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.	monitoring. They a	c able to design
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	- I - I - I	-
well. The lectures will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced ne	twork technologies	. Students
practically verify configurations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IC	S.	
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 variab		
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 statis	tical hypotheses ar	nd determining
the statistical dependence of two or more random variables.	774	
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, statements, functions, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for sea		<i>i i i i</i>
with linked lists and trees.	inclining, soluting, and	manipulating
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	1 1	-
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).		
BI-SAP.21 Computer Structure and Architecture	Z,ZK	5
Students will get acquainted with the basic architecture and units of a digital computer, understand the structure, function, and implementation of a	-	
memory, I/O communication, methods of data transfers between the units. The logic design and the implementation of a program-controlled simple p	rocessor is practica	ally implemented
in the labs using programmable circuits (FPGA), a single-chip microcomputer, and modern design (EDA) tools.		
BI-TZP.21 Technological Fundamentals of Computers Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how compu	Z,ZK	5
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to		
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.		
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Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADU.21	Unix Administration Zden k Muziká, Petr Zemánek, Miroslav Prágl Zden k Muziká Zden k Muziká (Gar.)	Z,ZK	5	2P+2C	L	PS
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	PS
BI-APS.21	Architectures of Computer Systems Michal Štepanovský, Pavel Tvrdík Michal Štepanovský Pavel Tvrdík (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-SPS.21	Administration of Computer Networks and Services Jan Kubr, Libor Dostálek Pavel Tvrdík Libor Dostálek (Gar.)	Z,ZK	5	2P+2S	Z	PS
BI-IDO.21	Introduction to DevOps Michal Valenta, Ji í Mlejnek, Tomáš Vondra, Zden k Rybola Tomáš Vondra Ji í Mlejnek (Gar.)	Z,ZK	5	2P+2C	Z	PS
BI-VDC.21	Virtualization and Data Centers Ji í Kašpar Ji í Kašpar Ji í Kašpar (Gar.)	Z,ZK	5	2P+2C	L	PS
BI-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	2P+2C	L	PS
BI-ZSB.21	Basics of System Security Marián Svetlík, Dominik Novák, Ladislav Marko, Martin Šutovský Simona Forn sek Simona Forn sek (Gar.)	Z,ZK	5	2P+2C	Z	PS

Characteristics of the courses of this group of Study Plan: Code=BI-PS-PV.21 Name=Compulsory Courses of Specialization Computer Systems and Virtualization, version 2021

BI-ADU.21 Unix Administration	Z,ZK	5		
Students will learn the internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles.	hey will understan	d the differences		
between user and administrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rigil	hts, file systems, c	lisk subsystems,		
processes, memory, network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the k	nowledge from th	e lectures on		
specific examples from practice.				
BI-AWD.21 Web and Database Server Administration	Z,ZK	5		
Students will get acquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, a	and backup comple	ex database and		
web service systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an example of	a web server.			
BI-APS.21 Architectures of Computer Systems	Z,ZK	5		
Students will learn the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Sp	ecial emphasis is	given on the		
pipelined instruction processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the p	principles of instru	ction processing		
not only in scalar processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of	of the sequential r	nodel of the		
program. The course further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory coherence and consistency in such				
systems.				
BI-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 administ	rated under the op	berating 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	d by practical hand	ls-on experience		
with real network infrastructure.				
BI-IDO.21 Introduction to DevOps	Z,ZK	5		
The course deals with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of	systems and serv	ices. The course		
covers the tools to support software development, testing and compilation. It also focuses on tools for automating infrastructure management and but	uilding and deploy	ing software to		
the Cloud. It is an introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquait	inted with modern	technologies		
used in practice.				
BI-VDC.21 Virtualization and Data Centers	Z,ZK	5		
The aim of the course is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design	and implementation	on of data center		
infrastructure, such as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data of	center technologie	es from private		
to public and hybrid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications				
design, validation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, outa	ages, and data los	ses.		
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 technical structures and the structure of the	nologies used in m	nodern computer		
networks from local area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practi	ical experience wit	th real network		
devices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securi	ty.			
BI-ZSB.21 Basics of System Security	Z,ZK	5		
The goal of the course is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of fore	nsic analysis and	related topics		
such as malware analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of more	dern operating sys	stems security,		
as well as skills needed for independent work in the area of operating system security incident analysis.				

Name of the block: Compulsory elective courses Minimal number of credits of the block: 5 The role of the block: PV

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

Name of the group: Compulsory elective Courses of Specialization Computer Systems and Virtualization, version 2021

Requirement credits in the group: In this group you have to gain at least 5 credits (at most 20)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 4) 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-BIG.21	DB Technologies for Big Data Monika Borkovcová Monika Borkovcová Monika Borkovcová (Gar.)	KZ	5	2P+2C	Z,L	PV
FIT-ITI	Modern IT infrastructure Ivan Šime ek	Z,ZK	5	2P+1C	Z,L	PV
BI-TAB.21	Applications of Security in Technology Ji í Dostál, Jan B lohoubek, Martin Kolárik, Martin Pozd na Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	PV
BI-VES.21	Embedded Systems Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	L	PV

Characteristics of the courses of this group of Study Plan: Code=BI-PV-PV.21 Name=Compulsory elective Courses of Specialization Computer Systems and Virtualization, version 2021

BI-BIG.21	DB Technologies for Big Data	KZ	5		
Students will be introdu	zed into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course	is focused praction	cally so that after		
finishing the course stud	dents were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible	method of data p	processing (data		
collection, transformation	ollection, transformation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretical foundation and presentation				
of individual technologies will be supplemented with specific examples from practice.					
FIT-ITI	Modern IT infrastructure	Z,ZK	5		
BI-TAB.21	Applications of Security in Technology	Z,ZK	5		
The goal of the course i	s to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stu	dents get a broad	der overview of		
cybersecurity applicatio	ns and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.				
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 embedded processors, their integrated					
peripheral circuits, prog	ramming methods, and applications. They get practical skills with development kits and tools.				

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

Code of the group: BI-PT.21

Name of the group: Compulsory Physical Education, version 2021

Requirement credits in the group:

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

Note on the group:

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

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

Characteristics of the courses of this group of Study Plan: Code=BI-PT.21 Name=Compulsory Physical Education, version 2021

Physical Education	Z	1
Physical education	Z	0
Physical Education Course	Z	0
Physical Education Course	Z	0
	Physical education Physical Education Physical education Physical Education Physical Education Physical Education	Physical educationZPhysical EducationZPhysical educationZPhysical EducationZPhysical EducationZPhysical Education CourseZ

Name of the block: Povinná zkouška z angli tiny

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 Note on the group: BI-ANG, ending with an exam for two credits, is enrolled by students who have completed preparator English courses and have a credit from the BI-A2L course.
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 BI-ANG1, ending with an exam for two credits, is enrolled by students who have credit from BI-A2L. These students must complete a credit paper before their own exam. After passing the exam, the student will also be recognized for the course BI-ANGS (Independent preparation for the English exam) for 2 credits.
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 The BIE-ECC course can be recognized for any active semester after the submission of a external

certificate at the level of at least B2 according to the Common European Framework of Reference.							
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 Zden k Muziká Zden k Muziká (Gar.)	Z	4	2D	L	PJ	
BI-ANG	English Language, Internal Certificate Kate ina Valentová Kate ina Valentová Kate ina Valentová (Gar.)	ZK	2	2D	Z,L	PJ	

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

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

Name of the block: Elective courses

Minimal number of credits of the block: 0

The role of the block: V

Code of the group: BI-V.2021

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

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BI-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-ALO	Algebra and Logic Jan Starý Jan Starý Jan Starý (Gar.)	Z,ZK	4	2P+1C	L	V
BI-AVI.21	Algorithms visually Lud k Ku era Lud k Ku era 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	Z,ZK	4	2P+1C	L	V
BI-STO	Tomáš Vichta Tomáš Vichta Tomáš Vichta (Gar.) Storage and Filesystems	Z,ZK	4	2P+2C	L,Z	v
NI-PSD	Public Services Design David Pešek, Ond ej Brém David Pešek	KZ	4	1P+2C		v
BIE-DIF	Differential equations Antonella Marchesiello, Jan Valdman, Ond ej Bouchala Tomáš Kalvoda Ond ej Bouchala (Gar.)	Z,ZK	5	2P+2C	L	v
NI-DZO	Digital Image Processing	Z,ZK	4	2P+1C	L	V
NI-DDM	Distributed Data Mining	KZ	4	3C	L	V
BI-EP1.24	Effective programming 1 Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	Z	V
BI-EP2	Efficient Programming 2 Martin Ka er Martin Ka er (Gar.)	KZ	4	2P+2C	L	V
BI-ANGK	English language, contact preparation for the B2 level exam Kate ina Valentová Kate ina Valentová (Gar.)	Z	2	2C	Z,L	v
BI-EJA	Enterprise Java Ji í Dan ek	Z,ZK	4	2P+2C	L	v
BI-EJK	Enterprise Java and Kotlin Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+2C	L	v
BI-FMU	Financial and Management Accounting	Z,ZK	5	2P+2C	Z	v
BI-HAM	HW accelerated network traffic monitoring Tomáš ejka, Karel Hynek Tomáš ejka Tomáš ejka (Gar.)	KZ	4	2P+1C	L	V
BI-HMI	History of Mathematics and Informatics Alena Šolcová Alena Šolcová (Gar.)	Z,ZK	3	2P+1C	L	V
BI-ARD	Interactive applications on Arduino Jan ezní ek, Ji í Cvr ek, Robert Hülle, Vojt ch Miškovský Robert Hülle Robert Hülle (Gar.)	KZ	4	3C	L	v
NI-IAM	Internet and Multimedia Ji í Melnikov	Z,ZK	4	2P+1C	L	v
BIE-CSI	Introduction to Computer Science Christoph Kirsch Christoph Kirsch (Gar.)	Z	2	2C	Z	V
FITE-EHD	Introduction to European Economic History Tomáš Evan	Z,ZK	3	2P+1C	L	V
BIE-IMA2	Introduction to Mathematics 2 Karel Klouda	Z	2	1C	Z	v
BI-CS2	C# language and data access Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	0P+3C	Z	v
BI-CS3	Language C# - design of web applications Pavel Št pán Pavel Št pán Pavel Št pán (Gar.)	KZ	4	3C	Z	v
BI-SQL.1	Language SQL, advanced Michal Valenta Michal Valenta (Gar.)	KZ	4	3C	L	v
BI-QAP	Quantum algorithms and programming Tomáš Kalvoda, Ivo Petr Ivo Petr (Gar.)	KZ	5	1P+2C	Z	v
NI-LSM	Statistical Modelling Lab Kamil Dedecius Kamil Dedecius (Gar.)	KZ	5	3C	L	v
BI-HAS	Human Aspects in Cryptography and Security Ivana Trummová Ivana Trummová Ivana Trummová (Gar.)	Z,ZK	5	2P+1C	Z	v
NI-MPL	Managerial Psychology Jan Fiala Jan Fiala Jan Fiala (Gar.)	ZK	2	2P	Z,L	v
NI-MSI	Mathematical Structures in Computer Science Jan Starý	Z,ZK	4	2P+1C	L	v
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-MIT	Mikrotik technologies Jan Fesl Jan Fesl (Gar.)	KZ	3	1P+2C	Z	v
NI-MOP	Modern Object-Oriented Programming in Pharo Jan Blizni enko Robert Pergl Robert Pergl (Gar.)	KZ	4	3C	Z	v
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	v
BI-MMP	Multimedia team project Zde ka echová Zde ka echová Zde ka echová (Gar.)	KZ	4	3C	Z,L	v
BI-ORL	Operations Research and Linear Programming Dušan Knop Dušan Knop Dušan Knop (Gar.)	KZ	5	1P+2C	L	v
NI-OLI	Linux Drivers Miroslav Skrbek, Jaroslav Borecký Jaroslav Borecký Miroslav Skrbek (Gar.)	Z,ZK	4	2P+2C	L	v
BI-ACM	Programming Practices 1 Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	v
BI-ACM2	Programming Practices 2 Ond ej Suchý, Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	Z	v
BI-ACM3	Programming Practices 3 Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	KZ	5	4C	L	v

BI-ACM4	Programming Practices 4 Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.)	KZ	5	4C	Z	V
BI-AND.21	Programming for the Android Operating System Jan Mottl, Jan Vep ek, Marek Kodr, Petr Šíma Jan Mottl Marek Kodr (Gar.)	KZ	4	3C	L	V
BI-CS1	Programming in C# Pavel Št pán, Helena Wallenfelsová Helena Wallenfelsová Pavel Št pán (Gar.)	ΚZ	4	3C	L,Z	V
BI-PJV	Programming in Java Miroslav Balík, Jan Blizni enko, Ji í Borský, Jan Zimolka Miroslav Balík Miroslav Balík (Gar.)	Z,ZK	4	2P+2C	Z,L	V
BI-PJS.1	JavaScript Programming Old ich Malec	KZ	4	3C	L	V
ві-кот	Programing in Kotlin Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+2C	L	V
NI-PSL	Programming in Scala Jií Dan ek Jií Dan ek Jií Dan ek (Gar.)	Z,ZK	4	2P+1C	Z	V
BI-PMA	Programming in Mathematica Zden k Buk Zden k Buk Zden k Buk (Gar.)	Z,ZK	4	2P+2C	Z,L	v
BI-PHP.1	Programing in PHP	KZ	4	3C	Z	V
BI-PS2	Programming in shell 2 Lukáš Ba inka	Z,ZK	4	2P+2C	L	V
NI-PDD	Data Preprocessing Marcel Ji ina Marcel Ji ina Marcel Ji ina (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-PKM	Introduction to mathematics Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z	4		Z	V
NI-REV	Reverse Engineering Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	1P+2C	Z	V
BI-SCE1	Computer Engineering Seminar I Hana Kubátová Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V
BI-SCE2	Computer Engineering Seminar II Hana Kubátová Hana Kubátová (Gar.)	Z	4	2C	L,Z	V
BI-ST1	Network Technology 1 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST2	Network Technology 2 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	3C	L	V
BI-ST3	Network Technology 3 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	Z	V
BI-ST4	Network Technology 4 Alexandru Moucha Alexandru Moucha (Gar.)	Z	3	2C	L	V
BI-SKJ.21	Scripting Languages Lukáš Ba inka, Jan Ž árek Lukáš Ba inka Jan Ž árek (Gar.)	Z,ZK	4	2+2	L	V
BI-SOJ	Machine Oriented Languages	Z,ZK	4	2P+2C	L	V
FIT-SEP	World Economy and Business Tomáš Evan	Z,ZK	4	2P+2C	L	V
BI-SEP	World Economy and Business Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	L	V
NI-SYP	Parsing and Compilers Jan Janoušek Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	Z	V
BI-GIT	Version control system GIT Petr Pulc	KZ	2	16P	Z,L	V
BIE-SEG	Systems Engineering Christoph Kirsch Christoph Kirsch (Gar.)	Z	0	2C	Z	V
TVK1	Physical Education	Z	1		L,Z	V
TVV	Luboš Neuman Ji í Drnek (Gar.) Physical education	Z	0	0+2	Z,L	V
TV1	Physical Education	Z	0	0+2	_,_ Z	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TV2	Physical Education	Z	0	0+2	_,_ L	V
TV2K1	Physical Education 2	Z	1		 L,Z	V
TVKLV	Physical Education Course	Z	0	7dní	L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V
BI-TS1	Theoretical Seminar I Dušan Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BI-TS2	Dusan Knop, Ond ej Suchý, Tomáš Valla Tomáš Valla Ond ej Suchý (Gar.)	Z	4	2C	L	V
BI-TS3	Theoretical Seminar III Ond ej Suchý, Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	Z	V
BI-TS4	Theoretical Seminar IV Ond ej Suchý, Tomáš Valla Tomáš Valla Tomáš Valla (Gar.)	Z	4	2C	L	V
BI-TDA	Test driven architecture	KZ		1 1		

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

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

,		7	4
TVK1	Physical Education	Ζ	1
TVV	Physical education	Z	0
TV1	Physical Education	Z	0
TVV0	Physical education	Z	0
TV2	Physical Education	Z	0
TVKLV	Physical Education Course	Z	0
TVKZV	Physical Education Course	Z	0
BI-ADW.1	Windows Administration	Z,ZK	4
This course is pres	ented 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 comple	ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the compute	er science that exte	end substantially
knowledge presente	d 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></td></http:>	govision.org>
that make understa	nding the principles of algorithms easy.		

BI-A2L English language, preparation for the B2 level exam	Z	2
The content of the course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achieven	1	
active part in the language instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both		
tests with the success rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by		
class of the term.		g
BI-APJ Aplication Programming in Java	Z,ZK	4
This course is presented in Czech. Advanced technologies in Java.	2,21	-
	V7	5
NI-AFP Applied Functional Programming	KZ	-
This course is presented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel function		
the rise nowadays and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mas	tering this paradic	jm becomes a
necessary competence of a software engineer: the theory and especially the practice.		
BIE-ZUM Artificial Intelligence Fundamentals	Z,ZK	4
Students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classical students are introduced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving.		
space search, multi-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algor	thms and the neu	ral networks, will
be presented as well.		
BI-BLE Blender	Z,ZK	4
The course extends knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for thos	e interested in 3D	graphics and
animation. It offers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming graphi	cs applications) co	ourse.
NI-DSP Database Systems in Practes	Z,ZK	4
This course is presented in Czech.		
BI-STO Storage and Filesystems	Z,ZK	4
The student will learn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and a	· · ·	•
load balancing and high availability.	i o o o uo	otorago ocanig,
NI-PSD Public Services Design	KZ	4
	1	•
The course will introduce students to specifics of UX, Service design and development for public sector. We will look into the design and development for public sector. We will look into the design and development or public sector. We will look into the design and development or public sector.	-	
suppliers (devs and designesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaborat	on with client repi	esentatives.
Course is aimed at students-designers as well as clients.	7 71/	
BIE-DIF Differential equations	Z,ZK	5
This course provides a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essenti		-
of variables. Key theorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered		
polynomial analysis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application	-	
partial differential equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving OD	Es and PDEs, inc	luding implicit
and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
NI-DZO Digital Image Processing	Z,ZK	4
This course presents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical	algorithms that ar	e both easy to
implement and have an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that i	s also valuable ou	tside the domain
of digital image processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDI	२ compression, de	e-blurring in
frequency domain, abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray of	conversion, contex	t enhancement,
interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, a	dding depth, alph	a matting.
NI-DDM Distributed Data Mining	KZ	4
Course focuses on state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain han	ds on experience	with large scale
data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementation	ns and will be capa	able to propose
approaches to parallelize other algorithms. The course is prezented in czech language.		
BI-EP1.24 Effective programming 1	KZ	4
The course is taught in Czech.		·
BI-EP2 Efficient Programming 2	KZ	4
Continuation of Efficient Programming 1. Students will practice implementation of algorithms by solving typical problems. Various ways of solving inc	1	
with the aim to choose the best one and avoid implementation errors.	ividual problems a	are discussed,
BI-ANGK English language, contact preparation for the B2 level exam	Z	2
The content of the course corresponds to the preparation for the English exam at the B2 level. Requirements for course credit. Academic Achievement		
active part in the language instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both		
tests with the success rate set at 70%80% and over in BOTH tests means ORAL EXAM ONLY (no written part). Requirements will be specified by	individual teacher	's during the first
class of the term.		
BI-EJA Enterprise Java	Z,ZK	4
The course is on advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information	systems which an	re connected to
a database and are accessed through the web interface.		
BI-EJK Enterprise Java and Kotlin	Z,ZK	4
The course is on advanced technologies in the Java and Kotlin programming languages. The focus is on technologies for developing enterprise info		with microservice
architecture, that can be deployed to the cloud.		
BI-FMU Financial and Management Accounting	Z,ZK	5
The aim of the course is explanation of basic terms in the theory of accounting, the principles of balancing the property amounts and liabilities in the		-
operations in accounts and accounting statements including opening and closing of bookkeeping. The course provides students with a legal modific		
	allon of bookkeep	J,
of economic operations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of management		g are base of
of economic operations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage Business Inteligence moduls in Business information systems.		g are base of
Business Inteligence moduls in Business information systems.	gement accounting	-
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring	gement accounting	4
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring.	gement accounting KZ The monitoring an	4 d analysis of
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. network traffic are mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as	gement accounting KZ The monitoring an a source of inform	4 d analysis of nation and data
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. network traffic are mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as for analysis). The goals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network	gement accounting KZ The monitoring an a source of inform	4 d analysis of nation and data
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. network traffic are mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as for analysis). The goals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network level and to develop their practical abilities in this field.	gement accounting KZ The monitoring an a source of inform traffic on a hardwa	4 d analysis of nation and data are and software
Business Inteligence moduls in Business information systems. BI-HAM HW accelerated network traffic monitoring This course introduces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. network traffic are mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as for analysis). The goals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network	gement accounting KZ The monitoring an a source of inform	4 d analysis of nation and data

The subgroup is designative subsets of the great of baseling and any as infrastruction bandback space. The plant is equiphered by corresponding space in the share the subset is an excert space space space space space space in the space spac	BI-ARD Interactive applications on Arduino	KZ	4
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Scheme Engineering students: Harten L. Herrent and Multimedia Z.Z.K. 4 The NH-MM Uniter the located on principles and modern technologies for intervisions of audoresaut (VIV) signals. The yillable induces spaceholders of audient audoresaution of the servision of audoresaut (VIV) signals. The yillable induces spaceholders of audient audoresaution of the servision of audoresaution (VIV) signals. The yillable induces spaceholders of audoresaution of the service on the preventation in the service on the service on the preventation in the service on the preventation in the service on the ser			
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technologies in terms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involvement in the Pharo Consortium.			-
	technologies in terms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct inv	olvement in the Pha	ro Consortium.

BI-MVT.21	Modern Visualisation Technologies	Z,ZK	5
The goal of the course	is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and au	gmented reality, v	risualization on
	(e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mention	oned technologie	s, namely fractal
· · · · · · · · · · · · · · · · · · ·	ation, scientific data visualization, and 3D model scanning.		
BI-MMP This course is presente	Multimedia team project d in Czech.	KZ	4
BI-ORL	Operations Research and Linear Programming	KZ	5
-	oduce students to the issues of operational research and primarily to the practical application of linear programming as a func		ation technique.
	rimarily focuses on the use of engineering methods (with a mathematical background) to solve practical problems (such as ma		
NI-OLI	Linux Drivers	Z,ZK	4
	stem is an important operating system for personal computer and also for embedded systems. Systems on chip and combining of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developme		
	dge of Linux operating system architecture, principles of development of various types drivers, including practical experience.		
BI-ACM	Programming Practices 1	KZ	5
	se for preparing talented student for representation in international programming contests.		U
BI-ACM2	Programming Practices 2	KZ	5
This is a selective cours	se for preparing talented student for representation in international programming contests.	I	
BI-ACM3	Programming Practices 3	KZ	5
This is a selective cours	se for preparing talented student for representation in international programming contests.		
BI-ACM4	Programming Practices 4	KZ	5
	se for preparing talented student for representation in international programming contests.		
BI-AND.21	Programming for the Android Operating System	KZ	4
This course is presente			
BI-CS1	Programming in C#	KZ	4
-	is to introduce .NET Framework as a multi-language development platform. Then, programming language C#, its fundamental		
	b, definitions and calls of functions will be discussed. Attention is focused on the object oriented programming in C# - class def properties, static members, Garbage Collector, inheritance and polymorphism, collections, delegates, and generics. Debuggi		
well as work with files a			processing, as
BI-PJV	Programming in Java	Z,ZK	4
	d 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	t in Javascript. Th	e course is
recommended for stude	ents of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register for BIE-TWA.1. They should register for	r this course in th	eir 4th semester
of study.			
BI-KOT	Programing in Kotlin	Z,ZK	4
	ically-styled object-functional language that exploits the extensive Java language ecosystem while delivering a number of advance of advance of a state of a language that exploits the extensive aviiting parts with the development of		
	ave compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages).	a modern, object	-iunciionai way
NI-PSL	Programming in Scala	Z.ZK	4
-	the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language featu	, I	•
	y. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks a		Ũ
Scalaz, etc.			
BI-PMA	Programming in Mathematica	Z,ZK	4
	g with modern technical and scientific software. Students will learn how to use different programming styles (functional program	mming, rule-base	ed programming,
,, ,	amic interactive applications and visualisations, data processing and presentations.		
BI-PHP.1	Programing in PHP	KZ	4
-	Czech Main goal of the course is an introduction to PHP - language and technology. Students will learn also best practices a ne course is recommended for students of BIE-WSI-WI.2015 branch of study and do not have required knowledge to register f		
-	in their 3rd semester of study.	OF DIE-TWA.T. II	ley should
BI-PS2	Programming in shell 2	Z,ZK	4
	I overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In add	· ·	-
	er particular scripting languages and will get practical experience with shell script programming.	, , , ,	
NI-PDD	Data Preprocessing	Z,ZK	5
Students learn to prepa	re raw data for further processing and analysis. They learn what algorithms can be used to extract information from various dat		as images, texts,
time series, etc., and le	arn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of character	istics from image	s or from web
pages.			
BI-PKM	Introduction to mathematics	Z	4
This course is presente NI-REV		7 71	5
	Reverse Engineering inted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens t	Z,ZK	-
	inderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is ded		
	C++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be de		
	ing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compute	-	e. The focus of
the course is on the ser	ing work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the compute ninars, where students will solve practically oriented tasks from the real world.	-	e. The focus of
the course is on the set BI-SCE1		-	e. The focus of
BI-SCE1 The Seminar of Compu	minars, where students will solve practically oriented tasks from the real world. Computer Engineering Seminar I ter Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance	er malware scene Z e to failures and a	4 attacks. Students
BI-SCE1 The Seminar of Compu are approached individ	ninars, where students will solve practically oriented tasks from the real world. Computer Engineering Seminar I	er malware scene Z e to failures and a ne subject is worl	4 attacks. Students k with scientific

		· ·
BI-SCE2 Computer Engineering Seminar II		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 resistant 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 te		
semester.		
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 acred	ited under the Cisc	o Netacad -
CCNA1 - R&S Introduction to Networks.	7	2
BI-ST2 Network Technology 2 This course is presented in Czech.	Z	3
BI-ST3 Network Technology 3	7	3
Students will further enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented due	. –	-
get further extended in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, pr	edictability, extensi	ion beyond a
simple topology, security, etc.		-
BI-ST4 Network Technology 4	Z	3
Students will further enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switcl BI-ST2 courses got further extended in BI-ST3. Students were able to start fine-tune protocols' settings to gain certain advantages like increased e		-
beyond a simple topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a complete		-
Broadcast Multiple Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and sw		-
recoveries, and emergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mit	gation ways while	maintaining the
BI-SKJ.21 Scripting Languages Students gain a general overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In a	ddition they gain a	4
into shell and some other particular scripting languages and will get practical experience with shell script programming.	uullon, mey gain a	deeper maight
BI-SOJ Machine Oriented Languages	Z,ZK	4
Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optim	1 '	cessor's features
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vi	ew linked to higher	level languages.
This knowledge will be used during reverse engineering, optimization, and evaluation of code security.		
FIT-SEP World Economy and Business	Z,ZK	4
This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly land key regions of world economy. Students get to know about different religions and cultures, necessary for doing business in diverse societies as w		
corruption and economic development, which are needed for the right investment decision. Seminars help to improve on the knowledge in the form		
readings. It is advised to take bachelor level of this course BIE-SEP as a prerequisite.		
BI-SEP World Economy and Business	Z,ZK	4
This course is presented in Czech. The course introduces students of technical university to the international business. It does that predominantly business are consistent of the course introduces students of technical university to the international business.		
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NI-SYP Parsing and Compilers	Z,ZK	5
The module builds upon the knowledge of fundamentals of automata theory, formal language and formal translation theories. Students gain knowledge		-
of LR parsing and are introduced to special applications of parsers, such as incremental and parallel parsing.		
BI-GIT Version control system GIT	KZ	2
Students will be introduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and peven the implementation 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 Systems Engineering	7	0
This is an introductory class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principle	s of operating syst	-
to understand processor and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After ta		
understand the difference between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what of	oncurrency is, as c	opposed to
parallelism, and how processes and threads synchronize efficiently to overcome concurrency for communication.		1
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 cl are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course		
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS2 Theoretical Seminar II	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cl	assical reading gro	oup. The students
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course	is a work with scie	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS3 Theoretical Seminar III Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cl		4
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course		-
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS4 Theoretical Seminar IV	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cl		-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course	is a work with scie	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	K7	4
BI-TDA Test driven architecture The course is focused on practical examples of how to develop, test, and deploy software with tools like GitLab, Docker, Kubernetes, and more that	KZ t are well known in	1 -
world. This course has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occu		-
NI-TSP Testing and Reliability	Z,ZK	5
Students will gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to	1 '	-
the intuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with the sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with the sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with the sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with the sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with the sensitization and to use an ATPG for automatic test generation.	th built-in-self-test	equipment. They
will be able to compute, analyze, and control the reliability and availability of the designed circuits.		

BI-QUA Quality Assurance	KZ	4
This course introduces students to the fundamentals of testing and quality management. Students will learn what the role of a tester is in the context of	f different types	of software
development and will experience hands-on application testing using both manual and automated testing. At the end of the semester, the student should	d be prepared to	o perform a test
analysis, design a set of test scenarios, prepare test data, automate an appropriate portion of the scenarios, and prepare a report on the bugs found in	n the product un	der test.
FI-TOP Academic writing	Z	2
Publishing is an important and required part of research activity. It is not only about obtaining research results but also about applying them in the form	•	•
publications can be useful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the cou		
write a scientific article, what parts such an article should have, and how the peer review process works. Students will also try their hand at presenting an		-
else's article. The course will be taught in blocks, with one lecture at the beginning of the semester and one practicum in the middle of the semester. Da on the availability of enrolled students.	ales will be dele	ermined based
	Z,ZK	5
BI-CCN Compiler Construction his is an introductory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles or		-
understand the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching theme of	-	
BI-TEX TeX and Typography	Z,ZK	4
This course is presented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the	<i>'</i>	
rules.		son typographic
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).	2,21	5
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 diversit		_
anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt		•
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 become familiar	- 1	
and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (terminal).		
BI-OPT Introduction to Optical Networks	Z,ZK	4
Students get basic overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on poss	· .	
of optical network technology and on their solutions. The course will include the history of optical communications, an overview of passive components	(optical fibres,	multiplexors,
dispersion compensators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission syste	ems). The cours	e will also cover
the most up-to-date topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as	s the accurate ti	me on Internet,
ultrastable frequency transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters. S	Students will sol	ve real tasks
from practice.		
NI-VCC Virtualization and Cloud Computing	Z,ZK	5
Students will gain knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and o	-	
acquainted with virtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie		
performance parameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effective	0,	
management of complex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills i and development tools (Continuous integration and development).	In the use of mo	dern integration
	ZK	4
BI-VHS Virtual game worlds The course leads students to create a complex virtual world. The course is a continuation of basic graphical courses (MGA, PGR, BLE,). This current students to create a complex virtual world.	1	
complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. The	-	
the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.		io followed by
BI-VR1 Virtual reality I	KZ	4
Introduction to Virtual Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements o	1	
The course focuses on the ways of teaching using virtual reality technologies and interactive activities in educational virtual 3D worlds. It improves com		
and shared social activities.		0, 1 ,
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	1	
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 to the b	basic courses, v	ve approach the
issue from applications to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic	ic data structure	s. Furthermore,
with the active participation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) info	ormatics. Areas	from which we
will select problems to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimiza	ation 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
The lecture begins with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then add		
properties. Further, we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the wa	vavelet transform	n. We examine
the linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting examples.		
NI-VYC Computability	Z,ZK	4
Classical theory of recursive functions and effective computability.		
BI-ZS10 Bachelor internship abroad for 10 credits	Z	10
Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or res		
internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits contents are used used for the evidence and evaluation of the internship in IS KOS.		
employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided in	•	
exceeds the academic year's dead-line.		
BI-ZS20 Bachelor internship abroad for 20 credits	Z	20
Each student can once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or res	1	
internship the Dean of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the profession		
internship. Auxiliary courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits co		
employment with a foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided in	•	
exceeds the academic year's dead-line.		

BI-ZS30	Bachelor internship abroad for 30 credits	Z	30
Each student can once	within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or	research institutio	n. Before the
internship the Dean of th	ne FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content.	sional content and	d extent of the
internship. Auxiliary cou	rses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits	correspond to 4 w	veeks of full-time
employment with a forei	gn institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided	d into two subjects	s if the internship
exceeds the academic y	rear's dead-line.		
BI-ZIVS	Intelligent Embedded System Fundamentals	KZ	4
Intelligent embedded sy	stem fundamentals course is focused on high-level technology embedded systems integrating artificial intelligence. The aim	of the course is to	teach students
modern humanoid robot	control and development of applications in a graphical development environment. Lectures provide fundamentals of motion c	ontrol, sensor rea	ding, application
interfaces, robot navigat	ion and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to g	et practical experi	ence with these
technologies.			
BI-ZPI	Process engineering	KZ	4
Students will learn funda	amentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles	of process model	ling and they will
learn basics of the used	notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of I	ousiness processe	es using modern
CASE tools. The role of	process engineering for information systems development is discussed as well as its importance in the overall context of info	ormation and busi	ness strategy of
an enterprise.			
BI-ZNF	PHP Framework Nette - basics	KZ	3
Students will gain the ba	usics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech	n popular framewo	ork. The resulting
knowledge should serve	for the efficient creation of a web backend in PHP language.		
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
This course is presented	d in Czech.		
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
This course is presented	d in Czech.	- · · · · · · · · · · · · · · · · · · ·	
BI-3DT.1	3D Printing	KZ	4

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

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

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Note on the gr	oup.					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
BI-AG2.21	Algorithms and Graphs 2 Dušan Knop, Michal Opler, Ond ej Suchý, Tomáš Valla, Radek Hušek Ond ej Suchý Ond ej Suchý (Gar.)	Z,ZK	5	2P+2C	L	V
BI-ASB.21	Applied Network Security Yelena Trofimova, Ji í Dostál, Jakub Tetera, Michal Polák, Martin Šutovský, Martin Mandík Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	z	V
BI-BEK.21	Secure Code Josef Kokeš Josef Kokeš (Gar.)	Z,ZK	5	2P+2C	L	V
BI-BIG.21	DB Technologies for Big Data Monika Borkovcová Monika Borkovcová Monika Borkovcová (Gar.)	KZ	5	2P+2C	Z,L	V
BI-EPP.21	Economic Business Processes David Buchtela David Buchtela Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	L,Z	V
BI-EHA.21	Ethical Hacking Ji í Dostál, Martin Kolárik, Andrej Šimko Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	V
BI-FBI.21	Financial Business Intelligence David Buchtela David Buchtela Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	V
BI-HWB.21	Hardware Security Ji í Bu ek Ji í Bu ek Ji í Bu ek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-IOT.21	Internet of Things Viktor erný, Lenka Kosková T ísková Lenka Kosková T ísková Lenka Kosková T ísková (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-JPO.21	Computer Units Pavel Kubalík Pavel Kubalík Pavel Kubalík (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-KOM.21	Conceptual Modelling Robert Pergl, Marek B lohoubek Robert Pergl Robert Pergl (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-LA2.21	Linear Algebra 2 Daniel Dombek, Lud k Kleprlík, Karel Klouda, Marta Nollová, Jakub Šístek Lud k Kleprlík Karel Klouda (Gar.)	Z,ZK	5	2P+2C	L	V
BI-LOG.21	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-MDF.21	Modern Data Formats Petr Pauš Petr Pauš Petr Pauš (Gar.)	KZ	3	1P+1C	Z	V
BI-MVT.21	Modern Visualisation Technologies Ji í Chludil, Petr Pauš Petr Pauš Petr Pauš (Gar.)	Z,ZK	5	2P+2C	Z	V

BI-MGA.21	Multimedia and Graphics Applications Ji í Chludil, Lukáš Ba inka, Jan Buriánek, Šimon Tan v Lukáš Ba inka Ji í Chludil (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-OOP.21	Object-Oriented Programming Filip K ikava, Petr Máj, Filip íha Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PGR.21	Computer graphics programming Petr Felkel, Jaroslav Sloup Jaroslav Sloup Petr Felkel (Gar.)	Z,ZK	5	2P+2C	L	V
BI-PRS.21	Practical Statistics Kamil Dedecius, Petr Novák Petr Novák (Gar.)	KZ	5	1P+2C	L	V
BI-PNO.21	Practical Digital Design Martin Novotný Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	V
BI-PAI.21	Law and Informatics Zden k Ku era, Št pánka Havlíková, Dominik Vítek, Martin Samek, Ji í Maršál, Michal Mat jka Št pánka Havlíková Zden k Ku era (Gar.)	ZK	5	2P+2C	L	v
BI-PJP.21	Programming Languages and Compilers Jan Janoušek, Tomáš Pecka Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	V
BI-PPA.21	Programming Paradigms Jan Janoušek, Tomáš Pecka, Petr Máj, Tomáš Jakl Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+2R	Z	V
BI-PGA.21	Programming of Graphic Applications Ji (Chludil, Radek Richtr Radek Richtr (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-PJS.21	JavaScript Programming Martin Kolárik, Nikita Mironov Monika Borkovcová Monika Borkovcová (Gar.)	KZ	5	3C	L	V
BI-PYT.21	Python Programming Martin Šlapák, Ji í Hanuš, Ond ej Bouchala, Mohamed Bettaz, Jan Šafa ík Martin Šlapák Martin Šlapák (Gar.)	KZ	5	3C	Z,L	V
BI-PRR.21	Project management David Pešek David Pešek Petra Pavlí ková (Gar.)	Z,ZK	5	2P+2C	Z,L	V
BI-SIP.21	Network Programming Jan 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.)	KZ	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.)	ΚZ	5	2C	Z	V
BI-ML1.21	Machine Learning 1 Karel Klouda, Daniel Vašata Daniel Vašata (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ML2.21	Machine Learning 2 Daniel Vašata Daniel Vašata (Gar.)	Z,ZK	5	2P+2C	L	V
BI-SVZ.21	Machine vision and image processing Marcel Ji ina, Jakub Novák, David Kramný, Justýna Frommová Jakub Novák Marcel Ji ina (Gar.)	Z,ZK	5	2P+2C	L,Z	V
BI-SRC.21	Real-time systems Hana Kubátová, Ji í Vysko il Jaroslav Borecký Hana Kubátová (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-TAB.21	Applications of Security in Technology Ji í Dostál, Jan B lohoubek, Martin Kolárik, Martin Pozd na Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	V
BI-TJV.21	Java Technology Stanislav Kuznetsov, Jan Blizni enko, Ji í Dan ek, Raian Samerkhanov Ji í Dan ek	Z,ZK	5	2P+2C	Z	V
BI-TPS.21	Computer Networks Technologies Vladimír Smotlacha, Josef Koumar Vladimír Smotlacha Vladimír Smotlacha (Gar.)	Z,ZK	5	2P+2S	Z	V
BI-TIS.21	Information Systems Pavel Náplava Pavel Náplava Pavel Náplava (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-TUR.21	User Interface Design Jan Schmidt Jan Schmidt Jan Schmidt (Gar.)	Z,ZK	5	2P+2C	L	V
BI-TWA.21	Design of Web Applications David Bernhauer David Bernhauer (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-UKB.21	Introduction to Cybersecurity Ivana Trummová, Jan B lohoubek, David Pokorný, Jakub Tetera, František Ková, Martin Mandík, Tomáš Lu ák David Pokorný Jan B lohoubek (Gar.)	Z,ZK	5	3P+1C	Z	V
BI-VES.21	Embedded Systems Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	L	V
BI-VIZ.21	Data Visualization Magda Friedjungová Magda Friedjungová Magda Friedjungová (Gar.)	KZ	5	3P	Z	V
BI-VWM.21	Searching the Web and Multimedia Databases Ji í Novák, Tomáš Skopal Ji í Novák Tomáš Skopal (Gar.)	Z,ZK	5	2P+1C	L	V
BI-FEM.21	Fundamentals of Economics Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	5	2P+2C	Z	v

BI-ZRS.21	Basics of System Control Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	5	2P+2C	Z	V
BI-ZUM.21	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	5	2P+2C	L	V

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

BI-BIG.21 DB Technologies for Big Data	KZ	5
Students will be introduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course		-
finishing the course students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible	-	
collection, transformation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theory	retical foundation a	and presentation
of individual technologies will be supplemented with specific examples from practice.	7 71/	
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. Stu-	Joents get a broad	der overview of
cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.	7 71/	<u>г</u>
BI-VES.21 Embedded Systems Students learn to design embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and emb	Z,ZK	5
peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	leuueu processors	s, then integrated
BI-MPP.21 Methods of interfacing peripheral devices	Z,ZK	5
The course is focused on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ		-
includes both PC side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of		
drivers, simple application development, and APIs of selected devices.		
BI-MVT.21 Modern Visualisation Technologies	Z,ZK	5
The goal of the course is to give an overview of modern visualization technologies and their principles, namely technologies related to virtual and an		
high resolution displays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the men		
and procedural visualization, scientific data visualization, and 3D model scanning.		
BI-AG2.21 Algorithms and Graphs 2	Z,ZK	5
This course, presented in Czech, introduces basic algorithms and concepts of graph theory as a follow=up on the introduction given in the compulse	ory course BI-AG1	.21. It further
delves into advances data structures and amortized complexity analysis. It also includes a very light introduction to approximation algorithms. For E	nglish version of th	ne course see
BIE-AG2.21.		
BI-ASB.21 Applied Network Security	Z,ZK	5
The aim of the course is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge ga		
security applications like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishing	ing the course stud	dent will get
knowledge of security applications in computer networks.		
BI-BEK.21 Secure Code	Z,ZK	5
The students will learn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getti		
theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not ever		
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of security	-	-
security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	-	
BI-EPP.21 Economic Business Processes		5
The aim of the course is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic in the market environment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the course is the	-	
establishment of the company, through the management of property and capital structure, financing of the company, determining the cost function of		-
evaluating the financial health of the company and its eventual rehabilitation or termination.	r ine company and	
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		-
exploitation in computer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus		-
vulnerabilities testing and the following process of penetration test documentation.		
BI-FBI.21 Financial Business Intelligence	Z,ZK	5
The aim of the course is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for busin		
and other indicators for comparison with other companies and management decision process at the tactical and strategic level. The second view is	management acco	ounting as a tool
for financial management and prediction of business development. Management accounting allows monitoring of the financial status and performance	e of business activ	ities over several
accounting periods, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital a		
assess options related to future business decisions. The principles of management accounting, described in this course, are the basis of Business I	ntelligence module	es in business
information systems, decision support systems, and other knowledge-oriented systems.	1	
BI-HWB.21 Hardware Security	Z,ZK	5
The course deals with hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the o		
modules, security features of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HV		•
attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology includin	g applications and	related topics
for multi-factor authentication (biometrics). Students will understand methods of efficient implementations of ciphers.	7 71/	
BI-IOT.21 Internet of Things		5
The course focuses on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT arch		
areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development environme		
software - Arduino, Raspberry Pi OS).		un, 201, 0111,
BI-JPO.21 Computer Units	Z,ZK	5
Students deepen their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in deta		1
organization of computer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using ap		
of multiplication. The organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, inclu		-
correction for parallel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of co	•	
the environment and the architecture of the bus system. The problems will be practically evaluated in the labs and with the help of the educational micr	oprogrammed pro	cessor simulator
and programmable hardware design kits (FPGA).		

The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key terms in a domain, the ability to categorize and specify correct relations in complex systems of social reality, mostly enterprises and institutions. Students learn basics of ontological structural modeling in the OntoUML notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data representation in the Internet. They also learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO method and the BPMN notation will be taught. The course is designed with the respect to continuation in software implementations. Recommended optional follow-up course: BI-ZPI. BI-LA2.21 Linear Algebra 2 Z,ZK 5 Studenti si v tomto p edm tu rozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový prostor v abstraktní obecné form .
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Seznámíme se také s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou grafikou. Dalším velkým tématem
bude numerická lineární algebra, kde si ukážeme potíže s ešením soustav lineárních rovnic na po íta i a možnosti, jak se s tímto problémem vypo ádat s d razem na rozklady matic.
Ukážeme si také aplikace lineární algebry v r zných oborech. BI-LOG.21 Mathematical Logic Z.ZK 5
BI-LOG.21 Mathematical Logic Z,ZK 5 The course focuses on the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfiability, logical equivalence, and the
logical consequence of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are explained. This relates to the P
vs. NP problem and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and their models. The syntactic
approach to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorems is explained.
BI-MDF.21 Modern Data Formats KZ 3
The goal of the course is to give an overview of commonly used data formats for typical types of data. There will be a description of each data type and the data formats used for that
data type along with tools available to work with such data. After finishing the course, the students should know how to work with common data, e.g. on the Web.
BI-MGA.21 Multimedia and Graphics Applications Z,ZK 5
Students get acquainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for working with images, videos, 3D
graphics and animation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to graphic formats, and compression technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the principle of operation and use
of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating 3D models.
BI-OOP.21 Object-Oriented Programming Z,ZK 5
Object-oriented programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together by message passing. In this
course students get acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The emphasis is on practical techniques
for developing software, which includes testing, error handing, refactoring, and application of design pattern.
BI-PGR.21 Computer graphics programming Z,ZK 5
After attending this curse, students can program a simple interactive 3D graphical application like a computer game or scientific visualization, design the scene, add textures imitating
geometric details and materials (like wall surface, wood, sky), and set up the lighting. At the same time, they understand the fundamental principles and terms used in computer graphics,
such as graphical pipeline, geometric transformations, or lighting model. They gain knowledge allowing orientation in computer graphics and representing solid fundamentals for your
professional development, e.g., GPU programming and animations. They get used to techniques utilized in geometric modeling, modeling curves and surfaces, and scientific visualization. BI-PRS.21 Practical Statistics KZ 5
BI-PRS.21 Practical Statistics KZ 5 The students will be introduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose models fitting the data. The course
will encompass regression and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical software R and will apply the studied
methods on data from real problems.
BI-PNO.21 Practical Digital Design KZ 5
Students get an overview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the basics of the VHDL language
and implementation technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern industry-standard CAD design
tools.
BI-PAI.21 Law and Informatics ZK 5
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BI-SIP.21 Network Programming	Z	5
The course covers fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level prog	ہ Iramming using B	SD sockets. The
second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of middl	eware technologie	es. The final part
introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in constructions of the second	omputer labs using	g a chosen
programming language environment.		
BI-SWI.21 Software Engineering	Z,ZK	5
Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They		
their knowledge during the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get han		
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development		nin the course,
BI-SP1.21 Team Software Project 1		5
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. 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		
and finished in the BIE-SP2 course.		
BI-SP2.21 Team Software Project 2	KZ	5
Students gain hands-on experience with the iterative development process while working on a large-scale software project. The first iteration is the re-	1 1	-
However, in this follow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will we		
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 s	olution.	
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		ession and
classification models in the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relations	ships between mo	del bias and
variance, and know the fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimension	onal data visualiza	ation. In practical
demonstrations, pandas and scikit libraries in Python will be used.		
BI-ML2.21 Machine Learning 2	Z,ZK	5
The goal of this course is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in	-	
and neural networks. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction met	hods. Moreover, st	tudents get the
basic principles of reinforcement learning and natural language processing.		
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 evaluat	-	
introduces students to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical	use of camera sys	stems for solving
problems of practice that the graduates may encounter.	774	
BI-SRC.21 Real-time systems	Z,ZK	5 Suuladaa fram
Students obtain the basic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issu lectures will be experimentally verified in computer labs. The course is mainly focused on embedded RT systems, therefore the design kits in the lab		-
course.	are the same as	
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		-
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 physic	1 1 1	-
link layer. The lectures provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies	-	-
with the most important ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Eth	-	
always with focus on high-speed networks.		
BI-TIS.21 Information Systems	Z,ZK	5
The goal of this course is to familiarise students with the information systems topic and information systems implementation principles. During the course is to familiarise students with the information systems topic and information systems implementation principles.	ourse, students ar	e introduced to
"on the market" existing types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and oth	er types of informa	ation systems.
The fundamental part of the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, wa	-	-
implementation and information system implementation based on the project management principles. The emphasis is on the initial customer analys	-	-
decide whether it is better to implement any existing information system or to develop a new one from scratch. These factors determine the information		
At the end of the course information systems security, operation, support, maintenance, legislation impacts, and government information systems to		
BI-TUR.21 User Interface Design	Z,ZK	5 aduata da nat
Students gain a basic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where soft communicate with the user optimally, since the needs and characteristics of users are not taken into account during product development. Students		
bring users into the development process to ensure optimal interface for them.	gain an overview	
BI-TWA.21 Design of Web Applications	Z,ZK	5
The basic course of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some propert		-
structure (HTML) and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web application		-
modern libraries facilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Syml		
on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework React.		
BI-UKB.21 Introduction to Cybersecurity	Z,ZK	5
The goal of the course is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic of	overview of threats	in cyberspace
and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace regulations.		
BI-VIZ.21 Data Visualization	KZ	5
The course offers an overview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understa	anding data, their c	content and their
application in areas such as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preproce		-
different kinds of data such as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications	of selected metho	ods to real-world
examples in the Python programming language.		
BI-VWM.21 Searching the Web and Multimedia Databases	Z,ZK	5
Students get basic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous stora	-	-
students acquire information about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction fro		
knowledge of similarity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web data types (documents).	, search engines it	

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 microed	onomic and macroeconomic topics.		
BI-ZRS.21	Basics of System Control	Z,ZK	5
The course gives an int	roduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will for	cus our attention	particularly on
control of engineering a	nd physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, descript	ion methods of sy	/stem models,
basic linear dynamic sy	stems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of cr	eating a descripti	ion of the system
model, the basic linear	dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also give	n to sensors and	actuators in
control loops, issues of	stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industr	ial implementatio	n of continuous
and digital controllers a	nd PLC control.		
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 need	eded to create it w	vill be discussed,
especially at the decision	m-making level. The intelligent agent in the context of the course can be represented for example by a physical robot, but also	o by a non-physic	al entity, such:
as a virtual assistant or	a character in a computer game. We will not only introduce the basics, but also show the current state-of-the-art during the c	ourse.	

List of courses of this pass:

1	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 ar
active part in the lan	nguage instructionMeet the requirements for writing assignments - Summary, Abstract, Argumentation PaperSucceed in both th	e 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 indiv	vidual teachers du	ring the firs
	class of the term.		
BI-AAG.21	Automata and Grammars	Z,ZK	5
	ed to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite a	-	-
° °	s, context-free grammars, construction and use of pushdown automata, and translation grammars and transducers. They know the		
	understand the relationships between formal languages and automata. They are introduced to the Turing machine and complexity of		
BI-ACM	Programming Practices 1	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		
BI-ACM2	Programming Practices 2	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		
BI-ACM3	Programming Practices 3	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		
BI-ACM4	Programming Practices 4	KZ	5
	This is a selective course for preparing talented student for representation in international programming contests.		
BI-ADU.21	Unix Administration	Z,ZK	5
Students will learn the	internal structure of the UNIX operating system, with the administration of its basic subsystems and with the security principles. They	will understand the	difference
between user and adr	ministrator roles. They will get theoretical and practical knowledge of user management and administration, of users access rights, f	ile systems, disk s	subsystems
	and work convicts and remote access, and in the areas of system deployment and virtualization. In the labe, they will verify the labe		
processes, memory,	; network services and remote access, and in the areas of system deployment and virtualization. In the labs, they will verify the know	wledge from the l	ectures on
processes, memory,	specific examples from practice.	wledge from the l	ectures on
BI-ADW.1		Z,ZK	ectures on
	specific examples from practice.		1
	specific examples from practice. Windows Administration		1
BI-ADW.1 BI-AG1.21	specific examples from practice. Windows Administration This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	4
BI-ADW.1 BI-AG1.21 The course covers to	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	Z,ZK Z,ZK riculum. It links an	4 5 d partially
BI-ADW.1 BI-AG1.21 The course covers to develops the knowled	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 the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur	Z,ZK Z,ZK riculum. It links an	4 5 d partially
BI-ADW.1 BI-AG1.21 The course covers to develops the knowled	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 the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur dge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the t	Z,ZK Z,ZK riculum. It links an	4 5 d partially
BI-ADW.1 BI-AG1.21 The course covers to develops the knowler algorith BI-AG2.21	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 the basics of efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing cur dge from the course BI-DML.21, in which students acquire the knowledge and skills in combinatorics necessary for evaluating the to mms. The course also follows up knowledge from BI-MA1.21, the practical usage of asymptotic mathematics, in particular, the asymptotic mathematics and the asymptotic mathematics.	Z,ZK Z,ZK riculum. It links an time and space co ptotic notation. Z,ZK	4 5 d partially mplexity of 5
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BI-APS.21	Architectures of Computer Systems	Z,ZK	5
	n the construction principles of internal architecture of computers with universal processors at the level of machine instructions. Spec	1 0	
	n processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the princ processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of		
	e further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory cohe		
	systems.		
BI-ARD	Interactive applications on Arduino	KZ	4
The subject is desig	ned for students of first grade of bachelor study as introduction to embedded systems. Students will learn how to design simple applicat	ions for modern pro	ogrammable
	ried peripherals with help of available libraries. The goal of the subject is to show varied software approaches to control embedded s	•	
not only on displa	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 for	r Web and
BI-ASB.21	Software Engineering students.	Z,ZK	5
	Applied Network Security rse is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine		-
	ons like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishin		
	knowledge of security applications in computer networks.		-
BI-AVI.21	Algorithms visually	Z,ZK	4
-	ments other algorithm courses at FIT. It brings knowledge about particular important algorithms from different fields of the computer so		-
knowledge presente	ed in BI-AG1 and BI-AG2. A wide scope of covered subject is made possible due to using visualization bz Algovision (www.algovision.org&l that make understanding the principles of algorithms easy.	t;http://www.algovis	sion.org>)
BI-AWD.21	Web and Database Server Administration	Z,ZK	5
	equainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and		-
-	ice systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an exan		
BI-BAP.21	Bachelor Thesis	Z	14
BI-BEK.21	Secure Code	Z,ZK	5
The students will lea	arn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting fa	miliar with the thre	at modeling
-	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
-	leges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing		-
BI-BIG.21	database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and th DB Technologies for Big Data	KZ	5
	roduced into the field of Big Data processing where nonrelational (NoSQL) database engines are typically used today. The course is f	I	1
	e students were able to choose suitable tools (mostly open source) and techniques, design and implement a simplest reproducible me		
collection, transform	nation/aggregation, presentation). Students get acquainted with various architectures for processing and storing big data. A theoretic	al foundation and p	presentation
	of individual technologies will be supplemented with specific examples from practice.		
BI-BLE	Blender	Z,ZK	4
	ds knowledge of opensource program Blender from BI-MGA (Multimedia and Graphics Applications) course. It is intended for those i ffers a complete and practically oriented introduction to Blender environment. Students may continue to BI-PGA (Programming grap	-	-
BI-BPR 21			
BI-BPR.21 1. At the beginning	Bachelor project	Z	1
1. At the beginnin		Z partial tasks that h	1 e / she will
1. At the beginning perform during the external supervisor	Bachelor project g of the semester, the student reserves the topic of the bachelor's thesis and connects with the supervisor. He / she will arrange the semester to process the assignment. If he completes these tasks, the supervisor will award him a credit from the subject BI-BPR at t enters the information on granting the credit using the form "Granting credit from the external supervisor of the final thesis" (http://fit.cvu	Z partial tasks that he he end of the seme t.cz/student/studijn	1 e / she will ester. 2. The i/formulare).
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BI-EHA.21	Ethical Hacking	Z,ZK	5
The goal of the c	ourse is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln	erabilities, and the	ir possible
exploitation in con	nputer networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus is	on hands-on expe	rience with
	vulnerabilities testing and the following process of penetration test documentation.		
BI-EHD	Introduction to European Economic History This course is presented in Czech. However, there is an English variant in the program Informatics (B1801 / 4753).	Z,ZK	3
BI-EJA	Enterprise Java	Z,ZK	4
	advanced technologies in the Java programming language. The focus is on technologies for development of enterprise information systems		onnected to
	a database and are accessed through the web interface.		
BI-EJK	Enterprise Java and Kotlin	Z,ZK	4
The course is on a	dvanced technologies in the Java and Kotlin programming languages. The focus is on technologies for developing enterprise informat	ion systems with n	nicroservice
	architecture, that can be deployed to the cloud.	1/7	4
BI-EP1.24	Effective programming 1 The course is taught in Czech.	KZ	4
BI-EP2	Efficient Programming 2	KZ	4
Continuation of Ef	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
	rse is to present typical processes related to the usual life cycle of a company. The course focuses mainly on the basic economic and	-	
	ronment of the Czech Republic and the basics of management. In the course, students are acquainted with the typical phases of the ne company, through the management of property and capital structure, financing of the company, determining the cost function of the		
	evaluating the financial health of the company and its eventual rehabilitation or termination.	s company and lab	
BI-FBI.21	Financial Business Intelligence	Z,ZK	5
	rse is to acquaint students primarily with financial accounting as a tool for recording business operations and documents for business		1
	s for comparison with other companies and management decision process at the tactical and strategic level. The second view is mar	-	-
for financial manag	ement and prediction of business development. Management accounting allows monitoring of the financial status and performance of I	ousiness activities	over several
accounting perio	ds, enables a multidimensional view of business data, enables to control effectively factors affecting the return on invested capital and	d to use value infor	rmation to
assess options re	lated to future business decisions. The principles of management accounting, described in this course, are the basis of Business Inte	lligence modules in	n business
	information systems, decision support systems, and other knowledge-oriented systems.		_
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
BI-FMU	Financial and Management Accounting	Z,ZK	5
-	rse 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	-	-
of economic oper	rations based on current methods of double-entry bookkeeping for enterprising subjects in the Czech Republic. Principles of manage	ment accounting a	re base of
	Business Inteligence moduls in Business information systems.		
BI-GIT	Version control system GIT	KZ	2
	troduced to basic principles of version control systems. These principles will be then shown on DCVS Git both theoretically and pract		-
	mplementation details will be shown. Students will be challenged to use Git as users, project managers, team leaders as well as Git s	server administrato	
BI-GIT.21	SW Development Technologies		3
I his course is aime	ed at one of the rudimental team software development technology - version control. To be more specific, we will introduce students to from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use		on manager
BI-HAM	HW accelerated network traffic monitoring	 KZ	4
	duces students to modern and widely used technologies and principles in the area of network infrastructure and traffic monitoring. The		1
	mandatory skills to network operators (planning and development of resources and infrastructure) and security analysts alike (as a s	-	-
for analysis). The g	poals of the course are to acquaint students with the modern trends and cornerstone principles in the area of monitoring network traff	ic on a hardware a	nd software
	level and to develop their practical abilities in this field.		
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 developer	 Students of this of 	course can
	use their gained knowledge to design, plan and analyse their own projects in the context of human-centered security.	7 71/	<u>^</u>
BI-HMI	History of Mathematics and Informatics This course is presented in Czech.	Z,ZK	3
BI-HWB.21	Hardware Security	Z,ZK	5
	ith hardware resources used to ensure security of computer systems including embedded ones. Students become familiar with the operative states and the security of computer systems including embedded ones.		1
modules, security fe	eatures of modern processors, and storage media protection through encryption. They will gain knowledge about vulnerabilities of HW res	sources, including s	ide-channel
attacks and tampe	ering with hardware during manufacture. Students will have an overview of contact and contactless smart card technology including a	pplications and relations	ated topics
	for multi-factor authentication (biometrics). Students will understand methods of efficient implementations of ciphers.		_
BI-IDO.21	Introduction to DevOps		5
	with the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of system software development testing and compilation. It also focuses on tools for automating infrastructure management and build		
	support software development, testing and compilation. It also focuses on tools for automating infrastructure management and build introduction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acquaint		
	used in practice.		
BI-IOS	Fundamentals of iOS Application Development for iPhone and iPad	KZ	4
	This course is presented in Czech.		I
BI-IOT.21	Internet of Things	Z,ZK	5
The course focuses	s on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an over	view of sensors an	
	ication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT architec		
areas. Within the c	computer labs, students will gain practical experience with developing simple IoT systems using common development environments	(hardware - ARM,	ESP, STM;
	software - Arduino, Raspberry Pi OS).		

BI-JPO.21 Computer Units	Z,ZK	5
Students deepen their basic knowledge of digital computer units acquired in the obligatory course of the program (BIE-SAP), get acquainted in detail	1 1	-
organization of computer units and processors and their interactions with the environment, including accelerating arithmetic-logic units and using appropriate and the second	riate codes for impl	ementation
of multiplication. The organization of main memory and other internal memories (addressable, LIFO, FIFO and CAM) will be discussed in detail, includin	g codes for error de	tection and
correction for parallel and serial data transmissions. They will also get acquainted with the methodology of controller design, with the principles of comm	unication of the proc	cessor 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 micropresent of the educational microprese	ogrammed processo	or simulator
and programmable hardware design kits (FPGA).		
BI-KAB.21 Cryptography and Security	Z,ZK	5
Students will understand the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able to	use cryptographic	keys and
certificates in systems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in app	lications. Within labs	s, students
will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic proce	dures of cryptanaly	sis.
BI-KOM.21 Conceptual Modelling	Z,ZK	5
The course is focused on developing abstract thinking and precise formulation skills using conceptual models. Students learn skills of discerning key to	rms in a domain, th	e 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 the	e OntoUML
notation. Next, they learn how to express business rules and constraints using the OCL language and foundations of OWL/RDF semantic data represen		
learn the foundations of enterprise engineering, being a discipline for conceptual modelling of enterprises and institutes and their processes. The DEMO		/IN notation
will be taught. The course is designed with the respect to continuation in software implementations. Recommended optional follow-up of		
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 adva		
The language is fully Java compliant and allows for mixed projects that preserve existing parts written in Java, and continue with the development of a		ctional way
with minimum of boiler-plate code. Last but not least, Kotlin is suitable for designing of DSLs (Domain-Specific Languages	,	
BI-KSA Cultural and Social Anthropology	ZK	2
The one-semester course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit	-	-
anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	n, history, death, etc	c) will be
shown. The course is presented in Czech.		
BI-LA1.21 Linear Algebra 1	Z,ZK	5
We will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field		
and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimin	•	·
the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigen	values and eigenveo	ctors of a
matrix. We will also demonstrate some applications of these concepts in computer science.		_
BI-LA2.21 Linear Algebra 2	Z,ZK	5
Studenti si v tomto p edm tu rozší í znalosti z p edm tu BI-LA1, kde se pracovalo pouze s vektory ve form n-tic ísel. Zde si zavedeme vektorový pros		
Seznámíme se také s pojmem skalární sou in a lineární zobrazení, což nám dovolí ukázat souvislost s lineární algebrou, geometrií a po íta ovou gra		
bude numerická lineární algebra, kde si ukážeme potíže s ešením soustav lineárních rovnic na po íta i a možnosti, jak se s tímto problémem vypo áda	tsd razem na rozk	lady matic.
Ukážeme si také aplikace lineární algebry v r zných oborech.		_
BI-LOG.21 Mathematical Logic	Z,ZK	5
The course focuses on the basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfiabilit		
logical consequence of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are		
vs. NP problem and Boolean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, and approach to mathematical logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness the		
	· · ·	. 5
BI-MA1.21 Mathematical Analysis 1 We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine numbers.	Z,ZK	
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of functions	-	
is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation and		
problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course is closed with the Landaus asymptotic notation and methods of mathematical description of the course of t		
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 lear		
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 t	•	
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms, ar	-	
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and I		
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the integration of localization of localizat		-
BI-MDF.21 Modern Data Formats	KZ	3
The goal of the course is to give an overview of commonly used data formats for typical types of data. There will be a description of each data type and	1 1	
data type along with tools available to work with such data. After finishing the course, the students should know how to work with common data		
BI-MGA.21 Multimedia and Graphics Applications	Z,ZK	5
Students get acquainted with multimedia technologies and applications for 2D/3D bitmap and vector graphics. During the course, current tools for wor		
graphics and animation will be introduced. Students learn several basic techniques of creation and editing content in computer graphics, introduction to gra		
technologies. They learn to use multimedia transmission and representation systems, including real-time multimedia processing. They understand the	-	
of graphics processing cards. They gain a number of practical skills, such as vectorizing raster images, retouching photos, or creating		
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 cor	1 1	
middle internet service providers (ISPs). The students learn how to use and create the architectures of the network solutions which are based on the m		
and how to administrate and practically deploy them. The successful completion of this subject requires the previous knowledge of elementary computer n	-	
and technologies of the data-link, network and transport layer of the OSI model.		
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 k	1 / 1	
classification models in the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relationsh		
variance, and know the fundamentals of assessing model quality. Moreover, they learn the basic techniques of data preprocessing and multidimensiona		
demonstrations, pandas and scikit libraries in Python will be used.		

BI-ML2.21	Machine Learning 2	Z,ZK	5
	burse is to introduce students to the selected advanced methods of machine learning. In the supervised learning scenario, they, in pa		el methods
and neural networ	ks. In the unsupervised learning scenario students learn the principal component analysis and other dimensionality reduction method	ds. Moreover, stude	ents get the
	basic principles of reinforcement learning and natural language processing.		
BI-MMP	Multimedia team project	KZ	4
	This course is presented in Czech.		
BI-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
The course is focus	ed on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Universa	al serial bus (USB).	The course
includes both PC s	side and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of USE	3 devices, Linux an	d Windows
	drivers, simple application development, and APIs of selected devices.		
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		
high resolution disp	lays (e.g., SAGE and video mapping) and their applications in practice. Several lectures deal with the content creation for the mentione	ed technologies, na	mely fractal
DI OOD 01	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	lasis is on practical	techniques
	for developing software, which includes testing, error handing, refactoring, and application of design pattern.	771	4
BI-OPT	Introduction to Optical Networks	Z,ZK	4 doploymont
-	overview of optical networking technology with the emphasis on practical utilization in Internet and in network infrastructures, on poss technology and on their solutions. The course will include the history of optical communications, an overview of passive components	-	
-	sators, and others), and an overview of active components (optical switches and amplifiers, high-speed coherent transmission syster		
	e topics presented at premium research conferences, such as ECOC or OFC. Attention will also be paid to new applications, such as	,	
-	ncy transfer, or sensor networks. The labs will focus on real work with optical components and on measurement of their parameters.		
aniaotable neque	from practice.		
BI-ORL	Operations Research and Linear Programming	KZ	5
-	o introduce students to the issues of operational research and primarily to the practical application of linear programming as a fundar	I I	-
	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
	s a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread imp		
	ead scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS moni		
	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS W	indows.	-
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, structure)	I ' I	xpressions,
statements, function	ons, concept of recursion. They learn to analyse simple cases of algorithm complexity. They know fundamental algorithms for searchi	ng, sorting, and ma	anipulating
	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, que	eue, enlargeable ar	ray, list, set,
	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e	-	
		-	
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). Law and Informatics	e.g., template progr	amming,
table). They lear BI-PAI.21 The aim of the co	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 urse is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge of	e.g., template progr ZK doing business in	5 the Czech
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BI-PAI.21 The aim of the cor Republic and wi environment, will k and open-source li will also be aler BI-PGA.21	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 urse is to introduce students into the basic legal instruments that they will encounter in their practice. Students will gain knowledge of ill be alerted to the pitfalls that await them in business from the point of view of law. They will understand the process of concluding con now their responsibilities in working with the Internet, will be familiar with the institutes of intellectual property law, and will be able to iccenses. Emphasis will also be put on the legal protection of data on the Internet, the registration of Internet domains and protection a rted to such behaviour in the field of IT that can be classified as criminal under the Czech law. The course will also include analyses of Programming of Graphic Applications	e.g., template progr ZK doing business in pontracts in real and use commercial lic against their misuse of real cases from p Z,ZK	5 the Czech Internet ense types e. Students practice. 5
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BI-PKM	Introduction to mathematics	Z	4
	This course is presented in Czech.		
BI-PMA	Programming in Mathematica	Z,ZK	4
Students will be wo	rking with modern technical and scientific software. Students will learn how to use different programming styles (functional programm	ning, rule-based pr	ogramming,
	etc.), how to create dynamic interactive applications and visualisations, data processing and presentations.		
BI-PNO.21	Practical Digital Design	KZ	5
-	rerview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the		
and implementation	on technologies FPGA and ASIC. Students demonstrate practical use of the design techniques in the course project using modern in	ndustry-standard C	AD design
	tools.		_
BI-PPA.21	Programming Paradigms	Z,ZK	5
	ith basic paradigms of high-level programming languages, including their basic execution models, benefits, and disadvantages of par		
	ligm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The		
on lambda calculu	s and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstr	ream programming	languages
	such as C++ and Java.		-
BI-PRR.21	Project management	Z,ZK	5
	urse is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and		
	cation, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk as purce schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for st		-
	nowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in la		
	also suitable for all those who will develop software or hardware in the form of team projects.	ige companies. The	
BI-PRS.21	Practical Statistics	КZ	5
	e introduced to methods of applied statistics. They will learn how to work with various types of data, perform analyses, and choose more	1	-
	gression and correlation analysis, analysis of variance and non-parametric methods. Students will learn to use the statistical softwar	-	
	methods on data from real problems.	o realita will apply t	
BI-PS2	Programming in shell 2	Z.ZK	4
-	eneral overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In additi	1 '	
	into shell and some other particular scripting languages and will get practical experience with shell script programming.	ion, mey gain a dee	sper maight
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 s 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	-	Sidueniis
BI-PST.21			5
	Probability and Statistics the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variables. T	Z,ZK	-
	m variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction	-	
	nown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical		-
	the statistical dependence of two or more random variables.	i nypotneses and e	letermining
BI-PVT 21		K 7	5
BI-PYT.21	Python Programming		5 lifferences
The aim of the co	Python Programming urse is to get acquainted with basic efficient control and data structures of the Python programming language for text and binary data	a processing. The c	lifferences
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introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in computer labs using a chosen programming language environment. Z,ZK BI-SKJ.21 4 Scripting Languages Students gain a general overview of available scripting languages, their syntax, semantics, programming style, data structures, pros and cons. In addition, they gain a deeper insight into shell and some other particular scripting languages and will get practical experience with shell script programming. BI-SOJ Machine Oriented Languages Z.ZK 4 Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal use of microprocessor's features and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view linked to higher level languages. This knowledge will be used during reverse engineering, optimization, and evaluation of code security. BI-SP1.21 K7 Team Software Project 1 5 Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE-SWI course that runs concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teacher, in the role of the team and project leader, regularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software artefact will be further developed and finished in the BIE-SP2 course. BI-SP2.21 Team Software Project 2 ΚZ 5 Students gain hands-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result of the BIE-SP1 course project. However, in this follow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will work in teams of 4-6 people. The 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. 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 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 K7 Module is based on knowledge obtained in BI-DBS. Students become familiar with advanced relational and non-relational features of SQL language. In particular stored program unites, triggers, recursive queries, OLAP support, object-relational constructions. Part of the course is dedicated to practical database optimization from the point of view of specialized database structures like indexes, clusters, index-organized tables, and materialized views. as well as from the point of view query optimization. Execution plan and possibilities of its. changes will be discussed. Lectures will usually discuss SQL standard, but many features will be demonstrated on Oracle DBMS. Seminars are based on Oracle DBMS and partially on PostgreSQL. BI-SRC.21 Real-time systems Z,ZK 5 Students obtain the basic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issues. Theoretical knowledge from lectures will be experimentally 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-ST1 Ζ 3 Network Technology 1 The subject is oriented to providing the students basic information and practical skills from the area of digital and IP networks. The subject is acredited under the Cisco Netacad -CCNA1 - R&S Introduction to Networks. BI-ST2 Network Technology 2 Ζ 3 This course is presented in Czech. BI-ST3 Network Technology 3 Ζ 3 Students will further enhance their knowledge acquired from previous BI-ST1 and BI-ST2 courses. Principles of routing and switching presented during BI-ST1 and BI-ST2 courses will get further extended in the course. Students will be able to start fine-tune protocols' settings to gain certain advantages like increased efficiency, predictability, extension beyond a simple topology, security, etc. BI-ST4 Network Technology 4 7 Students will further enhance their knowledge already acquired from previous BI-ST1, BI-ST2, and BI-ST3 courses. Principles of routing and switching presented during 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 efficiency, predictability, extension beyond a simple topology, security, etc. This module teaches students to configure and fine-tune Wide Area Networks and to experience a completely other type of network (Non Broadcast Multiple Access) which radically differs from well-known Ethernet (broadcast) type of networks. Students will also manage router and switch firmware, perform password recoveries, and emergency procedures. Also the security aspect is treated; students will learn possible intra- and inter-network attacks and the mitigation ways while maintaining the network running. BI-STO Storage and Filesystems 7.7K 4 The student will learn principles and current solutions of storage systems architecture. The module explains principles of data store, protection, and archiving, as so as storage scaling, load balancing and high availability. 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 course introduces students to different types of camera systems and a variety of methods for image and video processing. The course is focused on practical use of camera systems for solving problems of practice that the graduates may encounter. BI-SWI.21 Software Engineering Z.ZK 5 Students get acquainted with methods of analysis and design of larger software projects that are typically designed and implemented in teams. They consolidate and practically verify their knowledge during the analysis and design of larger software systems that will be developed in the concurrent course BIE-SP1. Students get hands-on experience with CASE tools using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design and testing. Within the course, students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their development. BI-TAB.21 Applications of Security in Technology 5 Z.ZK 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 overview of cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security. **BI-TDA** Test driven architecture ΚZ 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 world. This course has a strong connection on courses like BI(E)-SI1 and BI(E)-SI2. The main goal of this course is to learn by examples that occur in the semester project. Documentation and Presentation BI-TDP.21 K7 3 The course is focused on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically final university theses. Students learn to create text of a technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically present it in front of classmates and the teacher. The course is intended primarily for those students who have chosen the topic of their bachelor's thesis or will choose it within the first 14 days of 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 pres	ented in Czech. This course gives basics of programming in TeX (plain TeX, ConTeXt, LaTeX, OpTeX, LuaTeX). Te second part of the	course focuses on	typographic
	rules.		
BI-TIS.21	Information Systems	Z,ZK	5
-	purse is to familiarise students with the information systems topic and information systems implementation principles. During the cour- xisting types of systems and their usage in specific industry segments. Students are familiarised with the CRM, ERP, MRP and other		
	tal part of the course is the introduction to key ideas of an information system selection, evaluation of information system benefits, wa		
	d information system implementation based on the project management principles. The emphasis is on the initial customer analysis,	-	-
	better to implement any existing information system or to develop a new one from scratch. These factors determine the information sy		
	of the course information systems security, operation, support, maintenance, legislation impacts, and government information system		
BI-TJV.21	Java Technology	Z,ZK	5
I ne goai is to provi	de knowledge and skills for developing information systems and applications through concepts used in software development and exp from Java language ecosystem. At the course end, the students are able to develop software systems in Java platform.	erience with librari	es and tools
BI-TPS.21	Computer Networks Technologies	Z,ZK	5
	uces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physica	· · ·	1
link layer. The lectu	res provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective technologies and explain relevant physical principles.	gies will be demor	nstrated and
with the most impo	ortant ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ethern	et, modern wireles	s networks,
	always with focus on high-speed networks.		
BI-TS1	Theoretical Seminar I		4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	·	
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		paporo ana
BI-TS2	Theoretical Seminar II	Z	4
Theoretical semina	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	al reading group. T	he students
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TS3	Theoretical Seminar III	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a		
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	Work with Scientine	papers and
BI-TS4	Theoretical Seminar IV	Z	4
Theoretical semina	r is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	al reading group. T	he students
are treated individu	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
BI-TUR.21	User Interface Design	Z,ZK	5
-	asic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where softwa the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gai		
communicate with	bring users into the development process to ensure optimal interface for them.		
BI-TWA.21	Design of Web Applications	Z,ZK	5
The basic course	of web application development. Initially, the students become familiar with HTTP and its possibilities and partly with some propertie	s of language desc	cribing the
	and presentation of document on the Web (CSS). These skills provide the necessary basis for the development of Web applications,		
modern libraries fa	acilitate the development of Web pages applications. Server side will be demonstrated on PHP technology using frameworks Symfony		velopments
BI-TZP.21	on the client side will be demonstrated using a JavaScript language with library jQuery and possibly MV* framework React Technological Fundamentals of Computers	Z,ZK	5
	ainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer si		1
	oduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to redu		
limits to the maxim	num operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a con	nputer power supp	ly looks like
	(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.		
BI-UKB.21	Introduction to Cybersecurity	Z,ZK	5
I he goal of the co	urse is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic over and attacker techniques, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace reg		cyberspace
BI-ULI	Introduction to Linux	Z	2
	familiar with the basics of the Linux operating system using e-learning form. They learn to work with the command line and become f	I –	1
	and techniques of a Unix-like system. Topics can be studied first theoretically and then practically verified in a virtual machine (te		
BI-UOS.21	Unix-like Operating Systems	KZ	5
	systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu		
	uters and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic propertion of the second state of the sec		-
	eads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level o e to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting in		
BI-VAK.21	Selected Applications of Combinatorics	Z	3
	p introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the b		-
	ions to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic		
	ticipation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) info		
will select probler	ns to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimizing to the studied problems with a special focus on the affective use of existing tools	ation and more. St	udents will
	also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.	7 74	5
BI-VDC.21 The aim of the cou	Virtualization and Data Centers rse is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and	Z,ZK	1
	the storian marze students with technology basis of cloud computer systems, it shows principles and technology basis of cloud computer systems, it shows principles and technology and estimate the stories of the stories o	-	
	rid clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications.	-	-
design, valid	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or	utages, and data lo	osses.

BI-VES.21	Embedded Systems	Z,ZK	5		
Students learn to d	esign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedded 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 1	furthermore		
complemented by the theory of game design, principles of writing dialogues and characters in order to create a functional and complex virtual world. The course can be followed by the course MI-PVR with the task of converting scenes and their dynamics into a fully virtual environment suitable for VR devices.					
BI-VIZ.21	Data Visualization	KZ	5		
	an overview of the types and characteristics of data as well as suitable visualization methods. This will aid the students in understandi	•			
application in areas such as data mining and machine learning. Within the course, students will be introduced to exploratory data analysis, preprocessing, and ways of visualizing					
different kinds of da	ata such as text, social networks, time series or basic image data processing. Students will get hands-on experience in applications of examples in the Python programming language.	selected methods to	o real-world		
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		e examine		
	he linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting		F		
BI-VPS.21	Selected Topics in Computer Networking Ipon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technolo		5		
	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		
	Jal Reality (VR), virtual reality operating system and virtual reality creation. Another objective is to meet the rules and requirements of	1 1	munication.		
The course focus	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.	nputational thinking	i, empathy		
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 for computer science and gamification in various social metaverse and desktop engines.	ctive is to develop a	applications		
BI-VWM.21	Searching the Web and Multimedia Databases	Z,ZK	5		
	ic overview about search techniques in the web environment that is interpreted as a very large distributed and heterogeneous storag	1 1			
students acquire i	nformation about search techniques in text and hypertext documents (the web pages themselves) and about feature extraction from	web pages. They g	et detailed		
knowledge of simila	arity search in multimedia databases (generally in collections of unstructured data). They also learn techniques for programming web se	arch engines for the	ementioned		
	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 avigation and development tools. In labs, students program a set of basic task by using the robot simulator and real hardware to get p	-			
intenaces, robot na	technologies.		e with these		
BI-ZNF	PHP Framework Nette - basics	KZ	3		
Students will gain t	he basics of PHP framework Nette. They will learn how to practically work with MVP architecture and various libraries of this Czech po	pular framework. T	he resulting		
	knowledge should serve for the efficient creation of a web backend in PHP language.				
BI-ZPI	Process engineering	KZ	4		
	fundamentals of process engineering in this subject. Students will get necessary foundations for understanding formal principles of p				
	used notations (UML, BPMN, BORM). The focus in this subject lies in training of practical skills of formalisation and modelling of bus ole of process engineering for information systems development is discussed as well as its importance in the overall context of inform				
	an enterprise.		Strategy of		
BI-ZRS.21	Basics of System Control	Z,ZK	5		
	an introduction to the field of automatic control. Students will gain knowledge in this rapidly evolving field of great future. We will focu				
-	ering and physical systems. We will provide basic information from the feedback control of linear dynamical SISO systems, description	-	-		
basic linear dynam	ic systems analysis and design verification, simple PID feedback, PSD, and fuzzy controllers. Students will learn the methods of creat	ing a description of	the system		
	linear dynamic systems analysis and design verification and simple PID feedback, PSD, and fuzzy controllers. Attention is also giver				
control loops, issu	es of stability in control systems, single and continuous adjustment of the controller parameters, and certain aspects of the industrial	implementation of	continuous		
DI 7040	and digital controllers and PLC control.	7	10		
BI-ZS10	Bachelor internship abroad for 10 credits	Z	10 Poforo the		
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content. The student must provide evidence of the professional content.				
	γ courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits cor				
	foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided int	-			
	exceeds the academic year's dead-line.	-			
BI-ZS20	Bachelor internship abroad for 20 credits	Z	20		
	once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or re				
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content. The student must provide evidence of the professional content.				
	/ courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits cor	-			
	foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided interceeds the academic year's dead-line.	-	-		
BI-ZS30	Bachelor internship abroad for 30 credits	Z	30		
	once within his / her bachelor's study programme have a foreign internship at a foreign university or other foreign scientific and/or re				
	an of the FIT, or the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content. The student must provide evidence of the profession of the profesion of the profession of the profession of the prof				
	v courses BI-ZS10, BI-ZS20, BI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits cor foreign institution. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided information of the internship is 30 credits. This amount can be divided information of the internship is 30 credits. This amount can be divided information of the internship is 30 credits.	-			
	exceeds the academic year's dead-line.		o mornanip		

BI-ZSB.21	Basics of System Security	Z,ZK	5
, s	purse is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forens		
such as malware a	analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of moder	n operating systen	ns security,
	as well as skills needed for independent work in the area of operating system security incident analysis.	7 71/	_
BI-ZUM.21	Artificial Intelligence Fundamentals roduction to artificial intelligence with emphasis on symbolic techniques. The design of an intelligent agent and the techniques needer	Z,ZK	5
	decision-making level. The intelligent agent in the context of the course can be represented for example by a physical robot, but also b		
	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 di		,,,
BI-ZWU	Introduction to Web and User Interfaces	Z,ZK	4
	This course is presented in Czech.		I
BIE-CSI	Introduction to Computer Science	Z	2
	ory class on Elementary Computer Science for broad audiences: bachelor students in computer science, students majoring in other fit		•
-	pol students, anybody with a background in basic math and the desire to understand the absolute basics of computer science. The go		
	rinciples of computer science for students to understand, early on, what computer science is, why things such as high-level programmer r 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
This course provide	es a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential so	olution methods like	e separation
	heorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered with		
	sis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application		
partial differential	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.	and PDEs, includi	ing implicit
BIE-EEC	English language external certificate	Z	4
	se can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in Engli	_	
200 000	the B2 level of the Common European Framework of Reference for Languages.		, encodeding
BIE-IMA2	Introduction to Mathematics 2	Z	2
Students refresh a	nd extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are a	able to apply them	in particular
	examples.		
BIE-SEG	Systems Engineering	Z	0
	ory class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles of d		
	essor 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 cor		
understand the	parallelism, and how processes and threads as well as entitlation and wirdualization, what wirdual memory is and now it works, what con parallelism, and how processes and threads synchronize efficiently to overcome concurrency for communication.	icurrency is, as op	posed to
BIE-ZUM	Artificial Intelligence Fundamentals	Z,ZK	4
	uced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classic		1
space search, mult	i-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm	s and the neural n	
-	be presented as well.		etworks, will
FI-TOP	be presented as well. Academic writing	Z	etworks, will
FI-TOP Publishing is an im	be presented as well. Academic writing portant and required part of research activity. It is not only about obtaining research results but also about applying them in the form of	Z of publication. Writi	etworks, will 2 ing scientific
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FI-TOP Publishing is an im publications can b write a scientific art	be presented as well. Academic writing portant and required part of research activity. It is not only about obtaining research results but also about applying them in the form of e useful for students not only in their own publishing activities but also in the preparation of a bachelor's or master's thesis. In the cou	Z of publication. Writi rse, students will le article and reviewir	etworks, will 2 ing scientific earn how to ng someone
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	Internet and Multimedia	Z,ZK	4	
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	-		
-	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u			
	nissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effe	-		
the quality and late	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the for audience.	e scene up to the p	presentation	
NI-LSM	Statistical Modelling Lab	KZ	5	
-	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p			
available information 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 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			
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4	
	ogramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where i	-		
is used to build complex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills of design and implementation				
of object systems in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development needs and areas of interest. In addition to deepening object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work on interesting projects and OO				
	ms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involvem			
NI-MPL	Managerial Psychology	ZK	2	
NI-MSI	Mathematical Structures in Computer Science	Z,ZK	4	
-	emantics of programming languages. Data types as continous lattices, Scott topology. Procedures as continuous mappings. The Scott	· · · ·		
Mathematical Se	Introduction to category theory.		calculus.	
NI-OLI	Linux Drivers	Z,ZK	4	
	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po	· · ·		
	ability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developmer	-		
	urse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practica			
NI-PDD	Data Preprocessing	Z,ZK	5	
	repare raw data for further processing and analysis. They learn what algorithms can be used to extract information from various data s			
	and learn the skills to apply these theoretical concepts to solve specific problems in individual projects - e.g., extraction of characterisi			
	pages.			
NI-PSD	Public Services Design	KZ	4	
The course will intr	oduce students to specifics of UX, Service design and development for public sector. We will look into the design and development pl	rocess from the pe	rspective of	
suppliers (devs a	nd designesr) as well as clients. In small teams students will work on projects from partner organizations and will try out collaboration	n with client represe	entatives.	
	Course is aimed at students-designers as well as clients.			
NI-PSL	Programming in Scala	Z,ZK	4	
The course introd	uces the modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feature			
			-	
	ibrary. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and		-	
advance standard I	ibrary. Scala enables to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks and Scalaz, etc.	l libraries e.g. Play,	Cassandra,	
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