Studijní plán

Název plánu: Bachelor Specialization, Computer Science, 2021

Sou ást VUT (fakulta/ústav/další): Fakulta informa ních technologií Katedra: Obor studia, garantovaný katedrou: Úvodní stránka Garant oboru studia.: **Program studia: Informatics** Typ studia: Bakalá ské prezen ní P edepsané kredity: 155 Kredity z volitelných p edm t : 25 Kredity v rámci plánu celkem: 180 Poznámka k plánu: This version of the study plan is intended for students who have been enrolled for study from the academic year 2021/2022 into the full-time form of study of the bachelor's program. . Guarantor: doc. Ing. Jan Janousek, Ph.D., email: jan.janousek@fit.cvut.cz Název bloku: Povinné p edm ty programu Minimální po et kredit bloku: 110 Role bloku: PP Kód skupiny: BIE-PP.21 Název skupiny: Compulsory Courses of Bachelor Study Program Informatics, version 2021 Podmínka kredity skupiny: V této skupin musíte získat 110 kredit Podmínka p edm ty skupiny: V této skupin musíte absolvovat 21 p edm t

Kredity skupiny: 110

Poznámka ke skupině: If you plan to profile yourself in the specialization Information Security, Computer Networks and Internet, Computer Systems and Virtualization, or Software Engineering, enroll in the course BIE-PSI.21 in your 2nd semester of study. If you plan to profile yourself in the specialization Computer Engineering, or Computer Science, enroll in the course BI-PSI.21 in your 4th semester of study. - On the basis of the certificate of knowledge of English at the B2 level, which is stated in the conditions for admission to study, you can have the subject BIE-EEC recognized for 4 credits.

Kód	Název p edm tu / Název skupiny p edm t (u skupiny p edm t seznam kód jejích len) Vyu ující, auto i a garanti (gar.)	Zakon ení	Kredity	Rozsah	Semestr	Role
BIE-AG1.21	Algorithms and Graphs 1 Tomáš Valla, Michal Opler, Ji ina Scholtzová, Dušan Knop, Maria Saumell Mendiola Dušan Knop Dušan Knop (Gar.)	Z,ZK	5	2P+2C	Z	PP
BIE-AAG.21	Automata and Grammars Jan Holub Jan Holub Jan Holub (Gar.)	Z,ZK	5	2P+2C	Z	PP
BIE-BPR.21	Bachelor Project Zden k Muziká Zden k Muziká (Gar.)	Z	1		Z,L	PP
BIE-BAP.21	Bachelor Thesis Zden k Muziká Zden k Muziká (Gar.)	Z	14		L,Z	PP
BIE-PSI.21	Computer Networks Yelena Trofimova, Michal Polák Yelena Trofimova Yelena Trofimova (Gar.)	Z,ZK	5	2P+1R+1C	L	PP
BIE-SAP.21	Computer Structures and Architectures Petr Fišer, Hana Kubátová Petr Fišer Petr Fišer (Gar.)	Z,ZK	5	2P+1R+2C	L	PP
BIE-KAB.21	Cryptography and Security Ji í Bu ek, Martin Jure ek, Filip Kodýtek, Josef Kokeš, Jaroslav K íž, Róbert Lórencz, Ivana Trummová, František Ková, David Pokorný Ji í Bu ek Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	L	PP
BIE-DBS.21	Database Systems Josef Pavlí ek, Otto Šleger, Martin Urbanec Josef Pavlí ek Josef Pavlí ek (Gar.)	Z,ZK	5	2P+2R+1L	L	PP
BIE-DML.21	Discrete Mathematics and Logic Eva Pernecká, Jitka Rybní ková, Francesco Dolce Eva Pernecká Eva Pernecká (Gar.)	Z,ZK	5	2P+1R+1C	Z	PP
BIE-TDP.21	Documentation and Presentation Dana Vynikarová Dana Vynikarová (Gar.)	KZ	3	2P+2C	Z,L	PP
BIE-EEC	English language external certificate Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	Z	4	2D	L	PP
BIE-LA1.21	Linear Algebra 1 Marzieh Forough Karel Klouda Marzieh Forough (Gar.)	Z,ZK	5	2P+1R+1C	Z	PP

Mathematical Analysis 1 Antonella Marchesiello Tomáš Kalvoda Tomáš Kalvoda (Gar.)	Z,ZK	5	2P+1R+1C	L	PP
Mathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.)	Z,ZK	6	3P+2C	Z	PP
Operating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík (Gar.)	Z,ZK	5	2P+1R+1L	L	PP
Probability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.)	Z,ZK	5	2P+2C	Z	PP
Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	2P+2R+2C	Z	PP
Programming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)	Z,ZK	7	2P+1R+2C	L	PP
SW Development Technologies Petr Pulc Petr Pulc (Gar.)	Z	3	2P	Z	PP
Technological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.)	Z,ZK	5	2P+2C	Z	PP
Unix-like Operating Systems Jan Trdli ka, Jakub Žitný, Zden k Muziká Zden k Muziká Zden k Muziká (Gar.)	КZ	5	2P+2C	Z	PP
	Antonella Marchesiello Ťomáš Kalvoda Tomáš Kalvoda (Gar.) Mathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.) Operating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík (Gar.) Probability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.) Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.) Programming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.) SW Development Technologies Petr Pulc Petr Pulc (Gar.) Technological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.) Unix-like Operating Systems Jan Trdli ka, Jakub Žitný, Zden k Muziká Zden k Muziká Zden k Muziká	Antonella Marchesiello Ťomáš Kalvoda Tomáš Kalvoda (Gar.) Z,ZK Mathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.) Z,ZK Operating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík Z,ZK Probability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.) Z,ZK Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.) Z,ZK Programming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.) Z,ZK SW Development Technologies Petr Pulc Petr Pulc (Gar.) Z Technological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.) Z,ZK Unix-like Operating Systems Jan Trdli ka, Jakub Žitný, Zden k Muziká Zden k Muziká Zden k Muziká KZ	Antonella Marchesiello Ťomáš Kalvoda Tomáš Kalvoda (Gar.)Z,ZKSMathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.)Z,ZK6Operating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík (Gar.)Z,ZK5Probability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.)Z,ZK5Programming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)Z,ZK7Programming and Algorithmics 2 Radek Hušek, Jan Trávní ek (Gar.)Z,ZK7SW Development Technologies Petr Pulc Petr Pulc (Gar.)Z3Technological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.)Z,ZK5Unix-like Operating Systems Jan Trdli ka, Jakub Žitný, Zden k Muziká Zden k Muziká Zden k MuzikáKZ5	Antonella MarchesielloTomáš Kalvoda Tomáš Kalvoda (Gar.)Z,ZKSZ HINHICMathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.)Z,ZK63P+2COperating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel TvrdíkZ,ZK52P+1R+1LProbability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.)Z,ZK52P+2CProgramming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ekZ,ZK72P+2R+2CProgramming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ekZ,ZK72P+1R+2CSW Development Technologies Petr Pulc Petr Pulc (Gar.)Z32PTechnological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin Novotný (Gar.)Z,ZK52P+2CUnix-like Operating Systems Jan Trdli ka, Jakub Žitný, Zden k Muziká Zden k Muziká Zden k MuzikáKZ52P+2C	Antonella Marchesiello Tomáš Kalvoda Tomáš Kalvoda (Gar.)Z,ZKSZ + HK+ICLMathematical Analysis 2 Antonella Marchesiello Tomáš Kalvoda Antonella Marchesiello (Gar.)Z,ZK63P+2CZOperating Systems Michal Štepanovský, Jan Trdli ka, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík Pavel TvrdíkZ,ZK52P+1R+1LLProbability and Statistics Francesco Dolce Pavel Hrabák Francesco Dolce (Gar.)Z,ZK52P+2CZProgramming and Algorithmics 1 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)Z,ZK72P+2R+2CZProgramming and Algorithmics 2 Radek Hušek, Jan Trávní ek, Ladislav Vagner, Josef Vogel Jan Trávní ek Jan Trávní ek (Gar.)Z,ZK72P+1R+2CLSW Development Technologies Petr Pulc Petr Pulc (Gar.)Z322ZTechnological Fundamentals of Computers Kate ina Hyniová, Martin Novotný, Matúš Olekšák Martin Novotný Martin

Charakteristiky p edmet této skupiny studijního plánu: Kód=BIE-PP.21 Název=Compulsory Courses of Bachelor Study Program Informatics, version 2021

BIE-AG1.21	Algorithms and Graphs 1	Z,ZK	5		
The course covers the b	asics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every comp	uting curriculum. I	t is interlinked		
with the concurrent BIE-	AAG and BIE-ZDM courses in which the students gain the basic skills and knowledge needed for time and space complexity	of algorithms and	learn to handle		
practically the asymptot	c mathematics.				
BIE-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 fir	nite automata, reg	ular expressions		
and regular grammars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, relationships between formal languages and automata.					
Knowledge acquired thr	ough the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translatio	n, and design of o	ligital circuits.		
BIE-BPR.21	Bachelor Project	Z	1		
At the beginning of the	semester the student will contact the supervisor of the bachelor thesis he has booked. They will discuss the partial tasks that	student will perfo	rm during the		
semester. If he fulfill the	se tasks, the supervisor will award him / her at the end of the semester with the BI-BPR course.				
BIE-BAP.21	Bachelor Thesis	Z	14		
BIE-PSI.21	Computer Networks	Z,ZK	5		
The course introduces s	tudents to the principles of computer networking. It covers basic technologies, protocols, and services commonly used in loc	al networks and i	n the Internet as		
well. The lectures will be	amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced netw	work technologies	. Students		
practically verify configu	rations and management of network devices in the lab within the environment of the operating systems Linux and Cisco IOS	S.			
BIE-SAP.21	Computer Structures and Architectures	Z,ZK	5		
Students understand ba	sic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, in	nputs, outputs, da	ta storage and		
transfer. In the labs, stud	lents gain practical experience with the design and implementation of the logic of a simple processor using modern digital d	esign tools.			
BIE-KAB.21	Cryptography and Security	Z,ZK	5		
Students will understand	d the mathematical foundations of cryptography and gain an overview of current cryptographic algorithms. They will be able t	o use cryptograpł	nic keys and		
certificates in systems b	ased on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in a	pplications. Within	n labs, students		
will gain practical skills i	n using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedure	s of cryptanalysis	. Students are		
expected to be compete	nt programmers in C/C++ (on a small scale). Basic Python knowledge is an advantage.				
BIE-DBS.21	Database Systems	Z,ZK	5		
Students get acquainted	with the architecture of the database engine and typical user roles. They learn to design the structure of a smaller data stor	e (including integ	rity constraints)		
using a conceptual mod	el and then implement them in a relational database engine. They get acquainted with the SQL language and also with its the	oretical basis - rel	ational database		
model. They will get acq	uainted with the principles of relational database schema normalization. They understand the basic concepts of transaction	processing and co	ontrol of parallel		
user access to a single	data source. At the end of the course, students will be introduced to alternative nonrelational database models.				
BIE-DML.21	Discrete Mathematics and Logic	Z,ZK	5		
Students will get acquai	nted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts	from set theory v	vill 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	per theory, with emphasis on modular arithmetics.				
BIE-TDP.21	Documentation and Presentation	KZ	3		
The course is focused o	n the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typical	ly final university	heses. Students		
learn to create text of a	technical report in the LaTeX system, process an electronic presentation using the LaTeX Beamer system, and practically pr	esent 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 1	4 days of teachin	g. Within the		
exercises of the course,	an active approach to the creation of individual parts of the bachelor's thesis is assumed.				
BIE-EEC	English language external certificate	Z	4		
The BIE-ECC course ca	n be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in E	nglish comparable	to or exceeding		
the B2 level of the Common European Framework of Reference for Languages.					
BIE-LA1.21	Linear Algebra 1	Z,ZK	5		
We will introduce studer	ts to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the fie	eld of real and cor	nplex numbers		
	s. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian eli		,		
the connection with lines	ar manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eige	nvalues and eiger	vectors of a		
matrix. We will also demonstrate some applications of these concepts in computer science.					

BIE-MA1.21 Mathematical Analysis 1	Z,ZK	5			
We begin the course by introducing students to the set of real numbers and its properties, and we note its differences with the set of machine number	ers. Then we study	real sequences			
and real functions of a real variable. We gradually introduce the notions of limits of sequences and functions, continuous functions, and derivatives of fu	nctions. This theor	etical foundation			
is then applied to root-finding problems (iterative method of bisection and Newtons method), construction of cubic interpolation (spline), and formulation	and solution of sin	nple optimization			
problems (i.e., the issue of finding extrema of functions). The course is closed with the Landaus asymptotic notation and methods of mathematical desc	cription of complex	ity of algorithms.			
BIE-MA2.21 Mathematical Analysis 2	Z,ZK	6			
The course completes the theme of analysis of real functions of a real variable initiated in BIE-MA1 by introducing the Riemann integral. Students w	ill learn how to inte	egrate 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	n to the computation	on of elementary			
functions with a prescribed accuracy. Then we study the linear recurrence equations with constant coefficients, the complexity of recursive algorithms	s, and its analysis	using the Master			
theorem. Finally, we introduce the student to the theory of multivariate functions. After establishing basic concepts of partial derivative, gradient, and	l Hessian matrix, v	ve study the			
analytical method of localization of local extrema of multivariate functions as well as the numerical descent method. We conclude the course with the in	ntegration of multiv	variate functions.			
BIE-OSY.21 Operating Systems	Z,ZK	5			
In this course that is a follow-up of the Unix-like operating systems course students deepen their knowledge in areas of OS kernels, process and thread	implementations,	race conditions,			
critical regions, thread scheduling, shared resource allocation and deadlocks, management of virtual memory and data storages, file systems, OS n	nonitoring. They a	re able to design			
and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Windows.					
BIE-PST.21 Probability and Statistics	Z,ZK	5			
Students will learn the basics of probabilistic thinking, the ability to synthesize prior and posterior information and learn to work with random variable	es. They will be ab	le to apply basic			
models of random variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction	they will be able t	o perform			
estimations of unknown distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statist	ical hypotheses ar	nd determining			
the statistical dependence of two or more random variables.					
BIE-PA1.21 Programming and Algorithmics 1	Z,ZK	7			
Students learn to construct algorithms for solving basic problems and write them in the C language. They master data types (simple, pointers, struct	ured), expression	s, statements,			
and functions presented in C language. They understand the principle of recursion and basics of algorithm complexity analysis. They know fundame	ntal algorithms for	r searching,			
sorting, and manipulating linked lists and trees.					
BIE-PA2.21 Programming and Algorithmics 2	Z,ZK	7			
Students know the instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack,	queue, enlargeab	le array, list, set,			
table). They learn these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming	(e.g., template pro	gramming,			
copying/moving of objects, operator overloading, inheritance, polymorphism).					
BIE-GIT.21 SW Development Technologies	Z	3			
This course is aimed at one of the rudimental team software development technology - version control. To be more specific, we will introduce studer	ts to Git, the infor	mation manager			
from hell, as Linus Torvalds nicknamed it, and provide a comprehensive guide into its depths, as well as for day-to-day use.					
BIE-TZP.21 Technological Fundamentals of Computers	Z,ZK	5			
Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how comput	er structures look	like at the lowest			
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to r	educe the consum	nption; what the			
limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a	computer power s	upply looks like			
(in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.					
BIE-UOS.21 Unix-like Operating Systems	KZ	5			
Unix-like operating systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative functions of multiuser operating					
systems for computers and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic properties of this OS family, such as					
processes and threads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level of advanced users who are not					
only able to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting interface	, called shell.				
Název bloku: Povinné p.edm. tv.specializace					

Název bloku: Povinné p edm ty specializace Minimální po et kredit bloku: 40 Role bloku: PS

Kód skupiny: BIE-TI-PS.21

Název skupiny: Compulsory Courses of the Bachelor Specialisation Computer Science, version 2021 Podmínka kredity skupiny: V této skupin musíte získat 40 kredit Podmínka p edm ty skupiny: V této skupin musíte absolvovat 8 p edm t

Kredity skupiny: 40

Poznámka ke skupině:

Kód	Název p edm tu / Název skupiny p edm t (u skupiny p edm t seznam kód jejích len) Vyu ující, auto i a garanti (gar.)	Zakon ení	Kredity	Rozsah	Semestr	Role
BIE-AG2.21	Algorithms and Graphs 2 Tomáš Valla, Radek Hušek, Michal Opler, Dušan Knop, Ond ej Suchý Ond ej Suchý Ond ej Suchý (Gar.)	Z,ZK	5	2P+2C	L	PS
BIE-APS.21	Architectures of Computer Systems Michal Štepanovský, Pavel Tvrdík Pavel Tvrdík Pavel Tvrdík (Gar.)	Z,ZK	5	2P+2C	Z	PS
BIE-ZUM.21	Artificial Intelligence Fundamentals Pavel Surynek Pavel Surynek Pavel Surynek (Gar.)	Z,ZK	5	2P+2C	L	PS
BIE-LA2.21	Linear Algebra 2 Karel Klouda, Marzieh Forough Karel Klouda Karel Klouda (Gar.)	Z,ZK	5	2P+2C	L	PS
BIE-LOG.21	Mathematical Logic Kate ina Trlifajová Kate ina Trlifajová (Gar.)	Z,ZK	5	2P+2C	Z	PS
BIE-OOP.21	Object-Oriented Programming Filip K ikava, Petr Máj, Filip íha Filip K ikava Filip K ikava (Gar.)	Z,ZK	5	2P+2C	Z	PS

BIE-PJP.21	Programming Languages and Compilers Tomáš Pecka, Jan Janoušek Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+1C	L	PS
BIE-PPA.21	Programming Paradigms Tomáš Pecka, Petr Máj, Tomáš Jakl Jan Janoušek Jan Janoušek (Gar.)	Z,ZK	5	2P+2R	Z	PS

Charakteristiky p edmet této skupiny studijního plánu: Kód=BIE-TI-PS.21 Název=Compulsory Courses of the Bachelor Specialisation Computer Science, version 2021

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	Algorithms and Graphs 2	Z,ZK	5		
The course presents the	basic algorithms and concepts of graph theory building on the introduction exposed in the compulsory course BIE-AG1.21.	It also covers adv	anced data		
structures and amortize	d analysis. It also includes a very light introduction into approximation algorithms.				
BIE-APS.21	Architectures of Computer Systems	Z,ZK	5		
Students will learn the c	onstruction principles of internal architecture of computers with universal processors at the level of machine instructions. Sp	ecial emphasis is	given on the		
pipelined instruction processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the principles of instruction processing					
not only in scalar processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of the sequential model of the					
program. The course fur	ther elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory c	oherence and cor	sistency in such		
systems.					
BIE-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5		
Students are introduced	to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the class	ssical tasks from t	ne areas of state		
space search, multi-age	nt systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algori	thms and the neu	ral networks, will		
be presented as well.					
BIE-LA2.21	Linear Algebra 2	Z,ZK	5		
Students will broaden th	eir knowledge gained in the BIE-LA1 introductory course, where only vectors in the form of n-tuples of numbers were conside	ered. Here we will	introduce vector		
spaces in a general abs	tract form. The notions of a scalar product and a linear map will enable to demonstrate the profound link between linear alge	bra, geometry, an	d computer		
graphics. The other main	n topic will be numerical linear algebra, in particular problems with solving systems of linear equations on computers. The iss	sues of numerical	linear algebra		
will be demonstrated ma	inly on the matrix factorization problem. Selected applications of linear algebra in various fields will be presented.				
BIE-LOG.21	Mathematical Logic	Z,ZK	5		
The course focuses on f	he basics of propositional and predicate logic. It starts from the semantic point of view. Based on the notion of truth, satisfial	bility, logical equiv	alence, and the		
logical consequence of	ormulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, a	re explained. This	relates to the P		
vs. NP problem and Boo	lean functions in propositional logic. In predicate logic, the course further deals with formal theories, such as arithmetics, an	d their models. Th	e syntactic		
approach to mathematic	al logic is demonstrated on the axiomatic system of propositional logic and its properties. Gödel's incompleteness theorems	is explained.			
BIE-OOP.21	Object-Oriented Programming	Z,ZK	5		
Object-oriented program	iming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate togeth	er by message pa	issing. In this		
course students get acq	uainted with the main principles of object-oriented programming and design, used in modern programming languages. The e	mphasis is on pra	ctical techniques		
for developing software,	which includes testing, error handing, refactoring, and application of design pattern.				
BIE-PJP.21	Programming Languages and Compilers	Z,ZK	5		
Students learn basic co	mpiling methods of programming languages. They are introduced to intermediate representations used in current compilers	GNU and LLVM. T	hey learn to		
create a specification of	a translation of a text that conforms a given syntax, to a target code and also to create a compiler based on the specification	n. The compiler ca	in translate not		
only a programming lan	guage but any text in a language generated by a given LL input grammar.				
BIE-PPA.21	Programming Paradigms	Z,ZK	5		
The course deals with b	asic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of par	ticular approache	s. Functional		
programming paradigm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. The principles are demonstrated					
on lambda calculus and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstream programming languages					
such as C++ and Java.					

Název bloku: Volitelné p edm ty oboru/specializace Minimální po et kredit bloku: 0 Role bloku: VO

Kód skupiny: BIE-TI-VO.21

Název skupiny: Elective vocational Courses of the Bachelor Specialization Computer Science, ver. 2021 Podmínka kredity skupiny:

Podmínka p edm ty skupiny:

Kredity skupiny: 0

Poznámka ke skupině:

Kód	Název p edm tu / Název skupiny p edm t (u skupiny p edm t seznam kód jejích len) Vyu ující, auto i a garanti (gar.)	Zakon ení	Kredity	Rozsah	Semestr	Role
BIE-SPS.21	Administration of Computer Networks and Services Libor Dostálek, Jan Kubr Pavel Tvrdík Libor Dostálek (Gar.)	Z,ZK	5	2P+2S	Z	VO
BIE-TAB.21	Applications of Security in Technology Jan B lohoubek, Ji í Dostál, Maciej Skórski, Martin Pozd na Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	VO
BIE-ASB.21	Applied Network Security Yelena Trofimova, Ji í Dostál, František Ková, Martin Šutovský Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-ZRS.21	Basics of System Control Kate ina Hyniová Kate ina Hyniová Kate ina Hyniová (Gar.)	Z,ZK	5	2P+2C	Z,L	VO
BIE-ZSB.21	Basics of System Security Ji í Bu ek, Simona Forn sek, Martin Šutovský, Marián Svetlík Simona Forn sek Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	Z	VO

BIE-TPS.21	Computer Networks Technologies Vladimír Smotlacha, Josef Koumar Vladimír Smotlacha Vladimír Smotlacha (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-JPO	Computer Units Pavel Kubalík	Z,ZK	5	2P+2C	Z	VO
BIE-KOM	Conceptual Modelling Robert Pergl	Z,ZK	5	2P+2C	Z	VO
BIE-VES	Embedded Systems Miroslav Skrbek	Z,ZK	5	2P+2C	L	VO
BIE-EHA.21	Ethical Hacking Ji í Dostál, Andrej Šimko, Martin Kolárik Ji í Dostál Ji í Dostál (Gar.)	Z,ZK	5	2P+2C	L	VO
BIE-HWB	Hardware Security Ji í Bu ek	Z,ZK	5	2P+2C	Z	VO
BIE-IOT.21	Internet of Things Pavel Tvrdík, Viktor erný, Lenka Kosková T ísková Lenka Kosková T ísková Lenka Kosková T ísková (Gar.)	Z,ZK	5	2P+2C	Z	vo
BIE-UKB.21	Introduction to Cybersecurity Jan B lohoubek, Ivana Trummová, David Pokorný, Tomáš Rabas, Tomáš Lu ák Jan B lohoubek Jan B lohoubek (Gar.)	Z,ZK	5	3P+1C	Z	VO
BIE-IDO.21	Introduction to DevOps Tomáš Vondra, Zden k Rybola, Jakub Jab rek Tomáš Vondra Zden k Rybola (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-TJV.21	Java Technology Ond ej Rozinek Ond ej Rozinek (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-MPP.21	Methods of interfacing peripheral devices Miroslav Skrbek Miroslav Skrbek Miroslav Skrbek (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-SIP.21	Network Programming Jan Fesl Jan Fesl (Gar.)	Z	5	2P+2C	Z	VO
BIE-PNO	Practical Digital Design Martin Novotný Martin Novotný (Gar.)	KZ	5	2P+2C	Z	VO
BIE-SRC.21	Real-time systems Hana Kubátová, Ji í Vysko il Hana Kubátová Hana Kubátová (Gar.)	Z,ZK	5	2P+2C	Z	VO
BIE-BEK	Secure Code Róbert Lórencz	Z,ZK	5	2P+2C	L	VO
BIE-VPS.21	Selected Topics in Computer Networking Alexandru Moucha, Mohamed Bettaz Pavel Tvrdík Mohamed Bettaz (Gar.)	Z,ZK	5	2P+2C	L	VO
BIE-SWI.21	Software Engineering Stanislav Kuznetsov, Zden k Rybola, Jakub Jab rek, Ond ej Rozinek Zden k Rybola Zden k Rybola (Gar.)	Z,ZK	5	2P+1C	L	VO
BIE-SP1.21	Team Software Project 1 Stanislav Kuznetsov, Zden k Rybola, Jakub Jab rek, Ond ej Rozinek Zden k Rybola Zden k Rybola (Gar.)	KZ	5	4C	L	VO
BIE-SP2.21	Team Software Project 2 Stanislav Kuznetsov, Zden k Rybola Zden k Rybola Zden k Rybola (Gar.)	KZ	5	2C	Z	VO
BIE-ADU.1	Unix Administration Petr Zemánek	Z,ZK	5	2P+2C	L	VO
BIE-VDC.21	Virtualization and Data Centers Ji í Kašpar Ji í Kašpar Ji í Kašpar (Gar.)	Z,ZK	5	2P+2C	L	VO
BIE-AWD.21	Web and Database Server Administration Michal Valenta, Lukáš Ba inka Lukáš Ba inka Michal Valenta (Gar.)	Z,ZK	5	2P+2C	Z	VO

Charakteristiky p edmet této skupiny studijního plánu: Kód=BIE-TI-VO.21 Název=Elective vocational Courses of the Bachelor Specialization Computer Science, ver. 2021

BIE-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 administr	rated under the op	perating 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 infrast	with real network infrastructure.					
BIE-TAB.21	Applications of Security in Technology	Z,ZK	5			
The goal of the course	s to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Stu	idents get a broad	ler overview of			
cybersecurity application	ns and extend their knowledge from the cryptology, the secure code, and system, network, and hardware security.					
BIE-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	ined in course BI-	-PSI with actual			
security applications like	e the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishi	ng the course stud	dent will get			
knowledge of security a	pplications in computer networks.					
BIE-ZRS.21	Basics of System Control	Z,ZK	5			
The course gives an int	oduction to the field of automatic control. It focuses particularly on the control of engineering and physical systems. It covers	basic knowledge	of the feedback			
control of linear dynami	cal single-input-single-output systems. Students will learn the methods of creating descriptions of system models, basic linea	ar dynamic system	ns analysis, and			
design and verification	of simple feedback PID, PSD, and fuzzy controllers. Attention is also given to sensors and actuators in control loops, issues of	stability of control	l systems, single			
and continuous adjustm	ent of the controller parameters, and certain aspects of the industrial implementations of continuous and digital controllers.					
BIE-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 forensic 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 modern operating systems security,						
as well as skills needed	for independent work in the area of operating system security incident analysis.					

BIE-TPS.21	Computer Networks Technologies	Z,ZK	5
	students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic and students with basic advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic advanced technologies, and advanced technologies, components, and interfaces of contemporary computer networks at the physical students with basic advanced technologies, and advanced technologies, advanced techno		•
	provide theoretical foundations of these technologies and explain relevant physical principles. In the labs, the respective tech	•	
	t ones students will get hands-on experience. Thematically, the course covers both local and long-range optical networks, Ether and a students will get hands-on experience.	nernet, modern wi	reless networks,
always with focus on hi		7 71/	
BIE-JPO	Computer Units	Z,ZK	
	ed with the internal structure and organization of computer units and their interfacing with the environment. They also learn th IFO, FIFO and CAM), design methodology of control units and basic principles of bus communication. Students get skills nee	-	-
BIE-KOM		Z,ZK	5
	Conceptual Modelling the development of abstract thinking skills and precise specifications in the form of conceptual models. Students will learn the	1 '	-
	ze and also determine the right links in complex systems of social reality, especially enterprises and institutions. Students will		
-	DitoUML notation. They will also learn to express the rules and limitations of everyday reality using the OCL language. Stude		-
-	as a discipline enabling conceptual modeling of the structure of enterprises and institutions and their process and learn the		
also designed with reg	ard to the continuity of software implementations.		
BIE-VES	Embedded Systems	Z,ZK	5
-	n embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and emb	bedded processors	s, their integrated
	gramming methods, and applications. They get practical skills with development kits and tools.		1
BIE-EHA.21	Ethical Hacking	Z,ZK	5
-	is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vu		-
	r networks, web applications, wireless networks, operating systems, and others like the Internet of Things or cloud. The focus nd the following process of penetration test documentation.	s is on hands-on e	experience with
BIE-HWB	Hardware Security	Z,ZK	5
	hardware resources used to ensure security of computer systems including embedded ones. The students become familiar w	1 '	-
	, the security features of modern processors, and storage media protection through encryption. They will gain knowledge abo		
	attacks and tampering with hardware during manufacture. Students will have an overview of contact and contactless smart care		
-	nulti-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.	0,	0 11
BIE-IOT.21	Internet of Things	Z,ZK	5
The course focuses on	an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an		rs and actuators,
wireless communicatio	n technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT arch	nitectures for differ	ent application
	uter labs, students will gain practical experience with developing simple IoT systems using common development environme	nts (hardware - A	RM, ESP, STM;
software - Arduino, Ras			1
BIE-UKB.21	Introduction to Cybersecurity	Z,ZK	5
-	is to provide students with the introduction of basic concepts in modern approach to cybersecurity. Students will get a basic of	overview of threat	s in cyberspace
-	s, security mechanisms in networks, operating systems and applications, as well as of basic cyberspace regulations.	7 71/	
BIE-IDO.21	Introduction to DevOps the topic of DevOps and prepares future developers and administrators for a modern culture of development and operation of	Z,ZK	5
	port software development, testing and compilation. It also focuses on tools for automating infrastructure management and bi		
	duction to technologies that will then be discussed in more detail in related follow-up courses. The student will also get acqua		-
used in practice.			· · · · · · · · · · · · · · · · · · ·
BIE-TJV.21	Java Technology	Z.ZK	5
	s to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get ac	cquainted with ger	neral theoretical
concepts and will be at	ole to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing	the course stude	ents will be able
to participate in the dev	relopment of software systems on the Java platform. Students are assumed to be acquainted with the following topics (they a	are used and not t	aught in this
	syntax, SQL, git version control system, Docker, continuous integration.		
BIE-MPP.21	Methods of interfacing peripheral devices	Z,ZK	5
	on methods for interfacing of peripheral devices. Interfacing of real peripheral devices is focused on techniques based on Univ	-	-
	and peripheral devices side. Labs are practically oriented. Students gain experience with implementation of relevant parts of	USB devices, Linu	ux and Windows
	ion development, and APIs of selected devices.	7	
BIE-SIP.21	Network Programming damental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming network applications.		5 SD sockots The
	to designing communication protocols and their verification. The third part introduces the principles and applications of midd		
	rn models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in c	-	-
programming language			.g
BIE-PNO	Practical Digital Design	KZ	5
	ew 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 teo	chnologies FPGA and ASIC.		
BIE-SRC.21	Real-time systems	Z,ZK	5
Students obtain the ba	sic knowledge in the real-time (RT) system theory and in the design methods for RT systems including the dependability issues	ues. Theoretical kr	owledge from
	nentally verified in department specialized labs. The course is mainly focused on embedded RT systems, therefore the design	h kits in the lab are	e the same as in
the BIE-VES course ar			1
BIE-BEK	Secure Code	Z,ZK	5
-	zovat a zohled ovat bezpe nostní rizika p i návrhu svého kódu a ešení v b žné inženýrské praxi. Od teorie modelování bez		
	h program pod nižšími oprávn ními a jak tato oprávn ní stanovovat, protože ne každý program musí nutn b žet s administi na rizika spojená s p ete ením bufferu. Dále se studenti budou krátce v novat zabezpe ení dat a jak toto zabezpe ení souvisí∷	, ,	
	ovat útok m typu DoS (Denial of Service) a obran proti nim.	5 Galabazovyiill Sj	sterny a webern.
BIE-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
	the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and tech		-
-	a networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining pract	-	-
	earning important methods of local area and wide area networks from the viewpoint of functionality, performance, and securi	-	

		_		
BIE-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 han	ds-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	in and testing. Wit	hin 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				
BIE-SP1.21 Team Software Project 1	KZ	5		
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the	e BIE-SWI course	e 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 fu	rther developed		
and finished in the BIE-SP2 course.				
BIE-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 res	sult of the BIE-SP	1 course project.		
However, in this follow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will we	ork in teams of 4-6	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 s	olution.			
BIE-ADU.1 Unix Administration	Z,ZK	5		
Students became familiar with the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of the	eir protection agai	nst unauthorized		
use. In the seminars they will verify the information from the lectures on real life examples from practice. They will understand the differences between	en user and admir	nistrator roles.		
They gain theoretical and practical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file syst	ems, disk subsyst	ems, processes,		
memory, network services, shared file systems, name services, remote access, and system boot.				
BIE-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 d	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	s. Students will un	derstand the		
design, validation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, outages, and data losses.				
BIE-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	nd backup compl	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.			

Název bloku: Povinn volitelné p edm ty Minimální po et kredit bloku: 5

Role bloku: PV

Kód skupiny: BIE-PV-TI.21

Název skupiny: Compulsory elective Courses of the Specialization Computer Science, version 2021 Podmínka kredity skupiny: V této skupin musíte získat alespo 5 kredit (maximáln 10) Podmínka p edm ty skupiny: V této skupin musíte absolvovat alespo 1 p edm t (maximáln 2) Kredity skupiny: 5

Poznámka ke skupině:

Kód	Název p edm tu / Název skupiny p edm t (u skupiny p edm t seznam kód jejích len) Vyu ující, auto i a garanti (gar.)	Zakon ení	Kredity	Rozsah	Semestr	Role
BIE-ML1.21	Machine Learning 1 Daniel Vašata, Alexander Kovalenko, Rodrigo Augusto Da Silva Alves Daniel Vašata Daniel Vašata (Gar.)	Z,ZK	5	2P+2C	Z	PV
BIE-SWI.21	Software Engineering Stanislav Kuznetsov, Zden k Rybola, Jakub Jab rek, Ond ej Rozinek Zden k Rybola Zden k Rybola (Gar.)	Z,ZK	5	2P+1C	L	PV

Charakteristiky p edmet této skupiny studijního plánu: Kód=BIE-PV-TI.21 Název=Compulsory elective Courses of the Specialization Computer Science, version 2021

BIE-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 t	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 languag	ge UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture desig	in and testing. Wit	hin the course,		
students also gain a the	oretical basis in the field of project management, estimation of costs of software projects, and methods of their development	<u>.</u>			
BIE-ML1.21	Machine Learning 1	Z,ZK	5		
The goal of this course	s to introduce students to the basic methods of machine learning. They get theoretical understanding and practical working l	knowledge of regr	ession and		
classification models in	the supervised learning scenario and clustering models in the unsupervised scenario. Students will be aware of the relations	hips 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.				
	(alitalia é a calua tri				

Název bloku: Volitelné p edm ty Minimální po et kredit bloku: 0 Role bloku: V

Kód skupiny: BIE-V.2021 Název skupiny: Purely Elective Bachelor Courses, Version 2021 till 2024/25

Podmínka kredity skupiny: Podmínka p edm ty skupiny: Kredity skupiny: 0 Poznámka ke skupině: Název p edm tu / Název skupiny p edm t Kód Kredity Rozsah Semestr (u skupiny p edm t seznam kód jejích len) Zakon ení Role Vyu ující, **auto i** a garanti (gar.) Artificial Intelligence Fundamentals **BIE-ZUM** Z,ZK 4 2P+2C L V Pavel Surynek **Basics of System Control** L **BIE-ZRS** Z,ZK 4 2P+2C V Kate ina Hyniová **Compiler Construction BIE-CCN** Z,ZK 5 2P+1C L V Christoph Kirsch Christoph Kirsch Christoph Kirsch (Gar.) **Computer Engineering Seminar I** Ζ **BIE-SCE1** Ζ 4 2C v Hana Kubátová, Miroslav Skrbek Hana Kubátová Hana Kubátová (Gar.) **Computer Engineering Seminar II BIE-SCE2** Ζ 4 2CL v Hana Kubátová, Ji í Vysko il Hana Kubátová Hana Kubátová (Gar.) Czech Language for Foreigners 2 **BIE-CZ0** K7 4C Z.L Tomáš Houdek, Markéta Hofmannová, Ivana Vondrá ková, Petra Korfová v Zden k Muziká Zden k Muziká (Gar.) Czech Language for Foreigners II 2 BIE-CZ1.21 Tomáš Houdek, Ivana Vondrá ková, Petra Korfová Zden k Muziká Zden k ΚZ 4C Z,L V Muziká (Gar.) eština pro pokro ilé Tomáš Houdek, Jakub Šenovský, Jakub Šolc, Adam Vostárek **Zden k Muziká** UKCJP Z,ZK 2 2BP+2BC Z,L v Zden k Muziká (Gar.) **Differential equations BIE-DIF** Z,ZK 5 2P+2C L v Antonella Marchesiello, Ond ej Bouchala, Jan Valdman Tomáš Kalvoda Ond ej Bouchala (Gar.) Economic project Ζ 1 L **BIE-EPR** v Tomáš Evan Tomáš Evan Tomáš Evan (Gar.) **Financial Markets BIE-FTR.1** Z,ZK 5 2P+2C L V Pavla Vozárová Human Factors in Cryptography and Security Ζ **BIE-HAS** Z,ZK 5 2P+1C v Ivana Trummová Ivana Trummová Ivana Trummová (Gar.) Introduction to Computer Science **BIE-CSI** Ζ 2 2C Ζ v Christoph Kirsch Christoph Kirsch Christoph Kirsch (Gar.) Introduction to European Economic History **BIE-EHD** Z,ZK 3 2P+1C L v Tomáš Evan Tomáš Evan Tomáš Evan (Gar.) Introduction to European Economic History FITE-EHD Z.ZK 3 2P+1C L v Tomáš Evan Introduction to Mathematics **BIE-IMA** Ζ 4 Ζ 3C V Karel Klouda Introduction to Mathematics 2 **BIE-IMA2** Ζ 2 1C Ζ V Karel Klouda Network Technology 1 Ζ 2C Ζ **BIE-ST1** 3 V Alexandru Moucha Alexandru Moucha (Gar.) **Object-Oriented Programming** Z,ZK 4 2P+2C Ζ BIE-OOP V Filip K ikava **Preparatory Mathematics** Ζ **BIE-PKM** Ζ 4 V Jitka Rybní ková Tomáš Kalvoda (Gar.) **Programming in Java** Ζ **BIE-PJV** Z,ZK 4 2P+2C v Jan Blizni enko **Jan Blizni enko** Jan Blizni enko(Gar.) Programming in shell 2 **BIE-PS2** Z,ZK 4 2P+2C L v Lukáš Ba inka Project management David Pešek David Pešek (Gar.) **BIE-PRR.21** Z,L Z,ZK 5 2P+2C v Scripting Languages **BIE-SKJ.21** Z,ZK 4 2P+2C L V Jan Ž árek, Lukáš Ba inka **Lukáš Ba inka** Jan Ž árek (Gar.) **Selected Combinatorics Applications BIE-VAK.21** Ζ 3 2R L V Michal Opler, Dušan Knop Michal Opler Michal Opler (Gar.) **Selected Mathematical Methods BIE-VMM** Z.ZK 4 2P+2C L V Marzieh Forough Tomáš Kalvoda Tomáš Kalvoda (Gar.) Seminá po íta ového inženýrství l Hana Kubátová Hana Kubátová (Gar.) Ζ **BI-SCE1** 4 2C L,Z V Systems Engineering Christoph Kirsch Christoph Kirsch (Gar.) **BIE-SEG** Ζ 0 Ζ 2C v TVV Ζ 0 Z,L 0+2 V T lesná výchova TVV0 Ζ 0 0+2 Z,L v T lesná výchova 0 TV2K1 Ζ L,Z 1 v T lesná výchova 2 Ζ TVKLV 0 7dní L T lovýchovný kurz v User Interface Design **BIE-TUR.21** Z.ZK 5 2P+2C L V Jan Schmidt Jan Schmidt Jan Schmidt (Gar.)

BIE-VR1.21		1	1	1		1
	Virtual reality I Petr Klán Petr Klán Petr Klán (Gar.)	KZ	4	2P+2C	L,Z	V
BIE-ADW.1	Windows Administration Ji í Kašpar, Miroslav Prágl Miroslav Prágl (Gar.)	Z,ZK	4	2P+1C	Z	V
FITE-SEP	World Economy and Business Tomáš Evan	Z,ZK	4	2P+2C	Z	V
BIE-SEP	World Economy and Business Tomáš Evan Tomáš Evan Tomáš Evan (Gar.)	Z,ZK	4	2P+2C	Z	V
BIE-3DT.1	3D Printing Marek Žehra	KZ	4	3C	L	V
Charakteristiky p edn 2024/25	net této skupiny studijního plánu: Kód=BIE-V.2021 Název=Pu	rely Elective	Bachelo	or Courses	s, Versior	n 2021 till
	ificial Intelligence Fundamentals			Z	,ZK	4
	e fundamental problems in the Artificial Intelligence, and the basic methods for their sc	olving. It focuses n	nainly on th		·	areas of state
	stems, game theory, planning, and machine learning. Modern soft-computing method	s, including the ev	olutionary	algorithms an	d the neural	networks, wil
be presented as well.					71/	
	sics of System Control			1	,ZK	. 4
	rení systém je ur en pro všechny zájemce o aplikovanou informatiku v bakalá ském s					
	ist konkuren ní výhodou a zhodnotí je bezesporu v pr myslové praxi. Studenti získaj		-			
	ení inženýrských a fyzikálních sysém . Poskytneme vám základní informace z oblasti					
-	netodami vytvá ení popisu a modelu systém, základní analýzou lineárních dynamick			-		
	Pozornost je v nována rovn ž sníma m a ak ním len m v regula ních obvodech, c		-	-		
	átoru a n kterým aspekt m pr myslových realizací spojitých a íslicových regulátor .	Jednotlivá témata	a p ednášel	< jsou prováze	ena množstv	vím užite ných
p íklad a praktických pr my	slových realizací.					
BIE-CCN Co	mpiler Construction			Z	"ZK	5
This is an introductory class	on compiler construction for bachelor students in computer science. The goal of the cl	lass is to introduc	e basic prir	nciples of com	npilers for st	udents to
understand the design and in	nplementation of programming languages. Seeing and actually understanding self-con	mpilation is the ov	erarching t	heme of the o	class.	
BIE-SCE1 Co	mputer Engineering Seminar I				Z	4
	igineering is a (s)elective course for students who want to deal with deeper topics of dig	nital design reliabi	lity and res	istance to fail	- 1	-
	within the subject. Each student or group of students solves some interesting topic wit	-	-			
	al literature and/or work in K N laboratories. The capacity of the subject is limited by t					
	a interature and/or work in K in laboratories. The capacity of the subject is infilted by t	ne possibilities of	uie semina	i leachers. I	ne topics are	e new ior each
semester.						
	mputer Engineering Seminar II				Z	4
The Seminar of Computer Er	ngineering is a (s)elective course for students who want to deal with deeper topics of dig	gital design, reliabi	lity and res	istance to fail	ures and atta	acks. Students
are approached individually	within the subject. Each student or group of students solves some interesting topic wit	h the selected su	pervisor. Pa	art of the subj	ect is work w	with scientific
articles and other profession	al literature and/or work in K N laboratories. The capacity of the subject is limited by t	he possibilities of	the semina	ar teachers. Tl	he topics are	e new for each
semester.						
BIE-CZ0 Cz	ech Language for Foreigners					
					KZ	2
Course Czech for foreigners		tudv. Travel. Time.	Family.		KZ	2
	offers the basic topics of conversation: Introductions, Orientation, Shopping, Work / St	tudy, Travel, Time,	Family.			
BIE-CZ1.21 Cz	offers the basic topics of conversation: Introductions, Orientation, Shopping, Work / St ech Language for Foreigners II				KZ	2
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BIE-EHD	Introduction to European Economic History	Z,ZK	3
	selection of themes from European economic history. It gives the student basic knowledge about forming of the global economic		
	s European countries have been dominant actors in this process it focuses predominantly on their roles in economic history.	•	
	e fragmentation of the Middle Ages, from the destruction of WWII to the current affairs, the development of modern financial ne detailed economic history of particular European countries but rather the impact of trade and the role of particular events,		
	will consist of a mixture of lectures and discussions.		ganizations in
	Introduction to European Economic History	Z,ZK	3
	selection of themes from European economic history. It gives the student basic knowledge about forming of the global economic		-
	s European countries have been dominant actors in this process it focuses predominantly on their roles in economic history.		-
	e fragmentation of the Middle Ages, from the destruction of WWII to the current affairs, the development of modern financial		
	he detailed economic history of particular European countries but rather the impact of trade and the role of particular events,	institutions and o	rganizations in
	will consist of a mixture of lectures and discussions.		
	Introduction to Mathematics		4
examples.	tend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they a	re able to apply th	em in particular
	Introduction to Mathematics 2	Z	2
	tend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they a		
examples.			
BIE-ST1	Network Technology 1	Z	3
	získání základních znalosti z oblasti po íta ových sítí a praktických zkušeností se sí ovými technologiemi. P edm t odpovíd	a látce kurikula Ci	sco Netacad
	amp;S Introduction to Networks.		
BIE-OOP	Object-Oriented Programming	Z,ZK	4
	ming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate togethe		-
	of the main principles of object-oriented programming and design. The emphasis is on practical techniques for software devi	elopment including	g testing, error
handing, refactoring and		7	4
	Preparatory Mathematics tory Mathematics is to help students revise the most important topics of high-school mathematics.	Z	4
	Programming in Java	Z,ZK	4
	g in Java will introduce students to the object oriented programming in Java programming language. Beside of basics of Java	· · ·	
-	specially data structures, files, GUI, networking, databases and concurrent APIs.	a language the fai	
BIE-PS2	Programming in shell 2	Z,ZK	4
	overview of scripting languages, introduction into syntax, semantics, programming style, data structures, pros and cons. In ad	dition, they gain a	a deeper insight
into Bourne Again shell a	and some other particular scripting languages and will get practical experience with shell script programming. Note to Erasmu	s students: We are	ready do adapt
	ven very basic Bourne shell usage. Depending on actual knowledge of the students, orientation in user filesystem tools (cp,		
	r, sort, uniq) can be provided. The advantage of this module is that we do not stop at this point - we will show you also a se	ection of advance	ed scripting
techniques used in prac BIE-PRR.21		Z,ZK	5
	Project management to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, and	, ,	-
	argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk	-	-
	chedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for		-
deepening their knowled	ge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in I	arge companies.	The course is
	e who will develop software or hardware in the form of team projects.		
BIE-SKJ.21	Scripting Languages	Z,ZK	4
	e world of scripted programming. Together, we will unveil the power of Bourne Again shell and PERL as proven industry stand		
_ · ·	g utilities (AWK, sed), with some basic UNIX system tools, in many real-world situations like processing web feeds or logs. W nd introduction into their pros and cons and students get practical experience with shell script programming. We will touch al	1 0	
	how your code documentation can be implemented. And if you know UNIX system-level scripting already, we can show you a		
	oked frequently but increase code robustness or execution efficiency. The course is led by two veteran programmers in the sc		
lecturer in advanced she	ell programming, teaching developers from the IT industry in several CE countries. Jan is a skilled lecturer and developer who	ose code contribu	tes to safe and
· · · · · · · · · · · · · · · · · · ·	cloud service datacenters around the globe.		
	Selected Combinatorics Applications	Z	3
	duce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the		
	to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some ba ion of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) i		
	e solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optim		
	lutions to the studied problems with a special focus on the effective use of existing tools.		
	Selected Mathematical Methods	Z,ZK	4
	an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then a		eries and their
properties. Further, we in	ntroduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the	wavelet transform	n. We examine
	problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interesting examples.		
	Seminá po íta ového inženýrství l	Z	4
	rženýrství je výb rový p edm t pro studenty, kte í se cht jí zabývat hloub ji tématy íslicového návrhu, spolehlivosti a odolnu odm tu p jetupuje jedividujého a koždú student i skupinka student očí p jeké zajímavé aktuální téma s vybraným čkolitel		
	edm tu p istupuje individuáln a každý student i skupinka student eší n jaké zajímavé aktuální téma s vybraným školitel J odbornou literaturou a/nebo práce v laborato ích K N. Kapacita p edm tu je omezena možnostmi u itel seminá e. Probíra	-	
nová.	שמשטרונים הופיטורים מחסטים אמטיטים אמטימנס וסודוג דו המשמטות p כמוד גם של סוווכברות ווטבווסטנדורם ונפר שפורווות ביינים אינטיים אונטיים אונטיים אמטיטים אמטימנס וסודוג דו המשמטות p כמוד גם של סוווכברות ווטבווסטנדורם ונפר שפור	tomata joou pro	s areas someou
	Systems Engineering	Z	0
	lass on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles		-
to understand processor	r and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After taki	ng the class, stud	ents are able to
	the between processes and threads as well as emulation and virtualization, what virtual memory is and how it works, what con	ncurrency is, as o	pposed to
	becesses and threads synchronize efficiently to overcome concurrency for communication.		
TVV	T lesná výchova	Z	0
TVV0	T lesná výchova 0	Z	0
TV2K1	T lesná výchova 2	Z	1

TVKLV	T lovýchovný kurz	Z	0	
BIE-TUR.21	User Interface Design	Z,ZK	5	
Students gain a basic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where software and other products do not				
communicate with the u	ser optimally, since the needs and characteristics of users are not taken into account during product development. Students	gain an overview	of methods that	
bring users into the dev	elopment process to ensure optimal interface for them.			
BIE-VR1.21	Virtual reality I	KZ	4	
Introduction to Virtual R	eality (VR), virtual reality operations, metaverse, and creation. Rules and requirements for virtual worlds communication. The	course focuses c	on the ways of	
creating virtual reality w	orlds and interactive activities in 3D worlds. It improves computational thinking, empathy, and shared social activities.			
BIE-ADW.1	Windows Administration	Z,ZK	4	
Students understand th	e architecture and internals of the Windows OS and acquire the skills to administrate the Windows OS. They are able use the	standard admini	stration and	
security tools and apply	advanced ActiveDirectory administration methods. They are able to solve problems by applying appropriate troubleshooting	methods and adm	ninistrate	
heterogeneous systems	s. Students are able to effectively configure centralised administration of a computer network.			
FITE-SEP	World Economy and Business	Z,ZK	4	
The course introduces :	students of technical universities to international business. It does that predominantly by comparing individual countries and k	ey regions of the	world economy.	
Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedom, corruption and economic				
development, which are	needed for the right investment decision. Seminars help to improve knowledge in the form of discussions based on individua	al readings.		
BIE-SEP	World Economy and Business	Z,ZK	4	
The course introduces :	students of technical universities to international business. It does that predominantly by comparing individual countries and k	ey regions of the	world economy.	
Students get to know al	pout different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedor	n, corruption and	economic	
development, which are	needed for the right investment decision. Seminars help to improve knowledge in the form of discussions based on individual	al readings.		
BIE-3DT.1	3D Printing	KZ	4	
Students learn to desig	h three-dimensional objects optimized for printing on a RepRap printer and the printing itself. They will be able to design obje	cts, prepare for pr	rinting and print	
in 3D.				

Seznam p edm t tohoto pr chodu:

Kód	Název p edm tu	Zakon ení	Kredity
BI-SCE1	Seminá po íta ového inženýrství l	Z	4
Seminá po íta ov	ého inženýrství je výb rový p edm t pro studenty, kte í se cht jí zabývat hloub ji tématy íslicového návrhu, spolehlivosti a odolnost	proti poruchám a	útok m. Ke
student m se v rán	nci p edm tu p istupuje individuáln a každý student i skupinka student eší n jaké zajímavé aktuální téma s vybraným školitelem.	Sou ástí p edm t	u je práce s
v deckými lánky a	jinou odbornou literaturou a/nebo práce v laborato ích K N. Kapacita p edm tu je omezena možnostmi u itel seminá e. Probíraná f	témata jsou pro ka	ždý semestr
	nová.		
BIE-3DT.1	3D Printing	KZ	4
Students learn to c	lesign three-dimensional objects optimized for printing on a RepRap printer and the printing itself. They will be able to design objects	, prepare for printir	ng and print
	in 3D.		
BIE-AAG.21	Automata and Grammars	Z,ZK	5
	uced to basic theoretical and implementation principles of the following topics: construction, use and mutual transformations of finite		•
	ars, translation finite automata, construction and use of pushdown automata, hierarchy of formal languages, relationships between for		
• ·	ed through the module is applicable in designs of algorithms for searching in text, data compression, simple parsing and translation,	<u> </u>	
BIE-ADU.1	Unix Administration	Z,ZK	5
	amiliar with the internal structure of Unix-like systems, with the administration of their basic subsystems and with the principles of their part to be the system of the later of the system of the s	•	
	ars they will verify the information from the lectures on real life examples from practice. They will understand the differences between		
They gain theoretic	al and practical knowledge of tools for tracking, analyzing, debugging and securing systems, implementing and managing file systems memory, network services, shared file systems, name services, remote access, and system boot.	s, disk subsystems	, processes,
BIE-ADW.1	Windows Administration	Z.ZK	4
	and the architecture and internals of the Windows OS and acquire the skills to administrate the Windows OS. They are able use the	, ,	
	and the arcinecture and memals of the windows OS and acquire the skins to administrate the windows OS. They are able use the nd apply advanced ActiveDirectory administration methods. They are able to solve problems by applying appropriate troubleshooting		
	heterogeneous systems. Students are able to effectively configure centralised administration of a computer network.	methods and adm	inistrate
BIE-AG1.21	Algorithms and Graphs 1	Z,ZK	5
The course covers	s the basics from the efficient algorithm design, data structures, and graph theory, belonging to the core knowledge of every computing	ng curriculum. It is	interlinked
with the concurrent	BIE-AAG and BIE-ZDM courses in which the students gain the basic skills and knowledge needed for time and space complexity of	algorithms and lea	rn to handle
	practically the asymptotic mathematics.		
BIE-AG2.21	Algorithms and Graphs 2	Z,ZK	5
The course prese	ents the basic algorithms and concepts of graph theory building on the introduction exposed in the compulsory course BIE-AG1.21.	t also covers adva	nced data
	structures and amortized analysis. It also includes a very light introduction into approximation algorithms.		
BIE-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		
	processing and on the memory hierarchy. Students will understand the basic concepts of RISC and CISC architectures and the prince		
	processors, but also in superscalar processors that can execute multiple instructions in one cycle, while ensuring the correctness of	•	
program. The cours	e further elaborates the principles and architectures of shared memory multiprocessor and multicore systems and the memory cohe	rence and consiste	ency in such
	systems.	7 71/	~
BIE-ASB.21	Applied Network Security	Z,ZK	5
	rse is to introduce selected topics from computer networks in terms of cybersecurity. These topics extend the basic knowledge gaine		
security applicati	ons like the public key infrastructure, encrypted network protocols, link and network layer security or wireless networks. After finishing knowledge of security applications in computer networks.	y me course stude	ni will get
	kilowieuge of security applications in computer networks.		

BIE-AWD.21	Web and Database Server Administration	Z,ZK	5
Students will get a	cquainted with the administration of database and web servers and services. They will be able to install, configure, operate, test, and	backup complex da	atabase and
web serv	vice systems. The principles will be demonstrated on the PostgreSQL relational database engine and Apache will be used as an examination of the principles will be used as an examination of the principle of the principles will be used as an examination of the principle of the principles will be used as an examination of the princi	ple of a web serve	er.
BIE-BAP.21	Bachelor Thesis	Z	14
BIE-BEK	Secure Code	Z,ZK	5
Studenti se nau í	posuzovat a zohled ovat bezpe nostní rizika p i návrhu svého kódu a ešení v b žné inženýrské praxi. Od teorie modelování bezpe	nostních rizik p isto	oupí k praxi,
-	ší b h program pod nižšími oprávn ními a jak tato oprávn ní stanovovat, protože ne každý program musí nutn b žet s administrátor		
prakticky demonst	rována rizika spojená s p ete ením bufferu. Dále se studenti budou krátce v novat zabezpe ení dat a jak toto zabezpe ení souvisí s da	tabázovými systém	ny a webem.
	V záv ru se budou v novat útok m typu DoS (Denial of Service) a obran proti nim.	-	4
BIE-BPR.21	Bachelor Project	Z	1
At the beginning	of the semester the student will contact the supervisor of the bachelor thesis he has booked. They will discuss the partial tasks that si semester. If he fulfill these tasks, the supervisor will award him / her at the end of the semester with the BI-BPR course.	udent will perform	during the
	Compiler Construction	Z,ZK	5
BIE-CCN	UCOMPILER CONSTRUCTION uctory class on compiler construction for bachelor students in computer science. The goal of the class is to introduce basic principles		-
	and the design and implementation of programming languages. Seeing and actually understanding self-compilation is the overarching	-	
BIE-CSI	Introduction to Computer Science	Z	2
	tory class on Elementary Computer Science for broad audiences: bachelor students in computer science, students majoring in other file	I	
	ool students, anybody with a background in basic math and the desire to understand the absolute basics of computer science. The go		
-	principles of computer science for students to understand, early on, what computer science is, why things such as high-level program		
	y are, and even how, on a basic yet representative and practically relevant level. After taking the class, students are able to answer no		
	questions about themselves such as which courses to take next and which books to follow up with, ideally realizing if they are interest		
	than expected, or even less than before.		
BIE-CZ0	Czech Language for Foreigners	KZ	2
	Course Czech for foreigners offers the basic topics of conversation: Introductions, Orientation, Shopping, Work / Study, Travel, Time		_
BIE-CZ1.21	Czech Language for Foreigners II	KZ	2
	ended for Students of English programmes who have completed BIE-CZ0 course or have basic knowledge of the Czech language. The		
	c vocabulary and clarifies the structure of the Czech language structure with regard to the practical needs of Students residing in the		
BIE-DBS.21	Database Systems	Z,ZK	5
	ainted with the architecture of the database engine and typical user roles. They learn to design the structure of a smaller data store (· ·	-
	model and then implement them in a relational database engine. They get acquainted with the SQL language and also with its theoret		
	et acquainted with the principles of relational database schema normalization. They understand the basic concepts of transaction pro		
	user access to a single data source. At the end of the course, students will be introduced to alternative nonrelational database n	nodels.	
BIE-DIF	Differential equations	Z,ZK	5
	es a foundational overview of differential equations, starting with basic motivation and examples of ODEs and progressing to essential si	· · ·	-
-	theorems on existence and uniqueness establish when solutions can be guaranteed. Linear and system-based ODEs are covered wi		-
polynomial analy	vsis, followed by examples of non-linear models such as predator-prey and epidemiological models to showcase real-world application	ns. Finally, an intro	duction to
partial differentia	l equations (PDEs) extends these concepts to multi-variable contexts. The course will also cover numerical methods for solving ODEs	and PDEs, includi	ing implicit
	and explicit Euler methods, Runge-Kutta methods, and finite element methods for both ODEs and PDEs.		
BIE-DML.21	Discrete Mathematics and Logic	Z,ZK	5
Students will get a	equainted with the basic concepts of propositional logic and predicate logic and learn to work with their laws. Necessary concepts fro	m set theory will be	e explained.
Special attention is	s paid to relations, their general properties, and their types, especially functional relations, equivalences, and partial orders. The cours	e also lays down th	he basics of
	combinatorics and number theory, with emphasis on modular arithmetics.		
BIE-EEC	English language external certificate	Z	4
The BIE-ECC cour	se can be recognized for any active semester after the submission of a certificate certificate that demonstrates their proficiency in Engli	sh comparable to c	or exceeding
	the B2 level of the Common European Framework of Reference for Languages.		1
BIE-EHA.21	Ethical Hacking	Z,ZK	5
-	course is to introduce students to the field of penetration testing and ethical hacking. The course deals with cybersecurity threats, vuln		-
exploitation in cor	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.		
BIE-EHD	Introduction to European Economic History	Z,ZK	3
	ices a selection of themes from European economic history. It gives the student basic knowledge about forming of the global economy	•	•
	bds. As European countries have been dominant actors in this process it focuses predominantly on their roles in economic history. Fro		
	ire to the fragmentation of the Middle Ages, from the destruction of WWII to the current affairs, the development of modern financial in	-	
course does not d	over the detailed economic history of particular European countries but rather the impact of trade and the role of particular events, in:	stitutions and organ	nizations in
	history. Class meetings will consist of a mixture of lectures and discussions.	-7	A
BIE-EPR	Economic project	Z	1
	This course is an extension of the course Introduction to European Economic History (BIE-EHD).	7 71/	~
BIE-FTR.1	Financial Markets	Z,ZK	5 rick and
	has been deeply transformed in the recent years, which led to a development of structured financial products, a new point of view on		
	rrket activities. The need to use and properly apply mathematical and technical tools is emphasized. To manage their financial activitie hools who have sufficient knowledge ICT and mathematics, and who have at the same time an understanding of the functioning of fin		
	noois who have sufficient knowledge iC I and mathematics, and who have at the same time an understanding of the functioning of fin se thus englobes both a description of financial markets and related economic theories, and an overview of mathematical and statistic		
		Z	3
BIE-GIT.21	SW Development Technologies	_	-
	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		Junanayer
			F
BIE-HAS	Human Factors in Cryptography and Security	Z,ZK	5 molementuií
-	tudent m, které zajímá nejen matematická a technická stránka v ci, ale i p emýšlení nad tím, jestli výsledný produkt bude použitelný pro aplikací). Studenti budou moci využít nabyté v domosti z tohoto kurzu k návrhu, plánování a analýze svých vlastních projekt v konte		
	zam ené na lov ka.	ALC RYDEITIELIUKE D	ezpe nosu
BIE-HWB	Hardware Security	Z,ZK	5
	hardware Security Is with hardware resources used to ensure security of computer systems including embedded ones. The students become familiar wit	, ,	
I The course deal	is war naroware resources used to ensure security of computer systems including embedded ones. The students become lamillar wit	n are operating pri	10162 01
cryptographic mod	lules, the security features of modern processors, and storage media protection through encryption. They will gain knowledge about v	ulnerabilities of HM	/ resources

and related topics for multi-factor authentication (biometrics). Students will understand the problems of effective implementation of ciphers.	g applications
BIE-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 service	1
covers the tools to support software development, testing and compilation. It also focuses on tools for automating infrastructure management and building and deployin	g 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 acquainted with modern	echnologies
used in practice.	4
BIE-IMA Introduction to Mathematics Z Students refresh and extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are able to apply there	4 n in particular
examples.	in in particular
BIE-IMA2 Introduction to Mathematics 2 Z	2
Students refresh and extend knowledge of elementary functions and their properties. Students understand basic mathematical principles and they are able to apply the	n in particular
examples.	-1
BIE-IOT.21 Internet of Things Z,ZK	5
The course focuses on an overview of technologies and development tools used in the field of the Internet of Things (IoT). Lectures are devoted to an overview of sensors a wireless communication technologies designed primarily for this area, and appropriate programming methods. They include an overview of IoT architectures for different differe	
areas. Within the computer labs, students will gain practical experience with developing simple IoT systems using common development environments (hardware - ARI	
software - Arduino, Raspberry Pi OS).	
BIE-JPO Computer Units Z,ZK	5
Students are acquainted with the internal structure and organization of computer units and their interfacing with the environment. They also learn the organization of val	-
types (main memory, LIFO, FIFO and CAM), design methodology of control units and basic principles of bus communication. Students get skills needed for computer	-
BIE-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 cryptograph certificates in systems based on them and learn the basics of safe use of symmetric and asymmetric cryptographic systems and hash functions in applications. Within I	-
will gain practical skills in using standard cryptographic methods with an emphasis on security and will also get acquainted with the basic procedures of cryptanalysis.	
expected to be competent programmers in C/C++ (on a small scale). Basic Python knowledge is an advantage.	
BIE-KOM Conceptual Modelling Z,ZK	5
The course focuses on the development of abstract thinking skills and precise specifications in the form of conceptual models. Students will learn the ability to distinguish	
in the domain, categorize and also determine the right links in complex systems of social reality, especially enterprises and institutions. Students will eleve have a students will be a st	-
structural modeling in OntoUML notation. They will also learn to express the rules and limitations of everyday reality using the OCL language. Students will also learn to Enterprise Engineering as a discipline enabling conceptual modeling of the structure of enterprises and institutions and their process and learn the DEMO methodology.	
also designed with regard to the continuity of software implementations.	
BIE-LA1.21 Linear Algebra 1 Z,ZK	5
We will introduce students to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field of real and compared to the basic concepts of linear algebra, such as vectors, matrices, vector spaces. We will define vector spaces over the field of real and compared to the basic concepts of linear algebra.	lex numbers
and also over finite fields. We will present the concepts of basis and dimension and learn to solve systems of linear equations using the Gaussian elimination method (Gl	
the connection with linear manifolds. We define the regularity of matrices and learn to find their inversions using GEM. We will also learn to find eigenvalues and eigen matrix. We will also demonstrate some applications of these concepts in computer science.	vectors or a
BIE-LA2.21 Linear Algebra 2 Z,ZK	5
Students will broaden their knowledge gained in the BIE-LA1 introductory course, where only vectors in the form of n-tuples of numbers were considered. Here we will intered the second of the second	
spaces in a general abstract form. The notions of a scalar product and a linear map will enable to demonstrate the profound link between linear algebra, geometry, and	
graphics. The other main topic will be numerical linear algebra, in particular problems with solving systems of linear equations on computers. The issues of numerical li	•
will be demonstrated assists on the metric factorization and law. Other tail and institutions of the second state in second stated will be associated	•
will be demonstrated mainly on the matrix factorization problem. Selected applications of linear algebra in various fields will be presented.	near algebra
BIE-LOG.21 Mathematical Logic Z,ZK	near algebra
	near algebra
BIE-LOG.21 Mathematical Logic Z,ZK 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 equival logical consequence of formulas are defined. Methods for determining the satisfiability of formulas, some of which are used for automated proving, are explained. This reveals 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 course further deals with formal theories.	5 ence, and the elates to the P e syntactic
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BIE-OOP.21	Object-Oriented Programming	Z,ZK	5
	programming has been used in the last 50 years to solve computational problems by using graphs of objects that collaborate together		-
course students ge	tt acquainted with the main principles of object-oriented programming and design, used in modern programming languages. The emph for developing software, which includes testing, error handing, refactoring, and application of design pattern.	asis is on practical	techniques
BIE-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 monit		
-	and implement simple multithreaded applications. General principles are illustrated on operating systems Solaris, Linux, or MS Wi	indows.	-
BIE-PA1.21	Programming and Algorithmics 1	Z,ZK	7
	construct algorithms for solving basic problems and write them in the C language. They master data types (simple, pointers, structure		
and functions pr	esented in C language. They understand the principle of recursion and basics of algorithm complexity analysis. They know fundament	al algorithms for s	earching,
	sorting, and manipulating linked lists and trees.		
BIE-PA2.21	Programming and Algorithmics 2	Z,ZK	7
	instruments of object-oriented programming and are able to use them for specifying and implementing abstract data types (stack, que	-	-
table). They lear	n these skills using the C++ programming language and are introduced to all C++ features needed in object-oriented programming (e copying/moving of objects, operator overloading, inheritance, polymorphism).	.g., template progr	amming,
BIE-PJP.21	Programming Languages and Compilers	Z,ZK	5
	asic compiling methods of programming languages. They are introduced to intermediate representations used in current compilers G	· ·	-
	tion of a translation of a text that conforms a given syntax, to a target code and also to create a compiler based on the specification. T		-
	only a programming language but any text in a language generated by a given LL input grammar.	·	
BIE-PJV	Programming in Java	Z,ZK	4
The course Progra	mming in Java will introduce students to the object oriented programming in Java programming language. Beside of basics of Java la	nguage the fundar	nental APIs
	will also be presented, especially data structures, files, GUI, networking, databases and concurrent APIs.		
BIE-PKM	Preparatory Mathematics	Z	4
	The purpose of Preparatory Mathematics is to help students revise the most important topics of high-school mathematics.		
BIE-PNO	Practical Digital Design	KZ	5
Students get an ov	rerview of the contemporary digital design flow and learn practical skills to use synchronous design techniques. They understand the l	basics of the VHDI	language,
	and implementation technologies FPGA and ASIC.	7 71/	
BIE-PPA.21	Programming Paradigms s with basic paradigms of high-level programming languages, including their basic execution models, benefits, and limitations of partic	Z,ZK	5 Sunctional
	digm and its basic principles are explained in details. Logic programming is introduced as another way of declarative programming. Th		
	is and on Lisp (Racket) and Prolog programming languages. Moreover, usage of these principles is demonstrated on modern mainstru		
	such as C++ and Java.	1.2.5	5
BIE-PRR.21	Project management	Z,ZK	5
The aim of the co	burse is to introduce students into the basic concepts and principles of project management, i.e. methods of planning, teamwork, analy	ysis, crisis manage	ement in a
project, communi	cation, argumentation and meeting management. Students will practice project management techniques (e.g. SWOT analysis, risk as	sessment and mar	nagement,
	ource schedule, resource balancing, network graphs) and creation of project documentation. The course is designed especially for stu		
deepening their k	nowledge outside IT, consider starting their own company, or have ambitions to work in middle or senior management positions in large	ge companies. The	course is
BIE-PS2	also suitable for all those who will develop software or hardware in the form of team projects.	7 71/	4
-	Programming in shell 2 heral overview of scripting languages, introduction into syntax, semantics, programming style, data structures, pros and cons. In additi	Z,ZK	4
	shell and some other particular scripting languages and will get practical experience with shell script programming. Note to Erasmus stu		
•	vide even very basic Bourne shell usage. Depending on actual knowledge of the students, orientation in user filesystem tools (cp, In,		
data filtering tool	Is (cut, tr, sort, uniq) can be provided. The advantage of this module is that we do not stop at this point - we will show you also a sele	ection of advanced	scripting
	techniques used in practice.		
BIE-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 n		
	es will be amended by proseminars that introduce students into network programming and demonstrate the abilities of advanced network	-	Students
	actically verify configurations and management of network devices in the lab within the environment of the operating systems Linux ar		
BIE-PST.21 Students will learn	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	5 apply basic
	om variable distributions and solve applied probabilistic problems in informatics and computer science. Using the statistical induction t	-	
	known distributional parameters from random sample characteristics. They will also be introduced to the methods for testing statistical		•
	the statistical dependence of two or more random variables.		-
BIE-SAP.21	Computer Structures and Architectures	Z,ZK	5
Students understa	'		orage and
transfer	and basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inpu	its, outputs, data s	
BIE-SCE1	and basic digital computer units and their structures, functions, and hardware implementation: ALU, control unit, memory system, inputer labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern contents of the logic of a simple processor using modern contents and the second structure and the second structure and the second structures and structures a structures and structures and structur	-	
	. In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern of Computer Engineering Seminar I	ligital design tools. Z	4
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The Seminar of Co are approached in articles and other p BIE-SCE2 The Seminar of Co are approached in articles and other p BIE-SEG This is an introduct	In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern of Computer Engineering Seminar I mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the semester. Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to semester. Computer Engineering Seminar II mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the ordersional literature and/or work in K is a solved solved solved solved solved solved to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the professional literature and/or work in K is a solved so	tigital design tools. Z failures and attack subject is work wit s. The topics are n Z failures and attack subject is work wit s. The topics are n Z operating systems	s. Students h scientific ew for each 4 s. Students h scientific ew for each 0 or students
The Seminar of Co are approached in articles and other p BIE-SCE2 The Seminar of Co are approached in articles and other p BIE-SEG This is an introduct to understand proc	In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern of Computer Engineering Seminar I mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the semester. Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to semester. Computer Engineering Seminar II mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester. Computer Engineering Seminar II mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester. Systems Engineering cory class on systems engineering for bachelor students in computer science. The goal of the class is to introduce basic principles of cosesor and memory virtualization. Seeing and actually understanding virtualization is the overarching theme of the class. After taking to present the sent of the class.	tigital design tools. Z failures and attack subject is work wit s. The topics are n Z failures and attack subject is work wit s. The topics are n Z operating systems the class, students	s. Students h scientific ew for each 4 s. Students h scientific ew for each 0 cor students are able to
The Seminar of Co are approached in articles and other p BIE-SCE2 The Seminar of Co are approached in articles and other p BIE-SEG This is an introduct to understand proc	In the labs, students gain practical experience with the design and implementation of the logic of a simple processor using modern of Computer Engineering Seminar I mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the semester. Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to semester. Computer Engineering Seminar II mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the ordersional literature and/or work in K is a solved solved solved solved solved solved to dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the professional literature and/or work in K is a solved so	tigital design tools. Z failures and attack subject is work wit s. The topics are n Z failures and attack subject is work wit s. The topics are n Z operating systems the class, students	s. Students h scientific ew for each 4 s. Students h scientific ew for each 0 cor students are able to

BIE-SEP World Economy and Business	Z,ZK	4
The course introduces students of technical universities to international business. It does that predominantly by comparing individual countries and key region		
Students get to know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedom, con	-	onomic
development, which are needed for the right investment decision. Seminars help to improve knowledge in the form of discussions based on individe BIE-SIP.21 Network Programming		5
BIE-SIP.21 Network Programming The course covers fundamental topics of programming network applications. It consists of 4 parts. The introductory part is focused on low-level programming	∠ a using BSD sor	
second part is devoted to designing communication protocols and their verification. The third part introduces the principles and applications of middleware te		
introduces basic modern models of distributed computing - P2P and blockchain. All topics will be first explained theoretically and then practices in comput	ter labs using a	chosen
programming language environment.		
BIE-SKJ.21 Scripting Languages	Z,ZK	4
Join us on a tour into the world of scripted programming. Together, we will unveil the power of Bourne Again shell and PERL as proven industry standards, as		
standard text processing utilities (AWK, sed), with some basic UNIX system tools, in many real-world situations like processing web feeds or logs. We will professing languages and introduction into their pros and cons and students get practical experience with shell script programming. We will touch also ROF	•	
to get some insight into how your code documentation can be implemented. And if you know UNIX system-level scripting already, we can show you advanced		
and tricks that get overlooked frequently but increase code robustness or execution efficiency. The course is led by two veteran programmers in the scripting w		
lecturer in advanced shell programming, teaching developers from the IT industry in several CE countries. Jan is a skilled lecturer and developer whose cod	le contributes to	safe and
streamline operations of cloud service datacenters around the globe.		
BIE-SP1.21 Team Software Project 1	KZ	5
Students gain hands-on experience with the analysis, design, and prototyping of a large-scale software system. Theoretical support is provided in the BIE concurrently and that teaches students necessary techniques and principles. Teams consisting of 4-6 students will work on a specific project. The teacher, in		
project leader, regularly consults with the team (at the seminars) both the formal and material aspects of the software design. The resulting software artefact		
and finished in the BIE-SP2 course.		
BIE-SP2.21 Team Software Project 2	KZ	5
Students gain hands-on experience with the iterative development process while working on a large-scale software project. The first iteration is the result of the		
However, in this follow-up, the functionality, testing, and documentation of the software system being developed will be emphasized. Students will work in te	-	ple. 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 the		
BIE-SPS.21 Administration of Computer Networks and Services Administrated unc	Z,ZK	5 a systems
Linux and Windows. The course syllabus requires the knowledge of network technologies and protocols in the environment of network servers administrated and 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 pract		
with real network infrastructure.		
BIE-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. The	oretical knowled	dge from
lectures will be experimentally verified in department specialized labs. The course is mainly focused on embedded RT systems, therefore the design kits in the previous sector of the p	he lab are the sa	ame as in
the BIE-VES course and FPGAs	Z	
BIE-ST1 Network Technology 1 P edm t je zam en na získání základních znalosti z oblasti po íta ových sítí a praktických zkušeností se sí ovými technologiemi. P edm t odpovída látce		3 Netacad
programu - CCNA1 - R&S Introduction to Networks.		locuouu
BIE-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 consolid	date and practic	ally 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 ex	•	
using the visual language UML for modeling and solving software problems. Students learn the basics of object-oriented analysis, architecture design and te	•	e course,
students also gain a theoretical basis in the field of project management, estimation of costs of software projects, and methods of their deve BIE-TAB.21 Applications of Security in Technology	Z,ZK	5
The goal of the course is to introduce students to selected topics from cybersecurity technical applications that are utilized in different industries. Students g		
cybersecurity applications and extend their knowledge from the cryptology, the secure code, and system, network, and hardware secu	-	001
BIE-TDP.21 Documentation and Presentation	KZ	3
The course is focused on the basics of creating electronic documentation with emphasis on the creation of technical reports of a larger scope, typically final un		. 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 i		
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	s of teaching. Wi	ithin the
exercises of the course, an active approach to the creation of individual parts of the bachelor's thesis is assumed. BIE-TJV.21 Java Technology	Z,ZK	5
The aim of the course is to provide knowledge and skills needed for the development of smaller and larger information systems. Students will get acquainted		
concepts and will be able to apply these concepts using libraries and tools from the ecosystem of the Java programming language. After completing the cou	0	
to participate in the development of software systems on the Java platform. Students are assumed to be acquainted with the following topics (they are use	ed and not taugh	nt in this
course): Java language syntax, SQL, git version control system, Docker, continuous integration.		
BIE-TPS.21 Computer Networks Technologies	Z,ZK	5
The course introduces students with basic and advanced technologies, components, and interfaces of contemporary computer networks at the physical layer 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, Ethernet, m		
always with focus on high-speed networks.		,
BIE-TUR.21 User Interface Design	Z,ZK	5
Students gain a basic overview of methods for designing and testing common user interfaces. They get experience to solve the problems where software and	nd other produc	ts do not
communicate with the user optimally, since the needs and characteristics of users are not taken into account during product development. Students gain an	overview of met	thods that
bring users into the development process to ensure optimal interface for them.	7 714	
BIE-TZP.21 Technological Fundamentals of Computers	Z,ZK	5
Students got acquainted with the fundamentals of digital and analog sizewite, as well as basis methods of analyzing them. Students learn how a structure to struc		the lowest
Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer structulevel. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce the	ures look like at t	
Students get acquainted with the fundamentals of digital and analog circuits, as well as basic methods of analyzing them. Students learn how computer structul level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce the limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a computer bus needs to be terminated.	ures look like at the consumption;	what the
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce the	ures look like at the consumption;	what the
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce th limits to the maximum operating frequency are and how to raise them; why a computer bus needs to be terminated, what happens if it is not; how a computer	ures look like at the consumption;	what the
level. They are introduced to the function of a transistor. They will understand why processors generate heat, why cooling is necessary, and how to reduce th 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 compute (in principle). In the labs, students model the behavior of basic electrical circuits in SW Mathematica.	ures look like at the consumption; er power supply Z,ZK	; what the looks like 5

BIE-UOS.21	Unix-like Operating Systems	KZ	5
	systems represent a large family mostly open-source codes that kept bringing during the history of computers efficient innovative fu		
, ,	uters and their networks and clusters. The most popular OS today, Android, has a unix kernel. Students get overview of basic propert		
	ads, access rights and user identity, filters, or handling files in a file system. They learn to use practically these systems at the level c		
-	to utilize powerful system tools that are available to users, but are also able to automatize routine agenda using the unix scripting in		
BIE-VAK.21	Selected Combinatorics Applications	Z	3
	introduce students in an accessible form to various branches of theoretical computer science and combinatorics. In contrast to the basic ons to theory. Together, we will first refresh the basic knowledge needed to design and analyze algorithms and introduce some basic	-	
	icipation of students, we will focus on solving popular and easily formulated problems from various areas of (not only theoretical) info		
	is to be solved will include, for example, graph theory, combinatorial and algorithmic game theory, approximation algorithms, optimize		
	also try to implement solutions to the studied problems with a special focus on the effective use of existing tools.		
BIE-VDC.21	Virtualization and Data Centers	Z,ZK	5
	se is to familiarize students with technology basis of cloud computer systems. It shows principles and techniques used in design and	implementation of	data center
infrastructure, suc	h as various kinds of virtualization and high availability of servers, storages, and software layers. The course guides through data cer	nter technologies fr	om private
	id clouds. Student learn current trends in the architecture of IT infrastructure and its configuration for classic and cloud applications.		
-	ation, and operation of complex infrastructures for modern applications with respect to scalability and protection against overloads, or	-	
BIE-VES	Embedded Systems	Z,ZK	5
Students learn to d	esign embedded systems and develop software for them. They get basic knowledge of the most common microcontrollers and embedd peripheral circuits, programming methods, and applications. They get practical skills with development kits and tools.	ed processors, the	r integrated
	Selected Mathematical Methods	774	4
BIE-VMM	s with an introduction to the analysis of complex functions of a complex variable. Next, we present the Lebesgue integral. We then ad	Z,ZK	4 s and their
-	; we introduce and study the properties of the Discrete Fourier Transform (DFT) and its fast implementation (FFT). We discuss the wa		
	the linear programming problem in more detail and its solution using the Simplex algorithm. Each topic is demonstrated with interestin		
BIE-VPS.21	Selected Topics in Computer Networking	Z,ZK	5
-	pon the Computer Networks course (BI-PSI), obligatory for the program. Students will learn in detail principles, protocols, and technolo	I ' I	-
	al area networks up to Internet, with focus on switching, routing, security, and virtualization. The emphasis will be on gaining practical	-	
dev	rices in the lab and learning important methods of local area and wide area networks from the viewpoint of functionality, performance	, and security.	
BIE-VR1.21	Virtual reality I	KZ	4
Introduction to Vir	tual Reality (VR), virtual reality operations, metaverse, and creation. Rules and requirements for virtual worlds communication. The comparison of the communication of the commu		ne ways of
	creating virtual reality worlds and interactive activities in 3D worlds. It improves computational thinking, empathy, and shared social		
BIE-ZRS	Basics of System Control	Z,ZK	4
	: základy ízení systém je ur en pro všechny zájemce o aplikovanou informatiku v bakalá ském studiu. Alespo pehledové znalosti vsolventy jist konkuren ní výhodou a zhodnotí je bezesporu v pr myslové praxi. Studenti získají znalosti v dynamicky se rozvíjejícím		
	éna na ízení inženýrských a fyzikálních sysém. Poskytneme vám základní informace z oblasti zp. tnovazebního ízení lineárních dy		
	ne vás s metodami vytvá ení popisu a modelu systém, základní analýzou lineárních dynamických systém a návrhem a ov ením je		
PID, PSD a fuzzy re	gulátor. Pozornost je v nována rovn ž sníma m a ak ním len m v regula ních obvodech, otázkám stability regula ních obvod,	jednorázovému a p	r b žnému
nastavování param	etr regulátoru a n kterým aspekt m pr myslových realizací spojitých a íslicových regulátor. Jednotlivá témata p ednášek jsou pro	vázena množstvím	užite ných
	p íklad a praktických pr myslových realizací.		
BIE-ZRS.21	Basics of System Control	Z,ZK	5
, v	n introduction to the field of automatic control. It focuses particularly on the control of engineering and physical systems. It covers bases are included to a standard and the second standard and the se	•	
	namical single-input-single-output systems. Students will learn the methods of creating descriptions of system models, basic linear d ion of simple feedback PID, PSD, and fuzzy controllers. Attention is also given to sensors and actuators in control loops, issues of stal		
-	nd continuous adjustment of the controller parameters, and certain aspects of the industrial implementations of continuous and digita		erns, single
BIE-ZSB.21	Basics of System Security	Z,ZK	5
	urse is to provide introduction to basic concepts in security of computer systems. Further, the course introduces the basics of forensi		
-	analysis or incident response. After finishing the course student will get both theoretical and practical knowledge in the area of moder	-	-
	as well as skills needed for independent work in the area of operating system security incident analysis.		
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 classica		
space search, mult	-agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm	s and the neural ne	etworks, will
	be presented as well.		
BIE-ZUM.21	Artificial Intelligence Fundamentals	Z,ZK	5
	uced to the fundamental problems in the Artificial Intelligence, and the basic methods for their solving. It focuses mainly on the classica -agent systems, game theory, planning, and machine learning. Modern soft-computing methods, including the evolutionary algorithm		
space search, mun	be presented as well.	s and the neularne	works, wiii
FITE-EHD	Introduction to European Economic History	Z,ZK	3
	ces a selection of themes from European economic history. It gives the student basic knowledge about forming of the global economy	· · · ·	-
key historical perio	ds. As European countries have been dominant actors in this process it focuses predominantly on their roles in economic history. Fro	om the large econo	mic area of
the Roman Empi	e to the fragmentation of the Middle Ages, from the destruction of WWII to the current affairs, the development of modern financial in	stitutions is deciph	ered. The
course does not c	over the detailed economic history of particular European countries but rather the impact of trade and the role of particular events, instruction of the second discussions will exercise and discussions.	stitutions and orgar	izations in
	history. Class meetings will consist of a mixture of lectures and discussions.	771/	
FITE-SEP	World Economy and Business	Z,ZK	4
	ces students of technical universities to international business. It does that predominantly by comparing individual countries and key know about different religions and cultures, necessary for doing business in diverse societies as well as indexes of economic freedon	-	- 1
-	ment, which are needed for the right investment decision. Seminars help to improve knowledge in the form of discussions based on i		
TV2K1	T lesná výchova 2	Z	1
TVKLV	T lovýchovný kurz	Z	0
TVV	T lesná výchova	Z	0
TVV0	T lesná výchova 0	Z	0
1 4 4 0		<u> </u>	v

UKCJP	eština pro pokro ilé	Z,ZK	2
	Kurz pokro ilé eštiny pro ukrajinské studenty, kte í mají status uprchlíka. Zkouška potvrdí znalost eštiny na úrovní B2 s platností p	oro VUT.	'

Aktualizace výše uvedených informací naleznete na adrese <u>http://bilakniha.cvut.cz/cs/FF.html</u> Generováno: dne 15.06.2025 v 13:59 hod.