Study plan

Name of study plan: Master branch Computer Systems and Networks, in Czech, 2016-2019

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Informatics, valid until 2024 Type of study: Follow-up master full-time Required credits: 94 Elective courses credits: 26 Sum of credits in the plan: 120 Note on the plan: Tato verze studijního plánu je ur ena pro ro ník, který byl p ijat ke studiu v akademickém roce 2016/2017 do prezen ní formy studia magisterského programu.

Name of the block: Compulsory courses in the program Minimal number of credits of the block: 54 The role of the block: PP

Code of the group: MI-PP.2016

Name of the group: Compulsory Courses of Master Study Program, Version 2016, in Czech Requirement credits in the group: In this group you have to gain 54 credits Requirement courses in the group: In this group you have to complete at least 6 courses

Credits in the group: 54

Note on the group: Opakovaně do studia zapsaní studenti s uznatelnou zkouškou z PAR mohou požádat o uznání zkoušky z předmětu PDP.# Opozdilcům: Student, kteremu chybí PPR, si zapíše PDP a získá z něj zápočet.# Do studia opakovaně zapsaným studentů: student se zkouškou z PPR má právou na uznání zápočtu z PDP.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
MI-DIP	Diploma Project	Z	23		L,Z	PP
MI-MPR	Master Project	Z	7		Z,L	PP
MI-MPI	Mathematics for Informatics Št pán Starosta	Z,ZK	7	3P+2C	Z	PP
MI-PDP.16	Parallel and Distributed Programming	Z,ZK	5	2P+2C	L	PP
MI-PAA	Problems and Algorithms Petr Fišer	Z,ZK	5	2P+1R+1C	Z	PP
MI-SPI.16	Statistics for Informatics	Z,ZK	7	4P+2C	L	PP

Characteristics of the courses of this group of Study Plan: Code=MI-PP.2016 Name=Compulsory Courses of Master Study Program, Version 2016, in Czech

MI-DIP	Diploma Project	Z	23				
MI-MPR	Master Project	Z	7				
1. At the beginning of th	At the beginning of the semester, a student reserves her/his final thesis topic and gets together with its supervisor. Together they decide on partial tasks that should be carried out						
during the semester. If t	during the semester. If the requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the end of the semester. 2. External						
Master these (MT) supe	Master these (MT) supervisor fills his/her assessment into the paper "Form to award assessment by an external Final theses (FT) supervisor" (for the courses BIE-BAP, MIE-MPR,						
MIE-DIP). Students, the	en, ensure that the assessment is registered into the information system (IS) by asking their internal FT opponent to award th	e assessment to t	he IS based on				
the confirmation of the	the confirmation of the external MT supervisor. In the case the FT opponent is external as well, the assessment will be registered to the IS by the head of the department responsible						
for the topic of the MT. 3. If the FT topic that the student has reserved is rather general, the immediate tasks the supervisor assigns to the student for the upcoming semester should							
aim at fine-tuning the FT topic so that the FTT will be complete and approvable at the end of the semester.							
MI-MPI	Mathematics for Informatics	Z,ZK	7				
The course comprises t	, opics from general algebra with focus on finite structures used in computer science. It includes topics from multi-variate apal	vsis smooth ontin	nization and				

The course comprises topics from general algebra with focus on finite structures used in computer science. It includes topics from multi-variate analysis, smooth optimization and multi-variate integration. The third large topic is computer arithmetics and number representation in a computer along with error manipulation. The last topic includes selected numerical algorithm and their stability analysis. The topics are completed with demonstration of applications in computer science. The course focuses on clear presentation and argumentation.

MI-PDP.16	Parallel and Distributed Programming	Z.ZK	5
Due to the development	of cloud, web, and communication technologies and due to the shift of the Moore law into multicore and manycore CPUs, p	arallel and distribu	uted applications
are becoming ubiquitou	s. Students get acquainted with architectures of parallel and distributed computing systems, their models, theory of interconr	nection networks,	and languages
and environments for pa	rallel programming of shared and distributed memory computers. On selected problems, they will learn the techniques of designation of the second se	gn of efficient and	scalable parallel
algorithms and methods	s of performance evaluation of their implementations.		
MI-PAA	Problems and Algorithms	Z,ZK	5
Students are able to eva	aluate discrete problems by complexity and by the purpose of optimisation (on-line tasks, multicriterial optimisation). They une	, derstand principle	s and properties
of heuristics and exact a	algorithms and, therefore, are able to select, apply, and experimentally evaluate a suitable heuristics for a practical problem.		
MI-SPI.16	Statistics for Informatics	Z,ZK	7
Summary of probability	heory; Multivariate normal distribution; Entropy and its application to coding; Statistical tests: T-tests, goodness of fit tests, indep	, pendence test; Ra	ndom processes
- stacionarity; Markov cl	nains and limiting properties; Queuing theory		
Name of the b	lock: Compulsory courses of the specialization		

Name of the block: Compulsory courses of the specialization Minimal number of credits of the block: 35 The role of the block: PO

Code of the group: MI-PO-PSS.2016

Name of the group: Compulsory Courses of Master Branch Computer Systems and Networks, in Czech, Version 2016

Requirement credits in the group: In this group you have to gain 35 credits Requirement courses in the group: In this group you have to complete at least 7 courses

Credits in the group: 35

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
MI-DSV.16	Distributed Systems and Computing	Z,ZK	5	2P+1C	Z	PO
MI-MTI.16	Modern Internet Technologies	Z,ZK	5	2P+1C	Z	PO
MI-PAP.16	Parallel Computer Architectures	Z,ZK	5	2P+1C	L	PO
MI-POA.16	Advanced Computer System Architectures	Z,ZK	5	2P+1C	L	PO
MI-SIB.16	Network Security	Z,ZK	5	2P+1C	L	PO
MI-SYB.16	System Security	Z,ZK	5	2P+2C	L	PO
MI-MDW.16	Web Services and Middleware	Z,ZK	5	2P+1C	Z	PO

Characteristics of the courses of this group of Study Plan: Code=MI-PO-PSS.2016 Name=Compulsory Courses of Master Branch Computer Systems and Networks, in Czech, Version 2016

MI-DSV.16 Distributed Systems and Computing	Z,ZK	5				
Students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computer students are introduced to methods are introd	1 1	-				
channels. They learn basic algorithms that assure correctness of computations realized by a group of loosely coupled processes and mechanisms the						
data and services, and safety in case of failures.	5 A	,				
MI-MTI.16 Modern Internet Technologies	Z,ZK	5				
Students learn technologies of the modern Internet. links of the IP technology to the modern communication networks, mechanisms for multicasting a	nd real-time com	nunication, more				
efficient mechanisms of virtual channels, and the new IPv6 architecture. They will understand the issues of monitoring and management of large comp	uter networks. The	y are introduced				
to the technologies of interconnection networks for HPC systems.						
MI-PAP.16 Parallel Computer Architectures	Z,ZK	5				
The students gain a good overview of present parallel architectures and processors:parallel (ILP) microarchitectures, multithreaded and multicore p	rocessors, SoCs a	and MPSoCs,				
GPUs, and neural processors. Students also get hands-on experience with programming these systems.						
MI-POA.16 Advanced Computer System Architectures	Z,ZK	5				
The student will learn the current trends in infrastructure architecture of complex business computer systems. After completion of the module, the student will be able to design a						
complex system infrastructure that meets availability and scalability requirements given by the business environment.						
MI-SIB.16 Network Security	Z,ZK	5				
The students will gain theoretical and practical knowledge and experience in the area of current security threats in computer networks, specifically a	about detection an	d defense. The				
course explains basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anomalies and suspicious network t	raffic. The course	locuses on				
explanation and practical examples of various mechanisms of securing network infrastructure and detection in real time. The course covers general	principals of hand	ling detected				
security events (i.e. incident handling and incident response).						
MI-SYB.16 System Security	Z,ZK	5				
Students will familiarize themselves with the actual ICT security needs in all ICT disciplines. Students will gain knowledge of typical network attacks an	d protection again	st them, together				
with essential communication encryption techniques. They will learn how to work with certain aspects of encryption techniques - passwords and certain aspects - passwords and certain aspects - passwords	tificates. After that	., students will				
learn the basics of anti-virus, anti-spam and heuristic analyses used in modern anti-virus solutions or Unified Threat Management (UTM) based sol	utions. They will al	so learn the				
principles of securing websites, web applications and databases. Upon completion of the module, students will have a broad overview of IT security	and will be able to	o apply it to the				
integration of various software systems and applications.						
MI-MDW.16 Web Services and Middleware	Z,ZK	5				
Students learn new trends and technologies in the area of service-oriented architectures, web services, middleware, and cloud computing, including	their theoretical h	background.				

Name of the block: Compulsory elective economic-management courses
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Code of the group: MI-PV-EM.2016

Note on the group:

Name of the group: Compulsory Elective Master Economics and Management Courses, in Czech, Ver. 2016 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 6) Requirement courses in the group: In this group you have to complete at least 1 course (at most 2) Credits in the group: 2

Opakovaně do studia zapsaným studentům: Má-li student uznaný předmět PRM, nelze ho uznat jako náhradu za nový předmět PCM (student musí vypracovat projekt).

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
FI-VEZ	economic-managerial course from a study abroad	Z	4	0+0	Z,L	VE
MI-IBE	Information Security	ZK	2	2P	Z	VE
MI-MPX	Management practice	Z	4	5XD	Z,L	VE
MI-PCM.16	Project And Change Management	KZ	3	1P+2C	Z,L	VE
MI-SEP	World Economy and Business	Z,ZK	4	2P+1C	Z	VE

Characteristics of the courses of this group of Study Plan: Code=MI-PV-EM.2016 Name=Compulsory Elective Master Economics and Management Courses, in Czech, Ver. 2016

FI-VEZ	economic-managerial course from a study abroad	Z	4				
A "Humanities subject t	hat has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module t	hat is required in	the curriculum.				
The substitution is appr	oved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.						
MI-IBE	Information Security	ZK	2				
Students learn informat	on and IS/ICT security management systems (ISMS), methods for information access control, and basic norms and internat	ional standards in	this area. They				
understand methods for	management of internal and external security threats, for IS/IT security audits, and for application security testing (e.g., pen	etration testing).					
MI-MPX	Management practice	Z	4				
The Student can once, v	within its master's degree graduate (to apply) management practices in the selected subject of practice (business subject) on t	ne operational, tae	ctical or strategic				
level of management (ty	rpically at the position of project manager, middle or top manager). The selected subject of practice and professional filling is	assessed well in	advance the				
course guarantor. In the	selected subject of practice may not have a substantial ownership interest or substantial decision-making influence of the re-	latives of the stud	lent (e.g. as a				
member of the top man	agement).						
MI-PCM.16	Project And Change Management	KZ	3				
This course is presented in Czech.							
MI-SEP	World Economy and Business	Z,ZK	4				
This course is presente	d in Czech. However, there is an English variant in the program Informatics (N1801 / 4793). The course introduces students of	of technical univer	sity to the				
international business. I	t does that predominantly by comparing individual countries and key regions of world economy. Students get to know about (different religions	and cultures,				
necessary for doing bus	iness in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed	d for the right inve	stment decision.				
Seminars help to improv	ve on the knowledge in the form of discussions based on individual readings. It is advised to take bachelor level of this course	e BIE-SEP as a p	rerequisite.				

Name of the block: Compulsory elective humanities courses Minimal number of credits of the block: 3 The role of the block: VH

Code of the group: MI-PV-HU.2016

Name of the group: Compulsory Elective Master Humanity Courses, Inclusive of Non-garanted Courses, Ver. 2016, in Czech

Requirement credits in the group: In this group you have to gain at least 3 credits (at most 6) Requirement courses in the group: In this group you have to complete at least 1 course (at most 2) Credits in the group: 3 Note on the group:

If a student has attended one of the hum. courses offered here in bc. study, he must choose another

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
NI-CAP	Cultural and Social Anthropology Alena Libánská, Tomáš Houdek, Jakub Šenovský Jakub Šenovský Alena Libánská (Gar.)	ZK	2	2P	Z	VH
FI-FIL	Philosophy Peter Zamarovský Peter Zamarovský Peter Zamarovský (Gar.)	ZK	2	2P	Z,L	VH
MI-HMI2	History of Mathematics and Informatics	ZK	3	2P+1C	Z	VH

FI-HTE	History of Technology and Economics Jan Mikeš, Marcela Efmertová Jan Mikeš (Jan Mikeš (Gar.)	ZK	2	2+0	Z,L	VH
FI-HPZ	Humanities subject from a study abroad	0+0	Z,L	VH		
MI-KYB.16	Cybernality	2P	Z	VH		
FI-MPL	Managerial Psychology	2+0	Z,L	VH		
FI-KSA	Cultural and Social Anthropology Jakub Šenovský	ZK	2	2P	L,Z	VH
FI-ULI	Introduction to Linguistics for Computer	ZK	2	2P	L	VH
nclusive of Non-gai	e courses of this group of Study Plan: Code=MI-PV-HU.2016 N ranted Courses, Ver. 2016, in Czech cultural and Social Anthropology	lame=Compulso	ory Electi		Humanit	y Cours
The one-semester course	aims to acquaint students with the basics of social and cultural anthropology as a s rom our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globa		-	-		
FI-FIL P see A0B16	hilosophy				ZK	2
MI-HMI2 H Selected topics {Infinitesim possibilities of applications		ZK	3 etc.) note or			
FI-HTE H	listory of Technology and Economics scientific disciplines of history and technology , economic and social history of the	Czech lands and Cze	choslovakia	1	ZK	2 evelopment
	lumanities subject from a study abroad				Z	3
A "Humanities subject that	has been studied abroad" is covered by the Humanities subject from a study abroad ad by the Vice-Dean for study affairs on behalf of the Dean at the request of the stu		manities Moo	l dule that is re		-
	ybernality				ZK	5
Students get acquainted w	ith the fundamentals of legislation and international activities in the area of fighting					
-	ns for computer surveillance and traffic monitoring in the cyberspace. Students will a ration of the state agencies and subjects dealing with defence of the cyberspace (and behavio	or. The cou
	fanagerial Psychology	especially Contraine	OLIVI team		ZK	2
	Cultural and Social Anthropology				ZK	2
The one-semester course anthropological research fi shown. The course is an in	aims to acquaint students with the basics of social and cultural anthropology as a s rom our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globa teresting alternative to other humanities, taught at FIT.		-	ge, health, hi	story, death,	etc) will
FI-ULI Ir This course is presented ir	ntroduction to Linguistics for Computer			·	ZK	2
· ·						
	ck: Elective courses					
	of credits of the block: 0					
The role of the b	block: V					
Code of the grou	up: MI-V.2017					
•	up: Purely Elective Master Courses, Version 201	7				
	edits in the group:					
	urses in the group:					
Credits in the gr						
•	•	oll as an oloctiv		uree the	t is offere	d withir
Note on the grou	Jp: In addition to the courses listed here, you can enry your study program and form of study that you did					

your study program and form of study that you did not enroll as a compulsory subject in the program/branch/specialization or a compulsory elective course.Courses of this group that a student has completed in the bachelor study at CTU cannot be re-completed.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
MI-IKM	Internet and Classification Methods	Z,ZK	4	1P+1C	L	V
MI-AFP	Applied Functional Programming Robert Pergl	KZ	5	2P+1C	L	V
MI-APH	Architecture of computer games	Z,ZK	4	2P+1C	Z	V
MI-BML	Bayesian Methods for Machine Learning	KZ	5	2P+1C	L	V
MI-BPS	Wireless Computer Networks	Z,ZK	4	2P+1C	L	V
MI-DSP	Database Systems in Practes	Z,ZK	4	2P+1C	L	V
MI-DZO	Digital Image Processing	Z,ZK	4	2P+1C	L	V
MI-DDM	Distributed Data Mining	KZ	4	3C	L	V

MI-PAM	Efficient Preprocessing and Parameterized Algorithms	Z,ZK	4	2P+1C	L	V
MI-GLR	Games and reinforcement learning	Z,ZK	4	2P+2C	L	v
NI-HSC	Side-Channel Analysis in Hardware	Z,ZK	4	2P+2C	Z	v
MI-HMI2	Vojt ch Miškovský, Petr Socha Petr Socha Vojt ch Miškovský (Gar.) History of Mathematics and Informatics	ZK	3	2P+1C	Z	v
MI-IVS		KZ	4	1P+3C	 L	v
NI-IAM	Intelligent embedded systems Internet and Multimedia	Z,ZK	4	2P+1C	L	v
MI-IOT		Z,ZK	4	2P+1C	 L	v
MI-ATH	Internet of Things Combinatorial Theories of Games	Z,ZK	4	2P+2C	L	v
NI-CCC	Creative Coding and Computational Art	KZ	4	1P+2C	 Z,L	v
	Josef Kortán, Radek Richtr Radek Richtr Radek Richtr (Gar.)					
NI-LSM	Statistical Modelling Lab Kamil Dedecius Kamil Dedecius (Gar.)	KZ	5	3C	L	V
MI-LOM.16	Linear Optimization and Methods	Z,ZK	5	2P+1C	Z	V
MI-MSI	Mathematical Structures in Computer Science	Z,ZK	4	2P+1C	L	V
MI-MZI	Mathematics for data science	Z,ZK	4	2P+1C	L	V
NI-MOP	Modern Object-Oriented Programming in Pharo Marek Skotnica, Jan Blizni enko Robert Pergl Robert Pergl (Gar.)	KZ	4	3C	Z	v
MI-MPC	Modern programming in C ++	Z,ZK	5	2P+1C	Z	V
MI-MAI	Multimedia and Internet	Z,ZK	3	2P+1C	L	V
MI-OLI	Linux Drivers	Z,ZK	4	2P+2C	L	V
MI-ARI	Computer arithmetic	Z,ZK	4	2P+1C	Z,L	V
NI-PG1	Computer Grafics 1 Radek Richtr Radek Richtr Radek Richtr (Gar.)	ZK	4	2P+1C	L	v
MI-PVR	Advanced Virtual Reality	KZ	4	2P+1C	Z	v
NI-AML	Advanced machine learning Miroslav epek, Petr Šimánek, Vojt ch Rybá, Rodrigo Augusto Da Silva Alves, Zden k Buk Miroslav epek Miroslav epek (Gar.)	Z,ZK	5	2P + 1C	L	v
MI-IOS	Advanced techniques in iOS applications	KZ	4	2P+2C	L	v
MI-PVS	Advanced embedded systems	Z,ZK	4	2P+2C	Z	v
MI-DNP	Advanced .NET	Z,ZK	4	2P+1C	Z	v
MI-PYT	Advanced Python	KZ	4	3C	Z	V
MI-PRC	Programming in CUDA	Z,ZK	4	2P+1C	L	v
MI-PSL	Programming in Scala	Z,ZK	4	2P+1C	L	v
MI-RUB	Programming in Ruby	KZ	4	3C	Z	V
MI-ROZ.16	Pattern Recognition	Z,ZK	5	2P+1C	Z	V
MI-RRI	Risk Management in Informatics	ZK	3	2P	L	v
MI-SCE1	Computer Engineering Seminar Master I	Z	4	2C	L,Z	V
MI-SCE2	Computer Engineering Seminar Master II	Z	4	2C	L,Z	V
MI-SZ1	Knowledge Engineering Seminar Master I	Z	4	2C	L,Z	V
PI-SCN	Seminars on Digital Design Petr Fišer Petr Fišer Petr Fišer (Gar.)	ZK	4	2P+1C	Z,L	v
MI-SCR	Statistical Analysis of Time Series	Z,ZK	4	2P+1C	Z	v
BI-SOJ	Machine Oriented Languages	Z,ZK	4	2P+2C	L	V
MI-TS1	Theoretical Seminar Master I	Z	4	2C	Z	V
MI-TS2	Theoretical Seminar Master II	Z	4	2C	L	V
MI-TS3	Theoretical Seminar Master III	Z	4	2C	Z	V
MI-TS4	Theoretical Seminar Master IV	Z	4	2C	L	V
MI-TNN	Theory of Neural Networks	Z,ZK	4	1P+1C	L	V
MI-VEM	Scientific thinking	KZ	2	1P+1C	L	V
MI-MCS	Multicore Systems	KZ	4	1P+2C	Z	V
MI-VYC	Computability	Z,ZK	4	2P+2C	L	V
	Research Project	Z	5		Z,L	v
NI-VPR	Št nán Starosta Št nán Starosta Št nán Starosta (Car)					
MI-ZS10	Št pán Starosta Št pán Starosta Št pán Starosta (Gar.) Master internship abroad for 10 credits	Z	10		Z,L	v
	Št pán Starosta Št pán Starosta (Gar.) Master internship abroad for 10 credits Master internship abroad for 20 credits	Z Z	10 20		Z,L Z,L	V V

Characteristics of the courses of this group of Study Plan: Code=MI-V.2017 Name=Purely Elective Master Courses, Version 2017

MI-HMI2 History of Mathematics and Informatics	ZK	3
Selected topics {Infinitesimal calculus, probability, number theory, general algebra, different examples of algorithms, transformations, recursive functions	ons, eliptic curves	s, etc.) note on
possibilities of applications of some mathematical methods in informatics and its development.		
MI-IKM Internet and Classification Methods	Z,ZK	4
In this course, the students get acquainted with classification methods used in four important internet, or generally network applications: in spam filter	ring, in recommen	dation systems,
in malware detection systems and in intrusion detection systems. However, they will learn more than only how classification is performed when solvin	ng these four kind	s of problems.
On the background of these applications, they get an overview of the fundamentals of classification methods. The course is taught in a 2-weeks cycle	e with 2-hour lectu	ures and 2-hour
exercises. During the exercises, the students on the one hand implement simple examples to topics from the lectures, on the other hand consult their	r semester tasks.	
MI-AFP Applied Functional Programming	KZ	5
This course is prezented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional	al programming la	nguages are on
the rise nowadays and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mast	tering this paradig	m becomes a
necessary competence of a software engineer: the theory and especially the practice.		
MI-APH Architecture of computer games	Z,ZK	4
Students will gain a basic understanding of the various issues in the field of computer game development, from both the technical and creative points	s of view. They wil	l get a grasp on
component-oriented architecture, game mechanics, and game AI that form an integral part of most games. They will also understand the basics of path	nfinding, networkii	ng, and scripting
and apply them in practical exercises (labs).		
MI-BML Bayesian Methods for Machine Learning	KZ	5
The subject is focused on practical use of basic Bayesian modeling methods in the dynamically evolving machine learning theory. In particular, it studies		
models providing description of real phenomena, as well as their subsequent use, e.g., for forecasting of future evolution or learning about the hidde	n variables (true c	bject position
from noisy observations etc.). The emphasis is put on understanding of explained principles and methods and their practical adoption. For this purpose		
and applications will be presented to students, for instance, 2D/3D object tracking, radiation source term estimation, or separation in medical imaging	g. The students wi	ill try to solve
some of them.		
MI-BPS Wireless Computer Networks	Z,ZK	4
Students will learn about the modern technologies, protocols, and standards for wireless networks. They will understand the routing mechanisms in a	ad-hoc networks,	multicast and
broadcast mechanisms, and data flow control mechanisms. They will also learn about principles of communication in sensor networks. They get know	wledge of security	mechanisms
for wireless networks and get skills of configuration of wireless network elements and simulation of wireless networks using suitable tools.		
MI-DSP Database Systems in Practes	Z,ZK	4
This course is presented in Czech.	· 1	
MI-DZO Digital Image Processing	Z,ZK	4
This course presents a comprehensive overview of modern methods for interactive editing of digital images and video. It mainly deals with practical	· · ·	e both easy to
implement and have an interesting theoretical basis. Visually attractive applications provide better understanding of basic theoretical background that is	-	-
of digital image processing. This course will introduce algorithms solving the following practical applications: edge-aware editing, tone mapping, HDR		
frequency domain, abstraction, hybrid images, gradient domain editing, seamless image stitching and cloning, digital photo-montage, color-to-gray c	-	-
interactive as-rigid-as-possible image deformation, free-form image registration, texture synthesis, interactive segmentation, colorization, painting, ac		
MI-DDM Distributed Data Mining	KZ	4
Course focuses on state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hand		-
data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementation	-	-
approaches to parallelize other algorithms. The course is prezented in czech language.		
	Z.ZK	4
	, 1	-
There are many optimization problems for which no polynomial time algorithms are known (e.g. NP-complete problems). Despite that it is often nece	-	
exactly in practice. We will demonstrate that many problems can be solved much more effectively than by naively trying all possible solutions. Often of (parameter) of the inputs from practice-e.g., all solutions are relatively small. Parameterized algorithms exploit that by limiting the time complexity expo		
and polynomially in the input size (which can be huge). Parameterized algorithms also represent a way to formalize the notion of effective polynomia		
which is not possible in the classical complexity. Such a polynomial time preprocessing is then a suitable first step, whatever is the subsequent soluti		
plethora of parameterized algorithm design methods and we will also show how to prove that for some problem (and parameter) such an algorithm (· .
will also not miss out the relations to other approaches to hard problems such as moderately exponential algorithms or approximation schemes.	biesumably) uses	TIOL EXIST. WE
	Z,ZK	4
		-
The field of reinforcement learning is very hot recently, because of advances in deep learning, recurrent neural networks and general artificial intellig give you both theoretical and practical background so you can participate in related research activities. Presented in English.	ence. This course	is intended to
	7 71/	4
NI-HSC Side-Channel Analysis in Hardware	Z,ZK	4
This course is dedicated to so-called side-channel information leakage in hardware devices. It focuses on both theoretical analysis and practical atta	-	
various kinds of side channels and they get deeper insight in power attacks. Students learn to implement various profiled and non-profiled attacks ar	•	n nigner-order
attacks. They also get practice in both designing the SCA countermeasures and analyzing the amount and characteristics of the side-channel inform	-	
MI-IVS Intelligent embedded systems	KZ	4
Intelligent embedded systems course for master's degree is focused on high-level technology embedded systems integrating artificial intelligence. The		
of the Intelligent embedded system fundamentals course for the bachelor degree. The aim of the course is to teach students humanoid robot program		
development. Lectures provide basis of motion control, sensor reading, application interfaces, robot navigation and development tools. In labs, studer	its develop advan	ced applications
combining knowledge of various courses like nature inspired algorithms, data mining algorithms, image recognition and web technologies		
NI-IAM Internet and Multimedia	Z,ZK	4
The NI-IAM course is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes ac		
presentation of AV signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practic		
audiovisual transmissions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the		-
the quality and latency of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording	g the scene up to	the presentation
for audience.		
MI-IOT Internet of Things	Z,ZK	4
The subject is focused on the area of hardware and software technologies for the strongly growing computer support of various devices. Its goal is fa	miliarization with	available
development elements (Raspberry Pi, Arduino Due) and with the language for efficient application development and modification (GNU Forth).		
MI-ATH Combinatorial Theories of Games	Z,ZK	4
This course is presented in Czech.	· 1	

NI-CCC	Creative Coding and Computational Art	KZ	4
	cal tasks, get acquainted with creative and yet proven methods of visualizing various types of data. The course freely follows	• •	
	students to suitable visualization methods for traditional as well as for open data. It combines well-known visualization techni	•	•
-	he aim is to create an interesting visualization project. It is planned to work closely with IPR CAMP (Center of Architecture ar	nd Metropolitan Pl	anning) and IIM
(Institute of Intermedia NI-LSM		KZ	5
-	Statistical Modelling Lab on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is		-
-	d its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms,	-	
	t is on the border of own research and may result in the topic of final work (diploma or bachelor thesis).	,	
MI-LOM.16	Linear Optimization and Methods	Z,ZK	5
Students learn the appl	cations of optimization methods in computer science, economics, and industry. They are aware of practical importance of line	ar and integer pro	gramming. They
	timization software and are familiar with languages used in programming of that software. They get skills in formalization of c		•
	uling of tasks to processors, analysis of network flows), distribution and allocation of resources (transportation problems, trav		-
in linear programming.	and modelling of conflicts via the game theory. They get an overview of computational complexity of optimization problems.	They get one filation	on in aigonums
MI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	s of programming languages.	<u>_,_</u> , ~	·
MI-MZI	Mathematics for data science	Z,ZK	4
In this course, students	are introduced to those fields of mathematics that are necessary for understanding standard methods and algorithms used in	n data science. Th	he studied topics
-	gebra (matrix factorisations, eigenvalues, diagonalization), continuous optimisation (optimisation with constraints, duality prin	ciple, gradient me	ethods) and
	robability theory and statistics.		
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	nming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, who modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the s		
	dern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development	-	-
	bject programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to wo		
technologies in terms o	f semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involved	ement in the Pha	ro Consortium.
MI-MPC	Modern programming in C ++	Z,ZK	5
	se the modern features of contemporary versions of the C++ programming language for software development. The course for		mming effectivity
-	m of writing maintainable and portable source code and creating correct programs with low memory and processor time requ		
MI-MAI	Multimedia and Internet	Z,ZK	3
	inciples and technologies for processing and network transmissions of multimedia signals, stereoscopy and visualizations in h worked multimedia, transmission formats, interfaces, codecs, technologies for acquisition and reproduction of multimedia data a	-	
	ation using networking and immersive environments.		
MI-OLI	Linux Drivers	Z,ZK	4
	tem is an important operating system for personal computer and also for embedded systems. Systems on chip and combining		sors and FPGAs
increase the variability	of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver development	ent for master's st	udents. The
	dge of Linux operating system architecture, principles of development of various types drivers, including practical experience		
MI-ARI	Computer arithmetic	Z,ZK	4
	bus data representations used in digital devices and will be able to design arithmetic operations implementation units.	71/	
NI-PG1	Computer Grafics 1 aphic courses (mainly BI-PGA and BI-PGR) and the knowledge from these courses is deepened by state-of-the-art knowledge	ZK	4
	computer graphics. Students will gain practical knowledge with realistic texturing and raytracing methods. An integral part of t		
	quent implementation. The course will be followed by a course PG2 supplementing the knowledge of PG1 on other areas and		-
MI-PVR	Advanced Virtual Reality	KZ	4
The course introduces a	advanced parts of the virtual reality. It is a continuation of the already running graphic objects, especially the creation of 3D mo	odels in Blender, a	and among other
-	lents to their application in virtual reality. Lectures will focus on virtual reality technology, its use in various applications and will a		
s a	(mainly Unity3D). The course is freely connected with the subject VHS (virtual game worlds), students will be able to apply the	e knowledge gain	ed in this subject
	tly create a complex game for VR.	7 71/	F
NI-AML	Advanced machine learning Advanced advanced topics of machine learning and artificial intelligence. The topics present techniques in the field of	Z,ZK	5 systems_image
	interconnection of physical laws with the field of machine learning. The aim of the exercise is to familiarize students with the		
MI-IOS	Advanced techniques in iOS applications	KZ	4
Students will learn the I	atest trends in mobile development technologies for iOS platform. Class covers advanced topics, students need to know all th	e basics from the	beginners class
BI-IOS.			
MI-PVS	Advanced embedded systems	Z,ZK	4
	on ARM processors and microcontrollers and their usage in wide range of applications. The course includes a series of advar	-	
-	age devices, motor control, system control and industrial communication. The students obtain both theoretical and also practi	cal experiences w	vith embedded
systems. MI-DNP			-
		7 7K	1
	Advanced .NET wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation	Z,ZK	4 (Windows
Communication Founda	Advanced .NET wledge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundatior ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications.	n), WCF/WebAPI	
Communication Founda	wledge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation tion) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications.	n), WCF/WebAPI	
MI-PYT	wledge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation	h), WCF/WebAPI	(Windows 4
MI-PYT The goal of this course very hands-on and it ha	wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python	h), WCF/WebAPI KZ Ioon (BI-PYT) left c	(Windows 4 If. The course is
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat.	wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew	i), WCF/WebAPI KZ Ion (BI-PYT) left c ork. The course is	Windows 4 If. The course is lead by external
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat. MI-PRC	Wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew Programming in CUDA	n), WCF/WebAPI KZ non (BI-PYT) left c rork. The course is Z,ZK	(Windows 4 If. The course is
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat. MI-PRC The students gain a go	Wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew Programming in CUDA ad overview of present parallel architectures in GPUs. Students also get hands-on experience with programming these system	i), WCF/WebAPI KZ ion (BI-PYT) left c ork. The course is Z,ZK ms.	Windows 4 of. The course is lead by external 4
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat. MI-PRC The students gain a go MI-PSL	Wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew Programming in CUDA od overview of present parallel architectures in GPUs. Students also get hands-on experience with programming these system Programming in Scala	n), WCF/WebAPI KZ non (BI-PYT) left c rork. The course is Z,ZK ms. Z,ZK	Windows 4 If. The course is lead by external 4
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat. MI-PRC The students gain a go MI-PSL The course introduces	Wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew Programming in CUDA od overview of present parallel architectures in GPUs. Students also get hands-on experience with programming these system Programming in Scala he modern programming language Scala which exploits object-functional paradigm. Scala comprises advance language feat	i), WCF/WebAPI KZ ion (BI-PYT) left c ork. The course is Z,ZK ms. Z,ZK ures - e.g.pattern	Windows 4 f. The course is lead by external 4 4 matching and
MI-PYT The goal of this course very hands-on and it ha teachers from Red Hat. MI-PRC The students gain a go MI-PSL The course introduces	Wedge about advanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation ation) and Entity Framework. They are able to apply these skills on a development and desgin of advanced .NET applications. Advanced Python is to learn various advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth s only tutorials, everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew Programming in CUDA od overview of present parallel architectures in GPUs. Students also get hands-on experience with programming these system Programming in Scala	i), WCF/WebAPI KZ ion (BI-PYT) left c ork. The course is Z,ZK ms. Z,ZK ures - e.g.pattern	Windows 4 f. The course is lead by external 4 amatching and

MI-RUB Programming in Ruby	KZ	4
This course is presented in Czech.		
MI-ROZ.16 Pattern Recognition The aim of the module is to give a systematic account of the major topics in pattern recognition with emphasis on problems and applications of the	Z,ZK	5 h to pattern
recognition. Students will learn the fundamental concepts and methods of pattern recognition, including probability models, parameter estimation, a		-
MI-RRI Risk Management in Informatics	ZK	3
Information security is very often considered as one of main objectives to secure targets of information processing. However, to focus on this info secure targets of information processing.		-
IT systems against viruses, malware etc. very often means misunderstanding and underestimating of real threats which are around us and which are	-	
other malware. The necessity to continue with business after disaster is also slightly ignored. International standards which are focused on informat during last years started to anticipate necessity of risk management. There is no commonly accepted methodology used for this task. Threats which		
worldwide, invoke pressures to prepare plans for business continuity management even in the case of dramatic political changes, natural disasters		
MI-SCE1 Computer Engineering Seminar Master I	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistar are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of		
articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea	-	
semester.		
MI-SCE2 Computer Engineering Seminar Master II	Z	4
The Seminar of Computer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistar		
are approached individually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of articles and other professional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tea		
semester.	ichers. The topics a	are new ior each
MI-SZ1 Knowledge Engineering Seminar Master I	Z	4
On this seminar you will present a research paper from a top institute / research group to your peers. You will learn what is being cooked in top rese	arch labs around t	he world.
Additionally, you will learn how to properly present and read scientific papers. The work in the seminar will prepare you to attend (and profit from) top m	achine learning and	d AI conferences
and summer schools, as well as FIT's own Summer Research Program (VyLet). PI-SCN Seminars on Digital Design	ZK	4
PI-SCN Seminars on Digital Design This subject deals with problems of realization and implementation of digital circuits - both combinational and sequential. Basic means of description	1 1	
synthesis and optimization algorithms are described. Basics of EDA (Electronic Design Automation) systems are given, together with combinatorial	•	•
MI-SCR Statistical Analysis of Time Series	Z,ZK	4
The course deals with the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange printing tasks) and the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange printing tasks) and the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange printing tasks) and the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange printing tasks) and the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange printing tasks) and tasks are printing tasks and tasks are printing tasks are printing tasks.		
problems (modelling of signals and processes) to computer networks (network components load, attacks detection). The students learn to select a c	-	
its parameters, analyze its properties and use it for forecasting of future or intermediate values. The stress is put on understanding and adoption of the real-world examples. Both the lab classes and the lectures exploit freely available software packages in order to provide easy and straightforward tr		-
the academic to the real world.		internedge nem
BI-SOJ Machine Oriented Languages	Z,ZK	4
Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optim		
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie This knowledge will be used during reverse engineering, optimization, and evaluation of code security.	ew linked to higher	level languages.
MI-TS1 Theoretical Seminar Master I	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	1 – 1	-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course	is a work with scier	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
MI-TS2 Theoretical Seminar Master II Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla	Z Z	4 up The students
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course		-
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
MI-TS3 Theoretical Seminar Master III	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class tracted individually and exposers the mostly and exposers the mostly and exposers the mostly and exposers the mostly a class tracted individually and exposers the most tracted individually a class tracted individually and exposers the mostly a class tracted individually and exposers the most tracted individually and exposers tracted indinitialy and exposers tra		
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	is a work with sciel	nunc papers and
MI-TS4 Theoretical Seminar Master IV	Z	4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a cla		-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course	is a work with scier	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	774	4
MI-TNN Theory of Neural Networks In this course, we study neural networks from the point of view of the theory of function approximation and from the point of view of probability theo	Z,ZK	4
pertaining to artificial neural Networks, such as neurons and connections between them, types of neurons from the point of view of signal transmiss	-	-
synaptic mappings, network training, and the role of time in neural networks. In connection with network topology, we get acquainted with its transfo		
and in connection with somatic and synaptic mappings, with their composition into mappings computed by the Network, Finally in connection with t		
problem of overtraining and to the fact that training is actually a specific optimization task, recalling the most typical objective functions and the most employed for neural network training. We will see the meaning of all these concepts in the context of common kinds of forward neural networks. Withi		
to neural networks, we first notice the connection of neural networks to expressing functions of many variables using functions of fewer variables (K		
theorem). Afterwards, we will see how the universal approximation capacity of neural networks can be mathematically formalized as the sets of mapped to the set of th		
being dense in important Banach spaces of functions, in particular in the spaces of continuous functions, spaces of functions integrable with respect functions with continuous derivatives, and Sabeley spaces. Within the tonic probabilistic approach, we first get acquisited with training based on ex-		
functions with continuous derivatives, and Sobolev spaces. Within the topic probabilistic approach, we first get acquainted with training based on ex- random sample, and with probabilistic assumptions about training data with which those two kinds of neural networks can be employed. We will see I	-	-
of the conditional expectancy of network outputs conditioned by its inputs using the expectancy based learning. We recall the strong and the weak	-	-
acquainted with an analogy of the strong law of large numbers for neural networks and with the assumptions for its validity. Finally, we recall the cer		
with its analogy for neural networks, with the assumptions for its validity and with the hypothesis tests based on it. We will see how those tests can be topology of the network	be employed to sea	arch for the
Interview Scientific thinking	KZ	2
The objective of the course is to get acquainted with scientific methods and discovery of order and laws of the universe, including the aspects of hu	1 1	1
scientific methods in natural sciences, mathematics, computer science and humanities. Another aim is to introduce rules and requirements of science	-	
papers and posters.		

MI-MCS	Multicore Systems	KZ	4
Students understar	nd architecture of systems based on multicore processors with multiple threads per core, structure and usage of cache hierarchy	with shared last I	evel. They learn
parallel algorithm c	lassification, parallel programming technics, simulation and monitoring tools for measurement and optimization of parallel algorith	ms. After this cou	rse, students can
design MTMD prog	rrams (Multiple Threads Multiple Data), measure and analyze latency and throughput of parallel algorithms and optimize them for	r contemporary m	ulticore systems.
MI-VYC	Computability	Z,ZK	4
Classical theory of	recursive functions and effective computability, with applications in provability theory.	•	
NI-VPR	Research Project	Z	5
Student obtains the	e credits for published scientific outputs. The details are at https://courses.fit.cvut.cz/NI-VPR/en.	I	1
MI-ZS10	Master internship abroad for 10 credits	Z	10
Each student can c	nce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research ins	stitution. Before th	e internship the
Dean of the FIT or	the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content ar	nd extent of the int	ernship. Auxiliarv
	the vice-deal for study analis assesses the professional content. The student must provide evidence of the professional content at		
courses MI-ZS10, I	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w	eeks of full-time	employment with
courses MI-ZS10, I	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w . The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjections of the student can earn for one internship is 30 credits. This amount can be divided into two subjections of the student can earn for one internship is 30 credits. This amount can be divided into two subjections of the student can earn for one internship is 30 credits. This amount can be divided into two subjections of the student can earn for one internship is 30 credits. This amount can be divided into two subjections of the student can earn for one internship is 30 credits.	eeks of full-time	employment with
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courses MI-ZS10, I a foreign institution academic year's de MI-ZS20	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject ead-line.	reeks of full-time ets if the internship	employment with exceeds the 20
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courses MI-ZS10, I a foreign institution academic year's de MI-ZS20 Each student can c Dean of the FIT, or	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w. . The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject ead-line. Master internship abroad for 20 credits once within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research inst	reeks of full-time et ts if the internship Z stitution. Before th ad extent of the int	employment with exceeds the 20 e internship the ernship. Auxiliary
courses MI-ZS10, I a foreign institution academic year's de MI-ZS20 Each student can c Dean of the FIT, or courses MI-ZS10, I	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject ead-line. Master internship abroad for 20 credits proce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research inst the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content ar	reeks of full-time ets if the internship Z stitution. Before th and extent of the int reeks of full-time ets	e internship Auxiliary
courses MI-ZS10, I a foreign institution academic year's de MI-ZS20 Each student can c Dean of the FIT, or courses MI-ZS10, I	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjected-line. Master internship abroad for 20 credits proce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research inst the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content ar MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 w.	reeks of full-time ets if the internship Z stitution. Before th and extent of the int reeks of full-time ets	e internship Auxiliary
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Code of the group: MI-PSS-VO.2017

Name of the group: Elective Vocational Courses for Master Branch MI-PSS, version 2017 Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0 Note on the group:

Compulsory courses of all branches and specializations with the exception of this branch.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
MI-ADM.16	Data Mining Algorithms	Z,ZK	5	2P+1C	L	V
MI-ADP.16	Architecture and Design Patterns	Z,ZK	5	2P+1C	Z	V
MI-AVY	Automata in Text Pattern Matching Ond ej Guth, Tomáš Pecka, Št pán Plachý, Jan Trávní ek, Jan Ž árek Ond ej Guth Ond ej Guth (Gar.)	Z,ZK	4	2P+1C	L	V
MI-BPR	Security and Secure Programming	Z,ZK	4	2P+1C	Z	V
MI-BHW.16	Security and Hardware Martin Novotný	Z,ZK	5	2P+2C	L	V
MI-BKO.16	Error Control Codes	Z,ZK	5	2P+1C	L	V
MI-DDW.16	Web Data Mining	Z,ZK	5	2P+1C	L	V
MI-FME.16	Formal Methods and Specifications	Z,ZK	5	2P+1C	L	V
MI-FLP	Functional and Logical Programming	Z,ZK	4	2P+1C	L	V
MI-GEN	Code Generators	Z,ZK	4	2P+1C	L	V
MI-HWB.16	Hardware Security	Z,ZK	5	2P+2C	L	V
MI-KOD.16	Data Compression	Z,ZK	5	2P+1C	L	V
MI-MKY.16	Mathematics for Cryptology	Z,ZK	5	3P+1C	L	V
MI-MVI.16	Computational Intelligence Methods	Z,ZK	5	2P+1C	Z	V
MI-MEP.16	Modelling of Business Processes Robert Pergl	Z,ZK	5	2P+1C	Z	V
MI-NFA.16	Design for the FPGA and ASIC Technology	Z,ZK	5	2P+1C	Z	V
MI-NUR.16	User Interface Design	Z,ZK	5	2P+1C	Z	V
MI-NSS.16	Normalized Software Systems Robert Pergl	ZK	5	2P	L	V
MI-EDW.16	Enterprise Data Warehouse Systems	Z,ZK	5	2P+1C	L	V
MI-PAL	Advanced Algorithms	Z,ZK	4	2P+1C	L	V
MI-KRY.16	Advanced Cryptology	Z,ZK	5	2P+2C	Z	V

MI-PDB.16	Advanced Database Systems	Z,ZK	5	2P+1C	Z	V
MI-PIS.16	Advanced Information Systems	Z,ZK	5	2P+1C	L	V
MI-PCM.16	Project And Change Management	KZ	3	1P+2C	Z,L	V
MI-PDD.16	Data Preprocessing	Z,ZK	5	2P+1C	Z	V
MI-REV.16	Reverse Engineering	Z,ZK	5	1P+2C	Z	V
MI-MBI.16	Management of Business Informatics	Z,ZK	5	3P+1C	L	V
MI-SWE.16	Semantic Web	Z,ZK	5	2P+1C	Z	V
MI-SMI.16	Strategic Management of Informatics	Z,ZK	5	3P+1C	Z	V
MI-SOC.16	Systems on Chip	Z,ZK	5	2P+1C	Z	V
MI-CPX	Complexity Theory	Z,ZK	5	3P+1C	Z	V
MI-TES.16	Systems Theory	Z,ZK	5	2P+1C	Z	V
MI-TSP.16	Testing and Reliability Petr Fišer	Z,ZK	5	2P+2C	Z	V
MI-VMM.16	Retrieval from Multimedia	Z,ZK	5	2P+1C	Z	V
MI-W20.16	Web 2.0	Z,ZK	5	2P+1C	L	V

Characteristics of the courses of this group of Study Plan: Code=MI-PSS-VO.2017 Name=Elective Vocational Courses for Master Branch MI-PSS, version 2017

MI-PCM.16 Project And Change Management This course is presented in Czech.	KZ	3
	Z,ZK	5
MI-ADM.16 Data Mining Algorithms The course focuses on algorithms used in the fields of machine learning and data mining. However, this is not an introductory course, and the studer		-
basics. The emphasis is put on advanced algorithms (e.g., gradient boosting) and non-basic kinds of machine learning tasks (e.g., recommendation		-
methods).	systems, and mot	
MI-ADP.16 Architecture and Design Patterns	Z,ZK	5
The objective of this course is to provide students with both work knowledge about the underlying foundations of object-oriented design and analysis		-
the challenges, issues, and tradeoffs of advanced software design. In the first part of the course, the students will refresh and deepen their knowledge		-
and get familiar with the commonly used object-oriented design patterns that represent the best practices for solving common software design problem	-	
will be introduced to the principles of software architecture design and analysis. This includes the classical architectural styles, component based syste	-	
architectures used in large-scale distributed systems.		
MI-AVY Automata in Text Pattern Matching	Z,ZK	4
Searching in a text (pattern matching) and generally in data is an area of problems and exciting solutions from theoretical and practical perspectives		
data as one-dimensional (text) or multi-dimensional (tree, picture). We may search for something known (a pattern: a string or a set specified by regu		
example, a regularity). Matching can be either exact or approximate. This course presents a taxonomy of searching problems. It focuses on algorithm	is based on some	automaton
(finite, pushdown, linear-bounded, or tree).		
MI-BPR Security and Secure Programming	Z,ZK	4
The students will learn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After gettin	•	
theory, students gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every		
administrator privileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securin	•	·
security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the		
MI-BHW.16 Security and Hardware	Z,ZK	5
Students gain a basic knowledge in selected topics of cryptography and cruptanalysis. The module focuses particularly on elliptic curve cryptography		
cryptographic systems. Students gain a good overview of the functionality of (hardware) cryptographic accelerators, random number generators, smart	cards, and resour	rces for securing
of internal functions of computer systems.		
MI-BKO.16 Error Control Codes	Z,ZK	5
The goal of the course is to present various ways to detect or correct individual errors and burst errors in data stored into memories or transmitted vi		
MI-DDW.16 Web Data Mining	Z,ZK	5
Students will learn latest methods and technologies for Web data acquisition, analysis and utilization of the discovered knowledge. Students will gain		-
techniques for Web crawling and search, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will a search development in the field of again web and to an analysis, web usage analysis, Web content mining and information extraction. Students will a	also gain an overv	lew of most
recent developments in the field of social web and recommendation systems.	7 71/	5
MI-FME.16 Formal Methods and Specifications	Z,ZK	5
Students are able to describe semantics of software formally and to use sound reasoning for construction of correct software. They learn to use some	software tools the	at allow to prove
basic properties of software.	7 71/	4
MI-FLP Functional and Logical Programming	Z,ZK	4
Students will be acquainted with principles of functional and logic programming. They will be able to write their programs in Lisp and Prolog program		4
MI-GEN Code Generators	Z,ZK	4
Students will become acquainted with both theoretical and practical aspects of back-end of an optimizing programming language compiler.		
MI-HWB.16 Hardware Security	Z,ZK	5
The course provides the knowledge needed for the analysis and design of computer systems security solutions. Students get an overview of safegua	-	-
using hardware means. They will be able to safely use and integrate hardware components into systems and test them for resistance to attacks. Stud the cryptographic accelerators, PUF, random number generators, smart cards, biometric devices, and devices for internal security functions of the co		owiedge about
	The second se	
MI-KOD.16 Data Compression	Z,ZK	5
Students are introduced to the basic principles of data compression. They will learn the necessary theoretical background and get an overview of data used in practice. The overview covers principles of integer coding and of statistical, distingant, and context data compression methods. In addition, si	-	-
used in practice. The overview covers principles of integer coding and of statistical, dictionary, and context data compression methods. In addition, st lossy data compression methods used in image, audio, and video compression.		
MI-MKY.16 Mathematics for Cryptology	Z,ZK	5
Students become familiar with parts of mathematics necessary for deeper understanding of the methods used in symmetric and asymmetric cryptogram		
principles on which security of encryption systems, cryptanalysis methods, cryptography over elliptic curves, and quantum cryptography are based.	apage and a second the	

MI-MVI.16	Computational Intelligence Methods	Z,ZK	5
	d methods and techniques of computational intelligence that are mostly nature-inspired, parallel by nature, and applicable to	· · ·	They will learn
how these methods wor	k and how to apply them to problems related to data mining, control, intelligen games, optimizations, etc.		
MI-MEP.16	Modelling of Business Processes	Z,ZK	5
	on introduction to the discipline of Enterprise Engineering. Students learn the importance of a proper methodological approa	ch for (re)enginee	ring and
	esses, organisation structures and information support in big enterprises and institutions.		
MI-NFA.16	Design for the FPGA and ASIC Technology	Z,ZK	5
-	knowledge needed to start a career in a design house. They will understand the FPGA and ASIC implementation technologi the design. They are able to perform and to manage typical workflows, their analytic and synthetic steps, with an emphasis		
	nds of software tools, as well as what to expect from them.		on. They know
MI-NUR.16	User Interface Design	Z,ZK	5
	d the theorical background of human-computer interaction and user interface (UI) design, will learn formal description of UIs, for	I ' I	
	They get acquainted with graphical, speech, and multimodal UIs. Thanks to the gained knowledge, the students will be able		
MI-NSS.16	Normalized Software Systems	ZK	5
Students will learn the f	oundations of Normalized Systems theory, which studies the evolvability of modular structures based on concepts from engin	heering such as st	tability from
	opy from thermodynamics. Initially, the theory was developed at the level of software architectures, where the concept of stabili		
	al effects. These effects occur when the impact of a change to the software architecture is dependent on the change itself, as		-
	esirable, as it will cause even a simple change to incur an ever-increasing impact as the size of the system grows over time. A		
	n cause of Lehman?s Law of Increasing Complexity (see, e.g., http://en.wikipedia.org/wiki/Lehman's_laws_of_software_evole study of which micro-states in a modular structure correspond with a given macro-state. This is related mainly to issues such a		-
	eory consists first of a set of principles which indicate where violations of stability and entropy-related issues occur in any give	-	
-	very fine-grained modular structures are required in order to control them. In the second part of the theoretical framework, it is		
can be constructed base	ed on a set of 5 design patterns called elements. These elements provide the core functionality of information systems in terms	of storing data, ex	xecuting actions,
workflows, connectors a	nd triggers, while controlling for violations of the stability and entropy-related principles, allowing them to realize new levels of ev	olvability in softwa	are architectures.
-	ystems theory was also applied to the modular structures in business processes and enterprise architectures, with the goal of	constructing a fou	ndational theory
for Enterprise Engineer			
MI-EDW.16	Enterprise Data Warehouse Systems	Z,ZK	5
	arehouses course focuses on the area of business intelligence. Students will be introduced to business intelligence methods		-
visualization.	arehouses and various architectures, but also their deployment and maintenance. This course also includes an introduction to	o the area of repol	rting and data
MI-PAL	Advanced Algorithms	Z,ZK	4
	he most important advanced algorithms in different domains of the computer science that are not covered by modules of the	I ' I	•
	aster program. They will also learn how to cope with problems that, according to the present knowledge, are not solvable opti		
time.			,
MI-KRY.16	Advanced Cryptology	Z,ZK	5
Students will learn the e	essentials of cryptanalysis and the mathematical principles of constructing symmetric and asymmetric ciphers. They will know		al principles of
random number genera	tors. They will have an overview of cryptanalysis methods, elliptic curve cryptography and quantum cryptography, which they	can apply to the i	ntegration of
	the creation of their own software solutions.		
MI-PDB.16	Advanced Database Systems	Z,ZK	5
	ves in problems of evaluation and optimization of SQL queries. The next part of the course deals with new concepts of datab		
	ated new data models (XML, graph databases, column databases) and languages for working with them (XQuery, XPath, C) erformance evaluation of database machines.	PHER, Gremlin).	The last part of
MI-PIS.16	Advanced Information Systems	7 7K	5
	n of business process logic and its formalization, with business process roles, business rules, and data processing, with the n	Z,ZK	-
	service solution of business logic. They get acquainted with these notions also for the other types of ISs. They learn about a		
	thods for implementation of these ideas in ISs. They understand modern object-oriented methodologies for modelling of busi		, ,
processed data, and en	terprise ISs. They will get the rules and technologies for successful implementation of IS.		
MI-PDD.16	Data Preprocessing	Z,ZK	5
Students learn to prepa	re raw data for further processing and analysis. They learn what algorithms can be used to extract parameters from various da	ita sources, such a	as images, texts,
	arn the skills to apply these theoretical concepts to solve a specific problem in individual projects - e.g., parameter extraction	-	or from Internet.
MI-REV.16	Reverse Engineering	Z,ZK	5
	nted with the essentials of reverse engineering of computer software. They will learn how processes start and what happens		
	nderstand how executable files are organized and how they interact with 3rd party libraries. Another part of the course is dec ++. Students will also understand principles of disassemblers and obfuscation techniques. A part of the course will also be d		с с
	ng work and which methods can be used to detect it. One of the lectures will be dedicated to the latest trends on the comput		
	ninars, where students will solve practically oriented tasks from the real world.	or maiware seene	
MI-MBI.16	Management of Business Informatics	Z,ZK	5
This course is presente	.	_,,	U U
MI-SWE.16	Semantic Web	Z,ZK	5
	Is used for processing and sharing knowledge mainly in the area of web. They get used to designing and using knowledge m		representation,
and practical aspects as	s publishing, sharing, exchange, and acquisition of knowledge on the web. The presentation is based on the idea of the sema	antic web, includin	g its standards
and technologies (RDF,	RDFS, OWL) and formal models.		
MI-SMI.16	Strategic Management of Informatics	Z,ZK	5
	the strategic management of information systems. Students will learn the process of creation and implementation of an information of an in		-
	or business and interrelations between information strategies and lobal business strategies. Furthermore, they gain the know	-	
-	anagement of investments and ROI, assessment of IT investments and management of human resources in IT (the role of C ject management, risk management and quality assessment of informatics.	, CEO, CFO). 1	ne part or the
MI-SOC.16	Systems on Chip	Z,ZK	5
	edge and skills in the design of large-scale digital systems. They will be familiar with architectures of such systems and comn		-
	workflow to design these architectures, their hardware and software. They will also have knowledge of contemporary method	-	
fault-tolerant systems d			

	7 71/	F			
MI-CPX Complexity Theory	Z,ZK	5			
Students will learn about the fundamental classes of problems in the complexity theory and different models of algoritms and about implications of the theory concerning practical					
(un)solvability of difficult problems.					
MI-TES.16 Systems Theory	Z,ZK	5			
Today, humankind has the ability to develop systems of incredible complexity (e.g., trains, microprocessors, airplanes, nuclear power plants). However	r, the costs of ma	anaging this			
complexity and of ensuring the correct behavior of a given system have become critical. A key technique for mastering this complexity is the usage of	models that des	cribe only those			
aspects of the systems that are important for the task at hand, and automated tools for analyzing those models. This subject will present theory and a	Igorithms that fo	rm the basis for			
the modeling and analysis of complex systems.					
MI-TSP.16 Testing and Reliability	Z,ZK	5			
Students gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepa	are a test set with	n the help of the			
intuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built-i	in-self-test equip	ment. They will			
be able to analyze and control reliability and availability of the designed circuits.					
MI-VMM.16 Retrieval from Multimedia	Z,ZK	5			
The student obtains general knowledge regarding interfaces of portals providing multimedia content, the principles of similarity search, the methods of fe	eature extraction	from multimedia			
objects, indexing, and structure of distributed search engines.					
MI-W20.16 Web 2.0	Z,ZK	5			
Students will learn new trends and technologies on the Web including theoretical foundations. Students will gain an overview about Web applications a	architectures, co	oncepts and			
technologies about programmable Web (REST Architectures, Mashups), basic mechanisms for knowledge representation on the Web (microformats, m	eta-data, ontolog	gies, open linked			
data, etc.), mechanisms about collective intelligence (collaborative filtering, predictions of users' behaviours), social networks, and security.					

List of courses of this pass:

Code	Name of the course	Completion	Credits		
BI-SOJ	Machine Oriented Languages	Z,ZK	4		
Students of the cou	rse will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal us	e of microprocess	or's features		
and efficient cooperation of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of view linked to higher level languages.					
	This knowledge will be used during reverse engineering, optimization, and evaluation of code security.				
FI-FIL	Philosophy	ZK	2		
	see A0B16				
FI-HPZ	Humanities subject from a study abroad	Z	3		
A "Humanities sub	ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	t is required in the	curriculum.		
	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.				
FI-HTE	History of Technology and Economics	ZK	2		
The course introdu	ces the scientific disciplines of history and technology, economic and social history of the Czech lands and Czechoslovakia in compa	arison with the dev	elopment of		
	the European region 19 to 21 century.				
FI-KSA	Cultural and Social Anthropology	ZK	2		
The one-semester	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit	y of the world - exa	amples from		
anthropological res	earch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	h, history, death, et	tc) will be		
	shown. The course is an interesting alternative to other humanities, taught at FIT.				
FI-MPL	Managerial Psychology	ZK	2		
FI-ULI	Introduction to Linguistics for Computer	ZK	2		
	This course is presented in Czech.				
FI-VEZ	economic-managerial course from a study abroad	Z	4		
A "Humanities sub	ject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that	t is required in the	curriculum.		
	The substitution is approved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.				
MI-ADM.16	Data Mining Algorithms	Z,ZK	5		
	s on algorithms used in the fields of machine learning and data mining. However, this is not an introductory course, and the students		•		
basics. The empha	sis is put on advanced algorithms (e.g., gradient boosting) and non-basic kinds of machine learning tasks (e.g., recommendation syst methods).	tems) and models	(e.g., kernel		
MI-ADP.16	Architecture and Design Patterns	Z,ZK	5		
The objective of thi	s course is to provide students with both work knowledge about the underlying foundations of object-oriented design and analysis as	well as with under	rstanding of		
the challenges, issu	ies, and tradeoffs of advanced software design. In the first part of the course, the students will refresh and deepen their knowledge o	f object-oriented p	rogramming		
and get familiar with	the commonly used object-oriented design patterns that represent the best practices for solving common software design problems. I	in the second part t	the students		
will be introduced to	the principles of software architecture design and analysis. This includes the classical architectural styles, component based systems	, and some advanc	ed software		
	architectures used in large-scale distributed systems.				
MI-AFP	Applied Functional Programming	KZ	5		
This course is prez	ented in Czech. Functional programming represents one of the traditional programming paradigms. Traditional and novel functional p	rogramming langua	ages are on		
the rise nowadays	and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, master	ing this paradigm b	becomes a		
	necessary competence of a software engineer: the theory and especially the practice.				
MI-APH	Architecture of computer games	Z,ZK	4		
	basic understanding of the various issues in the field of computer game development, from both the technical and creative points of				
component-oriente	d architecture, game mechanics, and game AI that form an integral part of most games. They will also understand the basics of pathfin	ding, networking, a	ind scripting		
	and apply them in practical exercises (labs).	,,			
MI-ARI	Computer arithmetic	Z,ZK	4		
	Students will learn various data representations used in digital devices and will be able to design arithmetic operations implementa	tion units.			

MI-ATH	Combinatorial Theories of Games	Z,ZK	4
	This course is presented in Czech.		
MI-AVY	Automata in Text Pattern Matching	Z,ZK	4
-	(pattern matching) and generally in data is an area of problems and exciting solutions from theoretical and practical perspectives. W		
	nsional (text) or multi-dimensional (tree, picture). We may search for something known (a pattern: a string or a set specified by regula		-
example, a regul	arity). Matching can be either exact or approximate. This course presents a taxonomy of searching problems. It focuses on algorithm	s based on some a	automaton
	(finite, pushdown, linear-bounded, or tree).	7 71/	-
MI-BHW.16	Security and Hardware	Z,ZK	5
e e	sic knowledge in selected topics of cryptography and cruptanalysis. The module focuses particularly on elliptic curve cryptography, a		
cryptographic syste	ems. Students gain a good overview of the functionality of (hardware) cryptographic accelerators, random number generators, smart ca	irds, and resources	for securing
	of internal functions of computer systems.		
MI-BKO.16	Error Control Codes	Z,ZK	5
The goa	I of the course is to present various ways to detect or correct individual errors and burst errors in data stored into memories or trans	mitted via channels	S.
MI-BML	Bayesian Methods for Machine Learning	KZ	5
The subject is focus	sed on practical use of basic Bayesian modeling methods in the dynamically evolving machine learning theory. In particular, it studies	the construction of	appropriate
models providing	description of real phenomena, as well as their subsequent use, e.g., for forecasting of future evolution or learning about the hidden	variables (true obje	ect position
from noisy observa	tions etc.). The emphasis is put on understanding of explained principles and methods and their practical adoption. For this purpose, a	number of real wor	ld examples
and applications	will be presented to students, for instance, 2D/3D object tracking, radiation source term estimation, or separation in medical imaging	. The students will t	try to solve
	some of them.		
MI-BPR	Security and Secure Programming	Z,ZK	4
The students will le	arn how to assess security risks and how to take them into account in the design phase of their own code and solutions. After getting f	amiliar with the thre	eat modeling
theory, students	gain practical experience with running programs with reduced privileges and methods of specifying these privileges, since not every	y program needs to	run with
administrator priv	ileges. Dangers inherent in buffer overflows will be practically demonstrated. Students will be introduced to the principles of securing	data and the relati	ionships of
security and	database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and th	he defense against	them.
MI-BPS	Wireless Computer Networks	Z,ZK	4
-	n about the modern technologies, protocols, and standards for wireless networks. They will understand the routing mechanisms in a	1 '	1
	nisms, and data flow control mechanisms. They will also learn about principles of communication in sensor networks. They get knowl		
	for wireless networks and get skills of configuration of wireless network elements and simulation of wireless networks using suita		
MI-CPX	Complexity Theory	Z,ZK	5
-	n about the fundamental classes of problems in the complexity theory and different models of algoritms and about implications of the	1 .	-
	(un)solvability of difficult problems.		gpraotioar
MI-DDM	Distributed Data Mining	KZ	4
	state-of-the-art approaches for distributed data mining and parallelization of machine learning algorithms. Students will gain hands	1	-
	amework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations	-	-
		and will be capable	io propose
	approaches to parallelize other algorithms. The course is prezented in czech language		
	approaches to parallelize other algorithms. The course is prezented in czech language.	7 74	_
MI-DDW.16	Web Data Mining	Z,ZK	5
Students will lea	Web Data Mining rn latest methods and technologies for Web data acquisition, analysis and utilization of the discovered knowledge. Students will gair	an overview of We	eb mining
Students will lea	Web Data Mining rn latest methods and technologies for Web data acquisition, analysis and utilization of the discovered knowledge. Students will gair eb crawling and search, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will a	an overview of We	eb mining
Students will lea techniques for W	Web Data Mining rn latest methods and technologies for Web data acquisition, analysis and utilization of the discovered knowledge. Students will gair eb crawling and search, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will a recent developments in the field of social web and recommendation systems.	an overview of We Ilso gain an overvie	eb mining ew of most
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MI-HMI2	History of Mathematics and Informatics	ZK	3
	nfinitesimal calculus, probability, number theory, general algebra, different examples of algorithms, transformations, recursive function	s, eliptic curves, et	c.) note on
	possibilities of applications of some mathematical methods in informatics and its development.		
MI-HWB.16	Hardware Security	Z,ZK	5
-	es the knowledge needed for the analysis and design of computer systems security solutions. Students get an overview of safeguard	-	-
-	neans. They will be able to safely use and integrate hardware components into systems and test them for resistance to attacks. Studer yptographic accelerators, PUF, random number generators, smart cards, biometric devices, and devices for internal security functions	-	uge about
MI-IBE	Information Security	ZK	2
	prmation and IS/ICT security management systems (ISMS), methods for information access control, and basic norms and internation	I I	
	Ind methods for management of internal and external security threats, for IS/IT security audits, and for application security testing (e.g.		
MI-IKM	Internet and Classification Methods	Z,ZK	4
In this course, the	students get acquainted with classification methods used in four important internet, or generally network applications: in spam filtering	, in recommendation	on systems,
in malware detect	ion systems and in intrusion detection systems. However, they will learn more than only how classification is performed when solving	these four kinds of	problems.
-	d of these applications, they get an overview of the fundamentals of classification methods. The course is taught in a 2-weeks cycle w		
	During the exercises, the students on the one hand implement simple examples to topics from the lectures, on the other hand consul		
MI-IOS	Advanced techniques in iOS applications	KZ	4
Students will learn	the latest trends in mobile development technologies for iOS platform. Class covers advanced topics, students need to know all the b BI-IOS.	asics from the begin	nners class
MI-IOT	Internet of Things	Z,ZK	4
-	focused on the area of hardware and software technologies for the strongly growing computer support of various devices. Its goal is fa		-
	development elements (Raspberry Pi, Arduino Due) and with the language for efficient application development and modification (G		
MI-IVS	Intelligent embedded systems	KZ	4
Intelligent embedo	ded systems course for master's degree is focused on high-level technology embedded systems integrating artificial intelligence. The	course is an advan	ce version
of the Intelligent e	embedded system fundamentals course for the bachelor degree. The aim of the course is to teach students humanoid robot programmed and the student of the stu	ning and advance a	application
development. Lecto	ures provide basis of motion control, sensor reading, application interfaces, robot navigation and development tools. In labs, students of		applications
	combining knowledge of various courses like nature inspired algorithms, data mining algorithms, image recognition and web tech		
MI-KOD.16	Data Compression	Z,ZK	5
	body body and the basic principles of data compression. They will learn the necessary theoretical background and get an overview of data	-	-
used in practice. If	he overview covers principles of integer coding and of statistical, dictionary, and context data compression methods. In addition, stude lossy data compression methods used in image, audio, and video compression.		
MI-KRY.16	Advanced Cryptology	Z,ZK	5
	n the essentials of cryptanalysis and the mathematical principles of constructing symmetric and asymmetric ciphers. They will know the	· · ·	-
	generators. They will have an overview of cryptanalysis methods, elliptic curve cryptography and quantum cryptography, which they c	-	-
	their own systems or to the creation of their own software solutions.		
MI-KYB.16	Cybernality	ZK	5
	uainted with the fundamentals of legislation and international activities in the area of fighting cybercrime. Students will understand the		
	of systems for computer surveillance and traffic monitoring in the cyberspace. Students will also familiarize themselves with hacker activ		The course
	will also discuss the cooperation of the state agencies and subjects dealing with defence of the cyberspace (especially CSIRT and CI		
MI-LOM.16	Linear Optimization and Methods	Z,ZK	5
	applications of optimization methods in computer science, economics, and industry. They are aware of practical importance of linear a ith optimization software and are familiar with languages used in programming of that software. They get skills in formalization of optir		
	scheduling of tasks to processors, analysis of network flows), distribution and allocation of resources (transportation problems, travell		
	mics, and modelling of conflicts via the game theory. They get an overview of computational complexity of optimization problems. The		
	in linear programming.		
MI-MAI	Multimedia and Internet	Z,ZK	3
The course will cov	er principles and technologies for processing and network transmissions of multimedia signals, stereoscopy and visualizations in high	definition. Lectures	will include
application areas o	f networked multimedia, transmission formats, interfaces, codecs, technologies for acquisition and reproduction of multimedia data and	technologies for vis	sualizations
	and distributed collaboration using networking and immersive environments.		
MI-MBI.16	Management of Business Informatics This course is presented in Czech.	Z,ZK	5
MI-MCS	Multicore Systems	KZ	4
	and architecture of systems based on multicore processors with multiple threads per core, structure and usage of cache hierarchy with	I I	
	classification, parallel programming technics, simulation and monitoring tools for measurement and optimization of parallel algorithms.		-
design MTMD prog	grams (Multiple Threads Multiple Data), measure and analyze latency and throughput of parallel algorithms and optimize them for cor	temporary multicor	re systems.
MI-MDW.16	Web Services and Middleware	Z,ZK	5
	ew trends and technologies in the area of service-oriented architectures, web services, middleware, and cloud computing, including t		kground.
MI-MEP.16	Modelling of Business Processes	Z,ZK	5
The subject is	focused on introduction to the discipline of Enterprise Engineering. Students learn the importance of a proper methodological approa	ch for (re)engineeri	ing and
	implementation of processes, organisation structures and information support in big enterprises and institutions.	7 71/	
MI-MKY.16	Mathematics for Cryptology	Z,ZK	5 athomatical
	familiar with parts of mathematics necessary for deeper understanding of the methods used in symmetric and asymmetric cryptograph rinciples on which security of encryption systems, cryptanalysis methods, cryptography over elliptic curves, and quantum cryptograph		autematical
MI-MPC	Modern programming in C ++	Z,ZK	5
	v to use the modern features of contemporary versions of the C++ programming language for software development. The course focus	· · · ·	-
	ficiency in the form of writing maintainable and portable source code and creating correct programs with low memory and processor t		
MI-MPI	Mathematics for Informatics	Z,ZK	7
	prises topics from general algebra with focus on finite structures used in computer science. It includes topics from multi-variate analys		
-	ation. The third large topic is computer arithmetics and number representation in a computer along with error manipulation. The last top		
algorithm and thei	r stability analysis. The topics are completed with demonstration of applications in computer science. The course focuses on clear pre-	sentation and argu	mentation.

	Master Project	Z	1
	g of the semester, a student reserves her/his final thesis topic and gets together with its supervisor. Together they decide on partial ta		
-	er. If the requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the en		
) supervisor fills his/her assessment into the paper "Form to award assessment by an external Final theses (FT) supervisor" (for the		
	s, then, ensure that the assessment is registered into the information system (IS) by asking their internal FT opponent to award the a		
	the external MT supervisor. In the case the FT opponent is external as well, the assessment will be registered to the IS by the head		•
for the topic of the	MT. 3. If the FT topic that the student has reserved is rather general, the immediate tasks the supervisor assigns to the student for the	ne upcoming seme	ster should
	aim at fine-tuning the FT topic so that the FTT will be complete and approvable at the end of the semester.		
MI-MPX	Management practice	Z	4
	nce, within its master's degree graduate (to apply) management practices in the selected subject of practice (business subject) on the c	-	-
, , , , , , , , , , , , , , , , , , ,	nent (typically at the position of project manager, middle or top manager). The selected subject of practice and professional filling is a		
course guarantor.	In the selected subject of practice may not have a substantial ownership interest or substantial decision-making influence of the relation of	tives of the student	t (e.g. as a
	member of the top management).		
MI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
	Mathematical semantics of programming languages.		
MI-MTI.16	Modern Internet Technologies	Z,ZK	5
	nologies of the modern Internet. links of the IP technology to the modern communication networks, mechanisms for multicasting and r		
efficient mechanism	ns of virtual channels, and the new IPv6 architecture. They will understand the issues of monitoring and management of large computer	networks. They are	e introduced
	to the technologies of interconnection networks for HPC systems.		
MI-MVI.16	Computational Intelligence Methods	Z,ZK	5
Students will unde	erstand methods and techniques of computational intelligence that are mostly nature-inspired, parallel by nature, and applicable to m	any problems. The	y will learn
	how these methods work and how to apply them to problems related to data mining, control, intelligen games, optimizations,	etc.	
MI-MZI	Mathematics for data science	Z,ZK	4
In this course, stud	ents are introduced to those fields of mathematics that are necessary for understanding standard methods and algorithms used in da	ata science. The sti	udied topics
include mainly: li	near algebra (matrix factorisations, eigenvalues, diagonalization), continuous optimisation (optimisation with constraints, duality princ	ciple, gradient meth	ods) and
	selected notions from probability theory and statistics.		
MI-NFA.16	Design for the FPGA and ASIC Technology	Z,ZK	5
Students gain the	e basic knowledge needed to start a career in a design house. They will understand the FPGA and ASIC implementation technologie	s and the limitation	s that the
technologies impo	ose on the design. They are able to perform and to manage typical workflows, their analytic and synthetic steps, with an emphasis on	basic verification.	They know
	the structure and demands of software tools, as well as what to expect from them.		
MI-NSS.16	Normalized Software Systems	ZK	5
Students will lea	, rn the foundations of Normalized Systems theory, which studies the evolvability of modular structures based on concepts from engine	eering such as stat	oility from
systems theory and	d entropy from thermodynamics. Initially, the theory was developed at the level of software architectures, where the concept of stability w	as translated into tl	ne definition
of so-called combir	natorial effects. These effects occur when the impact of a change to the software architecture is dependent on the change itself, as we	ell as on the size of	the system.
The latter is highly	undesirable, as it will cause even a simple change to incur an ever-increasing impact as the size of the system grows over time. As s	such combinatorial	
			effects can
be considered as a	a main cause of Lehman?s Law of Increasing Complexity (see, e.g., http://en.wikipedia.org/wiki/Lehman's_laws_of_software_evolutio		
entropy was used ir	n the study of which micro-states in a modular structure correspond with a given macro-state. This is related mainly to issues such as te	n). Additionally, the sting in software ar	concept of chitectures.
entropy was used in Normalized Syste	n the study of which micro-states in a modular structure correspond with a given macro-state. This is related mainly to issues such as te ms theory consists first of a set of principles which indicate where violations of stability and entropy-related issues occur in any given	n). Additionally, the esting in software ar a software architect	e concept of chitectures. ure. These
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the academic to the real world.				-
		the academic to the real world.		

MI-SEP	World Economy and Business	Z,ZK	4
	presented in Czech. However, there is an English variant in the program Informatics (N1801 / 4793). The course introduces students of		
	iness. It does that predominantly by comparing individual countries and key regions of world economy. Students get to know about dii g business in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed fo	-	
	o improve on the knowledge in the form of discussions based on individual readings. It is advised to take bachelor level of this course	•	
MI-SIB.16	Network Security	Z,ZK	5
	gain theoretical and practical knowledge and experience in the area of current security threats in computer networks, specifically abo	1 / 1	-
	basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anomalies and suspicious network tra		
	practical examples of various mechanisms of securing network infrastructure and detection in real time. The course covers general pr		
	security events (i.e. incident handling and incident response).		
MI-SMI.16	Strategic Management of Informatics	Z,ZK	5
	es on the strategic management of information systems. Students will learn the process of creation and implementation of an information	0, 0	
	f ICT for business and interrelations between information strategies and lobal business strategies. Furthermore, they gain the knowle	•	
management of it	S/IT, management of investments and ROI, assessment of IT investments and management of human resources in IT (the role of CIC course is the role of project management, risk management and quality assessment of informatics.), CEO, CFO). The	part of the
MI-SOC.16	Systems on Chip	Z,ZK	5
	knowledge and skills in the design of large-scale digital systems. They will be familiar with architectures of such systems and commun	1 / 1	-
	riate workflow to design these architectures, their hardware and software. They will also have knowledge of contemporary methods of	-	
	fault-tolerant systems design.		
MI-SPI.16	Statistics for Informatics	Z,ZK	7
Summary of proba	bility theory; Multivariate normal distribution; Entropy and its application to coding; Statistical tests: T-tests, goodness of fit tests, indepen	dence test; Random	processes
	- stacionarity; Markov chains and limiting properties; Queuing theory		
MI-SWE.16	Semantic Web	Z,ZK	5
	ndards used for processing and sharing knowledge mainly in the area of web. They get used to designing and using knowledge mode		
and practical aspe	ects as publishing, sharing, exchange, and acquisition of knowledge on the web. The presentation is based on the idea of the semant	c web, including its	standards
MI-SYB.16	and technologies (RDF, RDFS, OWL) and formal models.	774	F
	System Security arize themselves with the actual ICT security needs in all ICT disciplines. Students will gain knowledge of typical network attacks and pr	Z,ZK	5 m. togothor
	nmunication encryption techniques. They will learn how to work with certain aspects of encryption techniques - passwords and certifi	e	
	of anti-virus, anti-spam and heuristic analyses used in modern anti-virus solutions or Unified Threat Management (UTM) based solut		
	ring websites, web applications and databases. Upon completion of the module, students will have a broad overview of IT security an	-	
	integration of various software systems and applications.		
MI-SZ1	Knowledge Engineering Seminar Master I	Z	4
On this semina	r you will present a research paper from a top institute / research group to your peers. You will learn what is being cooked in top research	arch labs around the	e world.
Additionally, you w	Il learn how to properly present and read scientific papers. The work in the seminar will prepare you to attend (and profit from) top machine the seminar will prepare you to attend (and profit from) top machine the seminar will be a seminar will	ne learning and AI c	onferences
	and summer schools, as well as FIT's own Summer Research Program (VyLet).		
MI-TES.16	Systems Theory	Z,ZK	5
	nd has the ability to develop systems of incredible complexity (e.g., trains, microprocessors, airplanes, nuclear power plants). Howeve ensuring the correct behavior of a given system have become critical. A key technique for mastering this complexity is the usage of m		
	tems that are important for the task at hand, and automated tools for analyzing those models. This subject will present theory and alg		-
	the modeling and analysis of complex systems.		
MI-TNN	Theory of Neural Networks	Z,ZK	4
	study neural networks from the point of view of the theory of function approximation and from the point of view of probability theory. A		ic concepts
pertaining to artific	ial neural Networks, such as neurons and connections between them, types of neurons from the point of view of signal transmission,	network topology, s	omatic and
	s, network training, and the role of time in neural networks. In connection with network topology, we get acquainted with its transformation of the second		
	n with somatic and synaptic mappings, with their composition into mappings computed by the Network, Finally in connection with trai		
	aining and to the fact that training is actually a specific optimization task, recalling the most typical objective functions and the most in al network training. We will see the meaninig of all these concepts in the context of common kinds of forward neural networks. Within the		
	rks, we first notice the connection of neural networks to expressing functions of many variables using functions of fewer variables (Ko		
	ds, we will see how the universal approximation capacity of neural networks can be mathematically formalized as the sets of mappings	• ·	
being dense in ir	nportant Banach spaces of functions, in particular in the spaces of continuous functions, spaces of functions integrable with respect t	o a finite measure,	spaces of
functions with con	tinuous derivatives, and Sobolev spaces. Within the topic probabilistic approach, we first get acquainted with training based on expect	tation and training t	based on a
	nd with probabilistic assumptions about training data with which those two kinds of neural networks can be employed. We will see how		
	al expectancy of network outputs conditioned by its inputs using the expectancy based learning. We recall the strong and the weak la		•
	In analogy of the strong law of large numbers for neural networks and with the assumptions for its validity. Finally, we recall the centra for neural networks, with the assumptions for its validity and with the hypothesis tests based on it. We will see how those tests can be	-	
with its analogy	topology of the networks, with the assumptions to its validity and with the hypothesis tests based of it. We will see now those tests can be topology of the network.	employed to searc	
MI-TS1	Theoretical Seminar Master I	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	1 1	
are treated individ	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
MI-TS2	Theoretical Seminar Master II	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic		
are treated individ	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a	work with scientific	papers and
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		4
MI-TS3	Theoretical Seminar Master III		4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic ually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a		
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
MI-TS4	Theoretical Seminar Master IV	Z	4
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	. – .	
	ally and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is a		
	other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		

MI-TSP.16	Testing and Reliability	Z,ZK	5
	wledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepare		
intuitive path sens	itization and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built-in be able to analyze and control reliability and availability of the designed circuits.	-seif-test equipmen	it. They will
MI-VEM	Scientific thinking	KZ	2
	the course is to get acquainted with scientific methods and discovery of order and laws of the universe, including the aspects of huma	an life. The subject	
scientific methods	s in natural sciences, mathematics, computer science and humanities. Another aim is to introduce rules and requirements of scientific	communication via	a research
	papers and posters.		
MI-VMM.16	Retrieval from Multimedia	Z,ZK	5
The student obtains	s general knowledge regarding interfaces of portals providing multimedia content, the principles of similarity search, the methods of feat objects, indexing, and structure of distributed search engines.	ture extraction from	multimedia
MI-VYC	Computability	Z,ZK	4
	Classical theory of recursive functions and effective computability, with applications in provability theory.	_,	•
MI-W20.16	Web 2.0	Z,ZK	5
	rn new trends and technologies on the Web including theoretical foundations. Students will gain an overview about Web applications		-
technologies about	programmable Web (REST Architectures, Mashups), basic mechanisms for knowledge representation on the Web (microformats, met	-	open linked
MI-ZS10	data, etc.), mechanisms about collective intelligence (collaborative filtering, predictions of users' behaviours), social networks, and	Z	10
	Master internship abroad for 10 credits once within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research institu	1	-
	the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and e		
	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 week		
a foreign institutio	on. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects	if the internship exe	ceeds the
14 7000	academic year's dead-line.		
MI-ZS20	Master internship abroad for 20 credits	Z	20
	once within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research institu the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and existing the student of the professional content and existing the student of the professional content.		
	MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 week		
	on. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects		
	academic year's dead-line.		
MI-ZS30	Master internship abroad for 30 credits	Z	30
	once within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research institu		
	the vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content and ex MI-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 week		
	on. The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subjects	-	-
, i i i i i i i i i i i i i i i i i i i	academic year's dead-line.		
NI-AML	Advanced machine learning	Z,ZK	5
	ces students to selected advanced topics of machine learning and artificial intelligence. The topics present techniques in the field of rec	-	-
	control and interconnection of physical laws with the field of machine learning. The aim of the exercise is to familiarize students with		
NI-CAP	Cultural and Social Anthropology	ZK	2
	course aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diversit search from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, healt	-	-
unin opological rec	shown. The course is presented in Czech.	n, motory, dodan, or	, m
NI-CCC	Creative Coding and Computational Art	KZ	4
	ractical tasks, get acquainted with creative and yet proven methods of visualizing various types of data. The course freely follows the		
. ,	luces students to suitable visualization methods for traditional as well as for open data. It combines well-known visualization techniqu		0
modern technologi	es. The aim is to create an interesting visualization project. It is planned to work closely with IPR CAMP (Center of Architecture and N (Institute of Intermedia FEL).	vietropolitan Plannii	ng) and IIIVI
NI-HSC	Side-Channel Analysis in Hardware	Z,ZK	4
	dicated to so-called side-channel information leakage in hardware devices. It focuses on both theoretical analysis and practical attac		
	ide channels and they get deeper insight in power attacks. Students learn to implement various profiled and non-profiled attacks and	-	
attacks. T	hey also get practice in both designing the SCA countermeasures and analyzing the amount and characteristics of the side-channel	information leakage	e.
NI-IAM	Internet and Multimedia	Z,ZK	4
	se is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq		,
•	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical units in the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the eff		
	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording th		
	for audience.		
NI-LSM	Statistical Modelling Lab	KZ	5
	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p		
available informati	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, an	-	properties.
	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi Modern Object Originated Programming in Phane		4
NI-MOP Object-orjented pro	Modern Object-Oriented Programming in Pharo ogramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where	KZ	-
	plex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills	-	
	in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development n		
	ing object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work of		
-	rms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involven		
NI-PG1	Computer Grafics 1 on graphic courses (mainly BI-PGA and BI-PGR) and the knowledge from these courses is deepened by state-of-the-art knowledge. Th		4 od for thoso
	on graphic courses (mainly BI-PGA and BI-PGR) and the knowledge from these courses is deepened by state-of-the-art knowledge. If iced computer graphics. Students will gain practical knowledge with realistic texturing and raytracing methods. An integral part of the (-	
	subsequent implementation. The course will be followed by a course PG2 supplementing the knowledge of PG1 on other areas and	-	

NI-VPR	Research Project	Z	5
Student obtains the credits for published scientific outputs. The details are at https://courses.fit.cvut.cz/NI-VPR/en.			
PI-SCN	Seminars on Digital Design	ZK	4
This subject deals with problems of realization and implementation of digital circuits - both combinational and sequential. Basic means of description of digital circuits and basic logic			
synthesis and optimization algorithms are described. Basics of EDA (Electronic Design Automation) systems are given, together with combinatorial problems emerging in EDA.			

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2024-05-19, time 10:44.