Study plan

Name of study plan: Master branch Web and Software Engineering, spec. Info. Systems and Management, 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: 96 Elective courses credits: 24 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 o								
during the semester. If	he requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the	end of the semes	ter. 2. External						
Master these (MT) supe	ervisor fills his/her assessment into the paper "Form to award assessment by an external Final theses (FT) supervisor" (for th	ne courses BIE-BA	AP, MIE-MPR,						
MIE-DIP). Students, the	m, ensure that the assessment is registered into the information system (IS) by asking their internal FT opponent to award th	e assessment to	the IS based on						
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 he	ad of the departn	nent responsible						
for the topic of the MT.	B. If the FT topic that the student has reserved is rather general, the immediate tasks the supervisor assigns to the student fo	r the upcoming se	mester should						
aim at fine-tuning the F	im 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 second second second	'								

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.

	allel and Distributed Decomposition				7 71/	
	rallel and Distributed Programming loud, web, and communication technologies and due to the shift of the Moore law into	multicore and ma	Invcore CPL	1	Z,ZK	5 applicatior
	udents get acquainted with architectures of parallel and distributed computing system					
	I programming of shared and distributed memory computers. On selected problems, th performance evaluation of their implementations.	ey will learn the tee	chniques of	design of ef	ficient and scal	able parall
• · · · ·	oblems and Algorithms			7	Z,ZK	5
	e discrete problems by complexity and by the purpose of optimisation (on-line tasks, r	nulticriterial optimi	sation). The	1	·	-
_	ithms and, therefore, are able to select, apply, and experimentally evaluate a suitable	heuristics for a pra	actical proble			
	atistics for Informatics				Z,ZK	7
	ry; Multivariate normal distribution; Entropy and its application to coding; Statistical tests s and limiting properties; Queuing theory	: 1-lesis, goodness	s of fit lests, i	ndependen	ce lest, Randor	nprocesse
-						
Name of the bloc	k: Compulsory courses of the specialization					
Minimal number	of credits of the block: 5					
The role of the bl	ock: PO					
•	p: MI-PO-WSI.2016				_	
	p: Compulsory Courser of Specialization Web and	Software E	Enginee	ering, ir	n Czech,	Versic
2016						
Requirement cre	dits in the group: In this group you have to gain 5 o	credits				
Requirement cou	rses in the group: In this group you have to compl	ete at least	t 1 cou	rse (at	most 5)	
Credits in the gro	up: 5				,	
Note on the grou	•					
Ŭ	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their	Completion	Credits	Scope	Semester	Role
	members) Tutors, authors and guarantors (gar.)					
MI-MDW.16	Web Services and Middleware	Z,ZK	5	2P+1C	Z	PO
		1	1	1	<u> </u>	
	e courses of this group of Study Plan: Code=MI-PO-WSI.2016 N ering, in Czech, Version 2016	lame=Compu	Isory Co	ourser of	Specializa	tion We
	eb Services and Middleware			Z	Z,ZK	5
Students learn new trends a	nd technologies in the area of service-oriented architectures, web services, middlewa	re, and cloud com	puting, inclu	1	· ·	ground.
	k: Povinné p edm ty zam ení					
	of credits of the block: 32					
The role of the bl	ock: PZ					
Code of the group						
•	p: MI-PZ-ISM-ADM_A_IKM	violiootion I	nformo	tion	otomo or	. d
•	ip: Addition to compulsory subjects of master species	cialisation i	niorma	mon sy	stems ar	ia
management	ва насти и <i>с</i> . с. с.					
	dits in the group: In this group you have to gain at				,	
	rses in the group: In this group you have to compl	ete at least	t 1 cou	rse (at	most 2)	
Credits in the gro	•					
Note on the grou		ovat jeden z	těchto d	vou před	dmětů.	
	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their					
Code	members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
MI-IKM	Internet and Classification Methods	Z,ZK	4	1P+1C	L	PZ
		Z,ZK	5	2P+1C	L	ΡZ
MI-ADM.16	Data Mining Algorithms	2,21	Ŭ	2		
	Data Mining Algorithms Practical Data Mining	Z,ZK	5	2P+1C	L	PZ

 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 systems, in malware detection systems and in intrusion detection systems. However, they will learn more than only how classification is performed when solving these four kinds of problems.
 4

 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 with 2-hour lectures 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 semester tasks.
 4

MI-ADM.16 Da	ta Mining Algorithms			- 1	Z,ZK	5
	ta mining Algorithms its is not an its and data mining. However, this is not an i	ntroductory cours	e, and the s			-
	on advanced algorithms (e.g., gradient boosting) and non-basic kinds of machine lear					
methods).						
	actical Data Mining			1	Z,ZK	5
	he basic methods of discovering knowledge in data. In particular, they learn the basic ation, and fundamental principles of knowledge discovery methods. Students will be a			-		
	sessing model quality. Data mining software is extensively used in the module. Student		-			
(classification, regression, cl				J		
Code of the arour	o: MI-PZ-WSI-ISM.2016					
U 1	p: Compulsory Courses of Specialization Informat	ion Syster	hne and	Mana	nomont v	version
•		ION Oyster	ns and	mana	gement,	0013101
2016, in Czech						
•	dits in the group: In this group you have to gain 28					
Requirement cou	rses in the group: In this group you have to comple	ete 6 cours	ses			
Credits in the gro	up: 28					
0	: Pro studenty opakovaně zapsané a pro opozdilce do stu	dia: # Předm	nět MI-M	BI teď na	ahrazuie p	ůvodní
toto on the group	MI-RIC, případně MI-SIN. Pro případné uznání předmětu					
	absolvované dva předměty MI-RIC a MI-SIN. Ty mu pak n					
	MI-FRI, můžete požádat o uznání zápočtu z předmětu M					
	skupině existuje doplněk se dvěma předměty MI-IKM a N	•				
	#					,
	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their	Completion	Credits	Scone	Semester	Role
Code	members)	completion	oreans	ocope	Oemester	Noie
	Tutors, authors and guarantors (gar.)					
MI-MEP.16	Modelling of Business Processes Robert Pergl	Z,ZK	5	2P+1C	Z	PZ
MI-PIS.16	Advanced Information Systems	Z,ZK	5	2P+1C	L	PZ
MI-PCM.16	Project And Change Management	KZ	3	1P+2C	Z,L	PZ
MI-MBI.16	Management of Business Informatics	Z,ZK	5	3P+1C	L	PZ
MI-SMI.16	Strategic Management of Informatics	Z,ZK	5	3P+1C	Z	PZ
MI-TES.16	Systems Theory	Z,ZK	5	2P+1C	Z	PZ
				_		
	courses of this group of Study Plan: Code=MI-PZ-WSI-ISM.20	16 Name=Co	mpulsor	y Course	es of Speci	alization
	and Management, version 2016, in Czech				7 71/	
	delling of Business Processes roduction to the discipline of Enterprise Engineering. Students learn the importance c	f a proper method	lological an			5 and
	organisation structures and information support in big enterprises and institutions.		lological ap		le/engineening	anu
	vanced Information Systems				Z,ZK	5
1	pusiness process logic and its formalization, with business process roles, business rule	es, and data proce	ssing, with t		,	
	ice solution of business logic. They get acquainted with these notions also for the othe		-			-
-	s for implementation of these ideas in ISs. They understand modern object-oriented m	ethodologies for r	nodelling of	business pi	rocesses, busir	ness rules,
	ise ISs. They will get the rules and technologies for successful implementation of IS.				1/7	<u> </u>
MI-PCM.16 Pro This course is presented in C	oject And Change Management			I	KZ	3
	nagement of Business Informatics			2	Z,ZK	5
This course is presented in C					· · ·	
	ategic Management of Informatics				Z,ZK	5
	trategic management of information systems. Students will learn the process of creati	-				
	siness and interrelations between information strategies and lobal business strategies gement of investments and ROI, assessment of IT investments and management of h			-		
	nanagement, risk management and quality assessment of informatics.				,,	
	stems Theory			2	Z,ZK	5
	ility to develop systems of incredible complexity (e.g., trains, microprocessors, airplar	nes, nuclear powe	r plants). Ho			
	a correct hobovier of a given system have become critical. A key technique for meets					

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 describe 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 algorithms that form the basis for the modeling and analysis of complex systems.

Name of the block: Compulsory elective economic-management courses Minimal number of credits of the block: 2 The role of the block: VE

Code of the group: MI-PV-EM.2016 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 Note on the group:

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

MI-PCM.16	Project And Change Management	KZ	3						
This course is presente	This course is presented in Czech.								
FI-VEZ	economic-managerial course from a study abroad	Z	4						
A "Humanities subject t	A "Humanities subject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that 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 the	he operational, tad	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-SEP	World Economy and Business	Z,ZK	4						
This course is presented in Czech. However, there is an English variant in the program Informatics (N1801 / 4793). The course introduces students of technical university to the									
international business. It 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 business in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed for the right investment decision.								
Seminars help to 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 Senovský 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	Z	3	0+0	Z,L	VH
MI-KYB.16	Cybernality	ZK	5	2P	Z	VH
FI-MPL	Managerial Psychology	ZK	2	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

Characteristics of the courses of this group of Study Plan: Code=MI-PV-HU.2016 Name=Compulsory Elective Master Humanity Courses, Inclusive of Non-garanted Courses, Ver. 2016, in Czech

NI-CAP	Cultural and Social Anthropology	ZK	2
The one-semester cours	se aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diver	sity of the world	- examples from
anthropological researc	h from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, hea	alth, history, deat	h, etc) will be
shown. The course is pr	esented in Czech.		
FI-FIL	Philosophy	ZK	2
see A0B16			
MI-HMI2	History of Mathematics and Informatics	ZK	3
Selected topics {Infinite	simal calculus, probability, number theory, general algebra, different examples of algorithms, transformations, recursive function	ns, eliptic curves	s, etc.) note on
possibilities of application	ons of some mathematical methods in informatics and its development.		
FI-HTE	History of Technology and Economics	ZK	2
The course introduces t	he scientific disciplines of history and technology, economic and social history of the Czech lands and Czechoslovakia in con	parison with the	development of
the European region 19	to 21 century.		
FI-HPZ	Humanities subject from a study abroad	Z	3
A "Humanities subject the	nat has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module th	at is required in t	he curriculum.
The substitution is appre-	oved by the Vice-Dean for study affairs on behalf of the Dean at the request of the student.		
MI-KYB.16	Cybernality	ZK	5
Students get acquainted	d with the fundamentals of legislation and international activities in the area of fighting cybercrime. Students will understand th	e classification o	f attacks and
have an overview of sys	tems for computer surveillance and traffic monitoring in the cyberspace. Students will also familiarize themselves with hacker a	ctivities and beha	vior. The course
will also discuss the coo	peration of the state agencies and subjects dealing with defence of the cyberspace (especially CSIRT and CERT teams).		
FI-MPL	Managerial Psychology	ZK	2
FI-KSA	Cultural and Social Anthropology	ZK	2
The one-semester cours	se aims to acquaint students with the basics of social and cultural anthropology as a scientific discipline dealing with the diver	sity of the world	- examples from
anthropological researc	h from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, hea	alth, history, deat	h, etc) will be
shown. The course is an	n interesting alternative to other humanities, taught at FIT.		
FI-ULI	Introduction to Linguistics for Computer	ZK	2
This course is presented	d in Czech.		

Name of the block: Elective courses Minimal number of credits of the block: 0 The role of the block: V

Code of the group: MI-V.20 ²	17
Name of the group: Purely I	Elective Master Courses, Version 2017
Requirement credits in the	group:
Requirement courses in the	group:
Credits in the group: 0	
Note on the group: In add	dition to the courses listed here, you can enroll as an elective any course that is offered within

	has completed in the bachelor study at CTU canno Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their					
Code	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 Vojt ch Miškovský, Petr Socha Petr Socha Vojt ch Miškovský (Gar.)	Z,ZK	4	2P+2C	Z	V
MI-HMI2	History of Mathematics and Informatics	ZK	3	2P+1C	Z	V

MI-IVS	Intelligent embedded systems	KZ	4	1P+3C	L	V
NI-IAM	Internet and Multimedia	Z,ZK	4	2P+1C	L	V
MI-IOT	Internet of Things	Z,ZK	4	2P+1C	L	V
MI-ATH	Combinatorial Theories of Games	Z,ZK	4	2P+2C	L	V
NI-CCC	Creative Coding and Computational Art Josef Kortán, Radek Richtr Radek Richtr Radek Richtr (Gar.)	KZ	4	1P+2C	Z,L	V
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
NI-VPR	Research Project Št pán Starosta Št pán Starosta Št pán Starosta (Gar.)	Z	5		Z,L	V
MI-ZS10	Master internship abroad for 10 credits	Z	10		Z,L	V
MI-ZS20	Master internship abroad for 20 credits	Z	20		Z,L	V
MI-ZS30	Master internship abroad for 30 credits	Z	30		Z,L	V

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

MI-IKM Internet and Classification Methods

Z,ZK

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In this course, the students get acquainted with classification methods used in four important internet, or generally network applications: in spam filtering, in recommendation systems, in malware detection systems and in intrusion detection systems. However, they will learn more than only how classification is performed when solving these four kinds 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 with 2-hour lectures 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 semester tasks.

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NI-CCCCreative Coding and Computational ArtKZ4Students work on practical tasks, get acquainted with creative and yet proven methods of visualizing various types of data. The course freely follows the basic graphics courses (MGA, BLE,) and introduces students to suitable visualization methods for traditional as well as for open data. It combines well-known visualization techniques with artistic methods using modern technologies. The aim is to create an interesting visualization project. It is planned to work closely with IPR CAMP (Center of Architecture and Metropolitan Planning) and IIM (Institute of Intermedia FEL).NI-LSMStatistical Modelling LabKZ5The subject is oriented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is put on the effective use of the available information and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, and analyses of their properties.	MI-ATH	Combinatorial Theories of Games	Z,ZK	4
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At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesis).	-			
	At this point, the subject	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 Opti	mization and Methods	Z,ZK	5
	nization methods in computer science, economics, and industry. They are aware of practical importance of line	· · ·	gramming. They
are able to work with optimization softw	vare and are familiar with languages used in programming of that software. They get skills in formalization of c	optimization proble	ems in computer
science (such as scheduling of tasks to	processors, analysis of network flows), distribution and allocation of resources (transportation problems, trav	velling salesman p	problems, etc.),
issues from economics, and modelling	of conflicts via the game theory. They get an overview of computational complexity of optimization problems."	They get orientation	on in algorithms
in linear programming.			
MI-MSI Mathematic Mathematical semantics of programmin	cal Structures in Computer Science	Z,ZK	4
MI-MZI Mathematic	cs for data science	Z,ZK	4
,	to those fields of mathematics that are necessary for understanding standard methods and algorithms used i		
include mainly: linear algebra (matrix fa selected notions from probability theory	ctorisations, eigenvalues, diagonalization), continuous optimisation (optimisation with constraints, duality prin	ciple, gradient me	ethods) and
	ject-Oriented Programming in Pharo	KZ	4
	tly one of the most widespread paradigms of software creation, especially enterprise information systems, who		-
	ations. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the s	-	
	st system Pharo (https://pharo.org). The course focuses on individual approach to students, their development	-	-
addition to deepening object programm	ing skills, which are generally applicable in other OO languages, students will also gain the opportunity to wo	ork on interesting p	projects and OO
technologies in terms of semestral work	k with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involv	vement in the Pha	ro Consortium.
MI-MPC Modern pro	pgramming in C ++	Z,ZK	5
	features of contemporary versions of the C++ programming language for software development. The course for		mming effectivity
	intainable and portable source code and creating correct programs with low memory and processor time requ	1	
	and Internet	Z,ZK	3
	hnologies for processing and network transmissions of multimedia signals, stereoscopy and visualizations in h		
	dia, transmission formats, interfaces, codecs, technologies for acquisition and reproduction of multimedia data	and technologies	for visualizations
and distributed collaboration using network	-	7 71/	4
MI-OLI Linux Drive		Z,ZK	4
	tant operating system for personal computer and also for embedded systems. Systems on chip and combining bsystems requiring specific software drivers. This course is an advanced course in the Linux driver development		
	erating system architecture, principles of development of various types drivers, including practical experience		udents. The
MI-ARI Computer a		Z,ZK	4
	entations used in digital devices and will be able to design arithmetic operations implementation units.	2,213	
NI-PG1 Computer (ZK	4
· · ·	nainly BI-PGA and BI-PGR) and the knowledge from these courses is deepened by state-of-the-art knowledge	1 1	signed for those
interested in advanced computer graph	ics. Students will gain practical knowledge with realistic texturing and raytracing methods. An integral part of t	the course is the s	tudy of scientific
	ntation. The course will be followed by a course PG2 supplementing the knowledge of PG1 on other areas and	d topics of compu	ter graphics.
MI-PVR Advanced	/irtual Reality	KZ	4
The course introduces advanced parts	of the virtual reality. It is a continuation of the already running graphic objects, especially the creation of 3D me	odels in Blender, a	and among other
	olication in virtual reality. Lectures will focus on virtual reality technology, its use in various applications and will a		
)). The course is freely connected with the subject VHS (virtual game worlds), students will be able to apply the	e knowledge gaine	ed in this subject
in virtual reality, or directly create a com		7 71	
	machine learning	Z,ZK	5
	cted advanced topics of machine learning and artificial intelligence. The topics present techniques in the field of n of physical laws with the field of machine learning. The aim of the exercise is to familiarize students with the		
	techniques in iOS applications	KZ	4
	nobile development technologies for iOS platform. Class covers advanced topics, students need to know all the		
BI-IOS.			beginners class
	embedded systems	Z,ZK	4
	sors and microcontrollers and their usage in wide range of applications. The course includes a series of advar		-
	otor control, system control and industrial communication. The students obtain both theoretical and also practi	-	
systems.			
MI-DNP Advanced.	NET	Z,ZK	4
	dvanced desgin of applicatios on a .NET platform. They gain skills of WPF (Windows Presentation Foundation	1 1	(Windows
Communication Foundation) and Entity	Framework. They are able to apply these skills on a development and desgin of advanced .NET applications	i.	
MI-PYT Advanced F	² ython	KZ	4
The goal of this course is to learn vario	us advanced techniques and methods in Python. The course indirectly continues where Programming in Pyth	ion (BI-PYT) left c	of. The course is
very hands-on and it has only tutorials, e	everything is demonstrated on examples. Classification is based on work in class as well as semestral coursew	ork. The course is	lead by external
teachers from Red Hat.			
	ng in CUDA	Z,ZK	4
	present parallel architectures in GPUs. Students also get hands-on experience with programming these syste		
MI-PSL Programmi		Z,ZK	4
	gramming language Scala which exploits object-functional paradigm. Scala comprises advance language feat		-
Scalaz, etc.	to use of applications functional patterns e.g. H-List, Monads, etc. Scala is used by many powerful frameworks	anu ilbraries e.g. i	ray, Cassanora,
	ng in Puby	KZ	4
MI-RUB Programmi This course is presented in Czech.		112	-
MI-ROZ.16 Pattern Red	cognition	Z,ZK	5
1	ematic account of the major topics in pattern recognition with emphasis on problems and applications of the s		
recognition. Students will learn the fund	amental concepts and methods of pattern recognition, including probability models, parameter estimation, ar	nd their numerical	aspects.

MI-RRI	Risk Management in Informatics	ZK	3
-	very often considered as one of main objectives to secure targets of information processing. However, to focus on this info se	-	-
	ses, malware etc. very often means misunderstanding and underestimating of real threats which are around us and which are cessity to continue with business after disaster is also slightly ignored. International standards which are focused on information of the second standards wheth are focused on information of the second standards wheth are focused on information of the second standards wheth are focused on information of the second standards whether are second standar	•	
	d to anticipate necessity of risk management. There is no commonly accepted methodology used for this task. Threats which		
	sures to prepare plans for business continuity management even in the case of dramatic political changes, natural disasters e		
MI-SCE1	Computer Engineering Seminar Master I	Z	4
	ter Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the selected supervisor is a supervisor of the selected supervisor.		
	ssional 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 Compu	ter Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistand	ce to failures and a	attacks. Students
are approached individ	ually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of	the subject is wor	k with scientific
	ssional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar tead	chers. The topics a	are new for each
semester.			-
MI-SZ1	Knowledge Engineering Seminar Master I	Z	4
-	Il present a research paper from a top institute / research group to your peers. You will learn what is being cooked in top research property property of a strend (and profit from) top more than the property is property in the strend (and profit from) top more		
	rrn how to properly present and read scientific papers. The work in the seminar will prepare you to attend (and profit from) top ma is well as FIT's own Summer Research Program (VyLet).	crime learning and	a Al cometences
PI-SCN	Seminars on Digital Design	ZK	4
	problems of realization and implementation of digital circuits - both combinational and sequential. Basic means of description	1	·
-	tion 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 practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange pric		
	signals and processes) to computer networks (network components load, attacks detection). The students learn to select a co		
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	main principles ba	ased on practical
	oth the lab classes and the lectures exploit freely available software packages in order to provide easy and straightforward tra	insfer of students'	knowledge from
the academic to the rea			
BI-SOJ	Machine Oriented Languages	Z,ZK	4
	will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optima on of software with hardware. Next, there will be discussed x86 specifics of the majority of OSes from the application point of vie		
-	used during reverse engineering, optimization, and evaluation of code security.	w linked to higher	leven anguages.
MI-TS1	Theoretical Seminar Master I	Z	4
	intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classifier the science in the science is a student science with contemporary theoretical computer science.		·
	and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		
-	e. The capacity is limited by the the potentials of the teachers of the seminar.		
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MI-VYC	Computability	Z,ZK	4
Classical theory of	ecursive functions and effective computability, with applications in provability theory.		1
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.		
MI-ZS10	Master internship abroad for 10 credits	Z	10
Each student can o	nce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research ins	titution. Before the	e internship the
Dean of the FIT, or t	ne vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content an	d extent of the inte	ernship. Auxiliar
courses MI-ZS10, M	II-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 we	eks of full-time e	mployment with
a foreign institution.	The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject	s if the internship	exceeds the
academic year's de	ad-line.		
MI-ZS20	Master internship abroad for 20 credits	Z	20
Each student can o	nce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research ins	titution. Before the	e internship the
Dean of the FIT, or t	ne vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content an	d extent of the inte	ernship. Auxiliar
courses MI-ZS10, N	II-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 we	eks of full-time e	mployment with
a foreign institution.	The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject	s if the internship	exceeds the
academic year's de	ad-line.		
MI-ZS30	Master internship abroad for 30 credits	Z	30
Each student can o	nce within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research ins	titution. Before the	e internship the
Dean of the FIT, or t	ne vice-dean for study affairs assesses the professional content. The student must provide evidence of the professional content an	d extent of the inte	ernship. Auxiliar
courses MI-ZS10, N	II-ZS20, MI-ZS30 are used used for the evidence and evaluation of the internship in IS KOS. Every 10 credits correspond to 4 we	eks of full-time e	mployment with
a foreign institution.	The maximum number of credits a student can earn for one internship is 30 credits. This amount can be divided into two subject	s if the internship	exceeds the
academic year's de	ad-line.		

Code of the group: MI-WSI-ISM-VO.2017

Name of the group: Elective Vocational Courses for Master Specialisation MI-WSI-ISM, version 2017 Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least courses (at most 39) Credits in the group: 0

Note on the group:

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

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-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-DSV.16	Distributed Systems and Computing	Z,ZK	5	2P+1C	Z	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-MTI.16	Modern Internet Technologies	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-PAP.16	Parallel Computer Architectures	Z,ZK	5	2P+1C	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-POA.16	Advanced Computer System Architectures	Z,ZK	5	2P+1C	L	V
MI-PDB.16	Advanced Database Systems	Z,ZK	5	2P+1C	Z	V

MI-PDD.16 MI-REV.16	Data Preprocessing			Z,ZK	5	2P+1C	Z		V
	Reverse Engineering			Z,ZK	5	1P+2C			v
							Z		
MI-SWE.16	Semantic Web			Z,ZK	5	2P+1C			V
MI-SIB.16	Network Security			Z,ZK	5	2P+1C	L		V
MI-SYB.16	System Security			Z,ZK	5	2P+2C	L		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-TSP.16	Testing and Reliabili	ty		Z,ZK	5	2P+2C	Z		V
MI-VMM.16	Petr Fišer Retrieval from Multin	nedia		Z,ZK	5	2P+1C	Z		V
MI-W20.16	Web 2.0			Z,ZK	5	2P+1C			V
Specialisation MI-WS MI-ADP.16 Ar	chitecture and Design P	atterns				Z,	,ZK		5
the challenges, issues, and and get familiar with the com will be introduced to the prin architectures used in large- MI-AVY Au Searching in a text (pattern data as one-dimensional (te	is to provide students with both tradeoffs of advanced software monly used object-oriented de ciples of software architecture of scale distributed systems. Itomata in Text Pattern M matching) and generally in dat ext) or multi-dimensional (tree, p hing can be either exact or app	e design. In the first part of the sign patterns that represent th design and analysis. This inclue Attching a is an area of problems and e picture). We may search for so	course, the students will e best practices for solvin des the classical architect exciting solutions from the mething known (a pattern	refresh and deepe g common softwar ural styles, compo coretical and pract n: a string or a set	en their know e design pro nent based cal perspec specified by	vledge of obje oblems. In the systems, and Z, tives. We may regular expr	ect-orient e second l some ad ZK y interpre ession) o	ed progra part the s lvanced s t and sea r unknow	amming tudents oftware 4 arch the n (for
(finite, pushdown, linear-bo		ioximate. This course present	s a taxonomy of searchin	ly problems. It loct	ises on aige			automa	lon
	ecurity and Secure Prog	ramming				Ζ,	,ZK	4	1
	to assess security risks and how								-
	cal experience with running pro								
	ngers inherent in buffer overflov ems, web, remote procedure ca				-	-		-	os of
	ecurity and Hardware	iis, and sockets in general. Th	e module concludes with	Denial of Gervice			ZK		5
	ledge in selected topics of cryp	tography and cruptanalysis. Th	he module focuses partic	ularly on elliptic cu	rve cryptogr				-
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of internal functions of com	outer systems.								
	ror Control Codes	or correct individual errors or	ad burnet errore in data ate	rad into momorias	or tronomitt		,ZK	!	5
,	present various ways to detect		id burst errors in data stol	rea into memories	or transmitt		zK		5
	stributed Systems and C nethods for coordination of proce		t characterised by nondet	erministic time res	oonses of co	1 '			
	algorithms that assure correctn		,			patting proo			nicatior
			by a group of loosely coup	pled processes and	d mechanisr	ns that suppo	ort high a	vailability	
data ana services, ana saic	ty in case of failures.		by a group of loosely coup	pled processes and	d mechanisr	ns that suppo	ort high a	vailability	
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MI-DDW.16 W Students will learn latest me	eb Data Mining ethods and technologies for We	b data acquisition, analysis ar	nd utilization of the discov	vered knowledge. S	Students will	Z, gain an over	,ZK rview of V	Veb minir	of both
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MI-DDW.16 W Students will learn latest me techniques for Web crawling recent developments in the	eb Data Mining ethods and technologies for We g and search, Web structure an field of social web and recomm	b data acquisition, analysis a alysis, Web usage analysis, W endation systems.	nd utilization of the discov	vered knowledge. S	Students will	Z, gain an over will also gair	, ZK rview of V n an over	Veb minir view of m	of both 5 ng iost
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MI-DDW.16 W Students will learn latest me techniques for Web crawling recent developments in the MI-FME.16 For Students are able to describ basic properties of software	eb Data Mining ethods and technologies for We g and search, Web structure an field of social web and recomm ormal Methods and Spec be semantics of software formal	b data acquisition, analysis a alysis, Web usage analysis, W iendation systems. ifications ly and to use sound reasoning	nd utilization of the discov /eb content mining and in	vered knowledge. S formation extraction	Students will on. Students	Z, gain an over will also gair Z, some softwar	ZK rview of V n an over ZK re tools th	Veb minir view of m at allow t	of both
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MI-DDW.16 W Students will learn latest metechniques for Web crawling F techniques for Web crawling F MI-FME.16 FC Students are able to describ basic properties of software MI-FLP FL Students will be acquainted FL MI-FLP FL Students will be come acqua MI-GEN MI-HWB.16 Ha The course provides the kniusing hardware means. The Ha Students are introduced to to used in practice. The overvioon lossy data compression meters MI-MKY.16 MI-MKY.16 Ma Students become familiar we principles on which security MI-MVI.16 Co Students will understand methow these methods work are MI-MTI.16 Ma	eb Data Mining ethods and technologies for Web and search, Web structure an field of social web and recomm ormal Methods and Spector with principles of software formal desemantics of software formal desemantics of software formal desemantics of software formal desemantics of functional and bode Generators and with both theoretical and ardware Security owledge needed for the analysis y will be able to safely use and bors, PUF, random number generate at Compression the basic principles of integer thods used in image, audio, an athematics for Cryptolog ith parts of mathematics necess of encryption systems, cryptar pethods and techniques of comp at how to apply them to probler	b data acquisition, analysis ar alysis, Web usage analysis, We endation systems. ifications ly and to use sound reasoning ogramming d logic programming. They will practical aspects of back-end s and design of computer sys integrate hardware component rators, smart cards, biometric opression. They will learn the r coding and of statistical, diction d video compression. y sary for deeper understanding nalysis methods, cryptography the Methods utational intelligence that are ns related to data mining, com gies the IP technology to the mode	nd utilization of the discov /eb content mining and in g for construction of correct l be able to write their pro- of an optimizing program tems security solutions. S nts into systems and test devices, and devices for necessary theoretical bac mary, and context data co of the methods used in sy over elliptic curves, and mostly nature-inspired, pa trol, intelligen games, opt	vered knowledge. S formation extraction extraction extraction ograms in Lisp and aming language co atudents get an over them for resistance internal security fut kground and get a propression metho ymmetric and asyr quantum cryptogra arallel by nature, a imizations, etc.	Students will on. Students earn to use s Prolog prog mpiler. erview of sa e to attacks. unctions of tl n overview of ds. In addition nmetric cryp aphy are bas nd applicab	Z, gain an over will also gain Z, some softwar Z, gramming lan Z, gramming lan Z, feguards aga Students wil ne computer. Z, of data comp n, students I Z, otography. The sed. Z, le to many pr Z, ng and real-ti	ZK rview of V an over ZK ZK ZK ZK ZK ZK ression n learn the ZK ression n learn the ZK roblems. ZK roblems.	Veb minir view of m lat allow t lat allow	of both 5 19 5 0 prove 4 4 4 5 5 10 5 10 10 10 10 10 10 10 10 10 10

MI-NFA.16 Design for the FPGA and ASIC Technology	Z,ZK 5
Students gain the basic knowledge needed to start a career in a design house. They will understand the FPGA and	
technologies impose on the design. They are able to perform and to manage typical workflows, their analytic and syr	thetic 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-NUR.16 User Interface Design	Z,ZK 5
Students will understand the theorical background of human-computer interaction and user interface (UI) design, will le notions and procesures. They get acquainted with graphical, speech, and multimodal UIs. Thanks to the gained know	
MI-NSS.16 Normalized Software Systems	ZK 5
Students will learn the foundations of Normalized Systems theory, which studies the evolvability of modular structure systems theory and entropy from thermodynamics. Initially, the theory was developed at the level of software architectu	
of so-called combinatorial effects. These effects occur when the impact of a change to the software architecture is de	
The latter is highly undesirable, as it will cause even a simple change to incur an ever-increasing impact as the size	
be considered as a main cause of Lehman?s Law of Increasing Complexity (see, e.g., http://en.wikipedia.org/wiki/Le	
entropy was used in the study of which micro-states in a modular structure correspond with a given macro-state. This i	
Normalized Systems theory consists first of a set of principles which indicate where violations of stability and entropy	y-related issues occur in any given software architecture. These
principles indicate that very fine-grained modular structures are required in order to control them. In the second part c	f the theoretical framework, it is shown how software architectur
can be constructed based on a set of 5 design patterns called elements. These elements provide the core functionality	of information systems in terms of storing data, executing action
workflows, connectors and triggers, while controlling for violations of the stability and entropy-related principles, allowin	
Recently, Normalized Systems theory was also applied to the modular structures in business processes and enterprise	e architectures, with the goal of constructing a foundational theo
for Enterprise Engineering.	
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 processors, SoCs and MPSoCs,
GPUs, and neural processors. Students also get hands-on experience with programming these systems.	
MI-EDW.16 Enterprise Data Warehouse Systems	Z,ZK 5
The Enterprise Data Warehouses course focuses on the area of business intelligence. Students will be introduced to	
not only in designing warehouses and various architectures, but also their deployment and maintenance. This course visualization.	a also includes an introduction to the area of reporting and data
	7 71/ 4
MI-PAL Advanced Algorithms	Z,ZK 4
The students will learn the most important advanced algorithms in different domains of the computer science that are other modules of the Master program. They will also learn how to cope with problems that, according to the present	
time.	chowledge, are not solvable optimally in polyholmally bounded
MI-KRY.16 Advanced Cryptology	Z,ZK 5
Students will learn the essentials of cryptanalysis and the mathematical principles of constructing symmetric and as	
random number generators. They will have an overview of cryptanalysis methods, elliptic curve cryptography and qu	
their own systems or to the creation of their own software solutions.	
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 of	
complex system infrastructure that meets availability and scalability requirements given by the business environmen	
MI-PDB.16 Advanced Database Systems	Z.ZK 5
Students orient themselves in problems of evaluation and optimization of SQL queries. The next part of the course d	_, 0
databases), with the related new data models (XML, graph databases, column databases) and languages for workin	
the course deals with performance evaluation of database machines.	
MI-PDD.16 Data Preprocessing	Z,ZK 5
Students learn to prepare raw data for further processing and analysis. They learn what algorithms can be used to exi	
time series, etc., and learn the skills to apply these theoretical concepts to solve a specific problem in individual proj	ects - e.g., parameter extraction from image data or from Internet
MI-REV.16 Reverse Engineering	Z,ZK 5
Students will get acquainted with the essentials of reverse engineering of computer software. They will learn how pro	cesses start and what happens before and after the main functi
is called. Students will understand how executable files are organized and how they interact with 3rd party libraries.	Another part of the course is dedicated to reverse engineering of
applications written in C++. Students will also understand principles of disassemblers and obfuscation techniques. A	
debuggers and debugging work and which methods can be used to detect it. One of the lectures will be dedicated to	the latest trends on the computer malware scene. The focus of
the course is on the seminars, where students will solve practically oriented tasks from the real world.	
MI-SWE.16 Semantic Web	Z,ZK 5
Students learn standards used for processing and sharing knowledge mainly in the area of web. They get used to de	
and practical aspects as publishing, sharing, exchange, and acquisition of knowledge on the web. The presentation i	s based on the idea of the semantic web, including its standard
and technologies (RDF, RDFS, OWL) and formal models.	
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 c	
course explains basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anor explanation and practical examples of various mechanisms of securing network infrastructure and detection in real ti	•
security events (i.e. incident handling and incident response).	The the course covers general principals of handling detected
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 knowled	
with essential communication encryption techniques. They will learn how to work with certain aspects of encryption t	
learn the basics of anti-virus, anti-spam and heuristic analyses used in modern anti-virus solutions or Unified Threat	• •
principles of securing websites, web applications and databases. Upon completion of the module, students will have	
integration of various software systems and applications.	,
MI-SOC.16 Systems on Chip	Z,ZK 5
Students gain key knowledge and skills in the design of large-scale digital systems. They will be familiar with architect	
will use an appropriate workflow to design these architectures, their hardware and software. They will also have know	
fault-tolerant systems design.	
MI-CPX Complexity Theory	Z,ZK 5
Students will learn about the fundamental classes of problems in the complexity theory and different models of algor	
	itms and about implications of the theory concerning practical
(un)solvability of difficult problems.	itms and about implications of the theory concerning practical

	sting and Reliability out circuit testing and about methods for increasing reliability and security. They will ge	t practical akilla t	a ha ahla ta		Z,ZK	5
	nd to use an ATPG for automatic test generation. They will be able to design easy testa					
-	ol reliability and availability of the designed circuits.		-			-
	trieval from Multimedia	faimilaritu aaarah	the method		Z,ZK	5 m multimodia
-	knowledge regarding interfaces of portals providing multimedia content, the principles o ure of distributed search engines.	i similanty search	, the method	is of reature	extraction iro	mmuumedia
MI-W20.16 We	eb 2.0			Z	Z,ZK	5
	Is and technologies on the Web including theoretical foundations. Students will gain an nable Web (REST Architectures, Mashups), basic mechanisms for knowledge represer					-
	ut collective intelligence (collaborative filtering, predictions of users' behaviours), socia			als, mela-ua	ala, ontologie	s, open inkeu
Code of the group	p: MI-V-ISM					
Name of the grou	p: Elective Master Courses for Specialization Infor	mation Sy	stems	and Ma	anagem	ent,
Presented in Cze	ch					
Requirement crea	dits in the group:					
Requirement cou	rses in the group:					
Credits in the gro	up: 0					
Note on the group). D:					
	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
MI-IKM	Internet and Classification Methods	Z,ZK	4	1P+1C	L	V
MI-AVY	Automata in Text Pattern Matching	Z,ZK	4	2P+1C	L	v
	Ond ej Guth, Tomáš Pecka, Št pán Plachý, Jan Trávní ek, Jan Ž árek Ond ej Guth Ond ej Guth (Gar.)	Ζ,ΖΙ	4	26410		v
MI-BPS	Wireless Computer Networks	Z,ZK	4	2P+1C	L	V
MI-BPR	Security and Secure Programming	Z,ZK	4	2P+1C	Z	V
MI-BHW	Security and Hardware	Z,ZK	4	2P+2C	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-PAM	Efficient Preprocessing and Parameterized Algorithms	Z,ZK	4	2P+1C	L	V
MI-FME	Formal Methods and Specifications	Z,ZK	4	2P+1C	L	V
MI-FLP	Functional and Logical Programming	Z,ZK	4	2P+1C	L	V
MI-GLR	Games and reinforcement learning	Z,ZK	4	2P+2C	L	V
MI-GEN	Code Generators	Z,ZK	4	2P+1C	L	V
MI-IOT	Internet of Things	Z,ZK	4	2P+1C	L	V
MI-ATH	Combinatorial Theories of Games	Z,ZK	4	2P+2C	L	V
MI-MPR	Master Project	Z	7		Z,L	V
MI-MSI	Mathematical Structures in Computer Science	Z,ZK	4	2P+1C	L	V
MI-MTI	Modern Internet Technologies	Z,ZK	4	2P+1C	Z	V
MI-MAI	Multimedia and Internet	Z,ZK	3	2P+1C	L	V
MI-NFA	Design for the FPGA and ASIC Technology	Z,ZK	4	2P+1C	Z	V
MI-PAP	Parallel Computer Architectures	Z,ZK	4	2P+1C	L	V
MI-PAL	Advanced Algorithms	Z,ZK	4	2P+1C	L	V
MI-KRY	Advanced Cryptology	Z,ZK	4	2P+1C	Z	V
MI-PDB	Advanced Database Systems	Z,ZK	4	2P+1C	L	V
MI-DNP	Advanced .NET	Z,ZK	4	2P+1C	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	Pattern Recognition	Z,ZK	4	2P+1C	Z	V
MI-RRI	Risk Management in Informatics	ZK	3	2P	L	V
MI-SWE	Semantic Web	Z,ZK	4	2P+1C	Z	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-CPX	Complexity Theory	Z,ZK	5	3P+1C	Z	V
	Testing and Reliability			+ +		
MI-TSP	Petr Fišer	Z,ZK	4	2P+2C	Z	V
MI-MCS	Multicore Systems	KZ	4	1P+2C	Z	V
MI-VYC	Computability	Z,ZK	4	2P+2C	L	V
Systems and Mana MI-MPR	ne courses of this group of Study Plan: Code=MI-V-ISM Name=Elec gement, Presented in Czech Master Project semester, a student reserves her/his final thesis topic and gets together with its supervisi				Z	7
during the semester. If the Master these (MT) super MIE-DIP). Students, then the confirmation of the ex for the topic of the MT. 3.	e requirements they agreed upon are met, the supervisor awards the student an assessm visor fills his/her assessment into the paper "Form to award assessment by an external Fi , ensure that the assessment is registered into the information system (IS) by asking their ternal MT supervisor. In the case the FT opponent is external as well, the assessment wi If the FT topic that the student has reserved is rather general, the immediate tasks the su topic so that the FTT will be complete and approvable at the end of the semester.	ent for the course nal theses (FT) s internal FT oppo Il be registered to	MI-MPR a upervisor" nent to awa the IS by t	at the end of the for the course and the assess he head of the hea	he semest es BIE-BA sment to the e departm	ter. 2. External NP, MIE-MPR, he IS based on lent responsible
-	nternet and Classification Methods			7	.ZK	4
	ts get acquainted with classification methods used in four important internet, or generally	network application	ons: in spar		, I	-
•	ems and in intrusion detection systems. However, they will learn more than only how clas			•		
0	se applications, they get an overview of the fundamentals of classification methods. The or rcises, the students on the one hand implement simple examples to topics from the lectur	0		,		ures and 2-hour
-	Vireless Computer Networks	es, on the other i			,ZK	4
	the modern technologies, protocols, and standards for wireless networks. They will under	stand the routing	mechanisr		, ,	-
broadcast mechanisms, a	and data flow control mechanisms. They will also learn about principles of communication	in sensor networ	ks. They ge	et knowledge o	of security	mechanisms
	get skills of configuration of wireless network elements and simulation of wireless netwo	rks using suitable	tools.			
MI-DSP This course is presented	Database Systems in Practes			Z	,ZK	4
	Digital Image Processing			7	,ZK	4
	teresting theoretical basis. Visually attractive applications provide better understanding of b g. This course will introduce algorithms solving the following practical applications: edge-		•		aluable out	
of digital image processir frequency domain, abstra interactive as-rigid-as-po	g. This course will introduce algorithms solving the following practical applications: edge- ction, hybrid images, gradient domain editing, seamless image stitching and cloning, digi ssible image deformation, free-form image registration, texture synthesis, interactive segment	aware editing, ton tal photo-montage	e mapping e, color-to-	that is also va , HDR compre gray conversion ng, adding de	aluable out ession, de on, contex	-blurring in t enhancement,
of digital image processir frequency domain, abstra interactive as-rigid-as-pos MI-PAM There are many optimiza exactly in practice. We wi (parameter) of the inputs and polynomially in the ir which is not possible in the plethora of parameterized will also not miss out the	g. This course will introduce algorithms solving the following practical applications: edge- ction, hybrid images, gradient domain editing, seamless image stitching and cloning, digi ssible image deformation, free-form image registration, texture synthesis, interactive segm Efficient Preprocessing and Parameterized Algorithms tion problems for which no polynomial time algorithms are known (e.g. NP-complete probl I demonstrate that many problems can be solved much more effectively than by naively the from practice-e.g., all solutions are relatively small. Parameterized algorithms exploit that be put size (which can be huge). Parameterized algorithms also represent a way to formalize the classical complexity. Such a polynomial time preprocessing is then a suitable first step, algorithm design methods and we will also show how to prove that for some problem (ar relations to other approaches to hard problems such as moderately exponential algorithm	aware editing, ton tal photo-montage nentation, coloriza ems). Despite that rying all possible by limiting the time the notion of effe whatever is the s and parameter) suc	e mapping e, color-to-q tition, painti ti ti is often solutions. C complexity ective polyr ubsequent h an algori	that is also va , HDR compre- gray conversion ng, adding de Z necessary to Often one can y exponentiall nomial time prisolution meth thm (presuma s.	aluable out ession, de on, contexi epth, alpha ,ZK solve the find a con y in this (s reprocessi nod. We wi ably) does	-blurring in t enhancement, a matting. 4 se problems nmon property small) paramete ing of the input, ill present a not exist. We
of digital image processir frequency domain, abstra interactive as-rigid-as-poor MI-PAM There are many optimiza exactly in practice. We wi (parameter) of the inputs and polynomially in the ir which is not possible in the plethora of parameterized will also not miss out the MI-GLR	g. This course will introduce algorithms solving the following practical applications: edge- ction, hybrid images, gradient domain editing, seamless image stitching and cloning, digi ssible image deformation, free-form image registration, texture synthesis, interactive segm Efficient Preprocessing and Parameterized Algorithms tion problems for which no polynomial time algorithms are known (e.g. NP-complete probl I demonstrate that many problems can be solved much more effectively than by naively the from practice-e.g., all solutions are relatively small. Parameterized algorithms exploit that be put size (which can be huge). Parameterized algorithms also represent a way to formalize the classical complexity. Such a polynomial time preprocessing is then a suitable first step, algorithm design methods and we will also show how to prove that for some problem (ar relations to other approaches to hard problems such as moderately exponential algorithm Games and reinforcement learning	aware editing, ton tal photo-montage nentation, colorization ems). Despite that rying all possible so poly limiting the time the notion of effet whatever is the so and parameter) suc- is or approximation	e mapping a, color-to-q tition, painti solutions. C complexit ective polyr ubsequent h an algori n schemes	that is also va , HDR compre- gray conversion ng, adding de Z necessary to Often one can y exponentiall nomial time prisolution meth thm (presuma s. Z	aluable out ession, de on, contex apth, alpha ,ZK a solve the find a con y in this (s reprocessi nod. We wi ably) does ,ZK	-blurring in t enhancement, a matting. 4 se problems nmon property small) paramete ing of the input, ill present a not exist. We 4
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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.	curity as a matter	of protection of
IT systems against viruses, malware etc. very often means misunderstanding and underestimating of real threats which are around us and which are in	-	
other malware. The necessity to continue with business after disaster is also slightly ignored. International standards which are focused on informatic		
during last years started to anticipate necessity of risk management. There is no commonly accepted methodology used for this task. Threats which a		sible to see
worldwide, invoke pressures to prepare plans for business continuity management even in the case of dramatic political changes, natural disasters et		
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 class		-
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	s a work with sciel	ntific papers and
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.	7	4
MI-TS2 Theoretical Seminar Master II		4
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	00	•
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		nunc papers anu
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	_	•
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is		-
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
Theoretical seminar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a class		•
are treated individually and concern themselves with interesting topics from the latest research in the area. Therefore, an integral part of the course is	00	•
other scholarly literature. The capacity is limited by the the potentials of the teachers of the seminar.		
MI-MCS Multicore Systems	KZ	4
Students understand architecture of systems based on multicore processors with multiple threads per core, structure and usage of cache hierarchy	with shared last le	evel. They learn
parallel algorithm classification, parallel programming technics, simulation and monitoring tools for measurement and optimization of parallel algorithm	ns. After this cour	se, students can
design MTMD programs (Multiple Threads Multiple Data), measure and analyze latency and throughput of parallel algorithms and optimize them for o	contemporary mu	Ilticore systems.
MI-VYC Computability	Z,ZK	4
Classical theory of recursive functions and effective computability, with applications in provability theory.		
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	e 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 securing	g data and the re	lationships of
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MI-PDB	Advanced Database Systems	Z,ZK	4		
Students will get an over	rview of SQL application debugging and tuning. They will know the methods for evaluation and optimisation which are comm	, on to all DB engir	nes. Students will		
also have the knowledg	e about database engines from NoSQL family and about theoretical basis for these engines - CAP theorem. Exact lectures li	st slightly change	es each year		
according to state of the	e art.				
MI-ROZ	Pattern Recognition	Z,ZK	4		
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 statistical approach to pattern					
recognition. Students w	ill learn the fundamental concepts and methods of pattern recognition, including probability models, parameter estimation, ar	nd their numerica	l aspects.		
MI-SWE	Semantic Web	Z,ZK	4		
Students learn standard	s used for processing and sharing knowledge mainly in the area of web. They get used to designing and using knowledge m	odels, knowledge	e 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, includir	ng its standards		
and technologies (RDF,	RDFS, OWL) and formal models.				
MI-TSP	Testing and Reliability	Z,ZK	4		
Students gain knowledg	e about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prep	oare a test set wit	h the help of the		
intuitive path sensitizati	on and to use an ATPG for automatic test generation. They will be able to design easy testable circuits and systems with built	t-in-self-test equip	oment. They will		
be able to analyze and	control reliability and availability of the designed circuits.				

List of courses of this pass:

Code Name of the course Code	ompletion	Credits
BI-SOJ Machine Oriented Languages	Z,ZK	4
Students of the course will gain an ability to create their own programs in the assembly language of the most common PC platform focusing on optimal use of	microprocesso	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	l 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 subject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that is r	equired 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 introduces the scientific disciplines of history and technology, economic and social history of the Czech lands and Czechoslovakia in compariso		1
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 diversity of		1
anthropological research from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health, hi		
shown. The course is an interesting alternative to other humanities, taught at FIT.		
FI-MPL Managerial Psychology	ZK	2
	ZK	2
FI-ULI Introduction to Linguistics for Computer	Zn	Z
This course is presented in Czech.	_	
FI-VEZ economic-managerial course from a study abroad	Z	4
A "Humanities subject that has been studied abroad" is covered by the Humanities subject from a study abroad in Compulsory Humanities Module that is r	equired 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.		1
MI-ADM.16 Data Mining Algorithms	Z,ZK	5
The course focuses on algorithms used in the fields of machine learning and data mining. However, this is not an introductory course, and the students show		-
basics. The emphasis is put on advanced algorithms (e.g., gradient boosting) and non-basic kinds of machine learning tasks (e.g., recommendation systems	s) and models	(e.g., kernel
methods).		
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 as we	II as with under	rstanding of
the challenges, issues, and tradeoffs of advanced software design. In the first part of the course, the students will refresh and deepen their knowledge of obj		•
and get familiar with the commonly used object-oriented design patterns that represent the best practices for solving common software design problems. In the	-	
will be introduced to the principles of software architecture design and analysis. This includes the classical architectural styles, component based systems, and	d some advanc	ed software
architectures used in large-scale distributed systems.		
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 progr	amming langua	ages are on
the rise nowadays and the functional paradigm becomes an important construct of traditionally imperative languages (C++, C#, Java). As such, mastering	this paradigm b	becomes a
necessary competence of a software engineer: the theory and especially the practice.		
	Z,ZK	4
necessary competence of a software engineer: the theory and especially the practice.	, ,	-
Image: mecessary competence of a software engineer: the theory and especially the practice. MI-APH Architecture of computer games	w. They will get	t a grasp on
MI-APH Architecture of computer games Students will gain a basic understanding of the various issues in the field of computer game development, from both the technical and creative points of view	w. They will get	t a grasp on
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(finite, pushdown, linear-bounded, or tree).	based on some a	utomatom
MI-BHW Security and Hardware	Z.ZK	4
Students gain a basic knowledge in selected topics of cryptography and cruptanalysis. The module focuses particularly on elliptic curve cryptography, and	,	
cryptographic systems. Students gain a good overview of the functionality of (hardware) cryptographic accelerators, (pseudo)random number generators		
for securing of internal functions of computer systems.		
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, an		
cryptographic systems. Students gain a good overview of the functionality of (hardware) cryptographic accelerators, random number generators, smart car	ds, and resources	for securing
of internal functions of computer systems.	7 71/	-
MI-BKO.16 Error Control Codes 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 transm	Z,ZK	5
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 t		-
models providing description of real phenomena, as well as their subsequent use, e.g., for forecasting of future evolution or learning about the hidden v		
from noisy observations etc.). The emphasis is put on understanding of explained principles and methods and their practical adoption. For this purpose, a r		
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 tr	ry to solve
some of them.	7 71/	4
MI-BPR Security and Secure Programming 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 getting fa	Z,ZK	4
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 securing		
security and database systems, web, remote procedure calls, and sockets in general. The module concludes with Denial of Service attacks and the	e defense against	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 ad		
broadcast mechanisms, and data flow control mechanisms. They will also learn about principles of communication in sensor networks. They get knowle		echanisms
for wireless networks and get skills of configuration of wireless network elements and simulation of wireless networks using suitab MI-CPX Complexity Theory		F
MI-CPX Complexity Theory Students will learn about the fundamental classes of problems in the complexity theory and different models of algoritms and about implications of the	Z,ZK	5 n practical
(un)solvability of difficult problems.		gpraotioal
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 hands o	n experience with	large scale
data processing framework Apache Spark and with existing distributed DM / ML algorithms. They will learn principles of their parallel implementations a	nd will be capable	to propose
approaches to parallelize other algorithms. The course is prezented in czech language.		
MI-DDW.16 Web Data Mining	Z,ZK	5
	an overview of we	n minina
Students will learn latest methods and technologies for Web data acquisition, analysis and utilization of the discovered knowledge. Students will gain technologies for Web structure analysis. Web usage analysis web content mining and information extraction. Students will all		-
techniques for Web crawling and search, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will also		-
techniques for Web crawling and search, Web structure analysis, Web usage analysis, Web content mining and information extraction. Students will als recent developments in the field of social web and recommendation systems.		-
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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 possibilities of applications of some mathematical methods in informatics and its development.	s, eliptic curves, et	c.) note on
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	· ·	
using hardware m	neans. They will be able to safely use and integrate hardware components into systems and test them for resistance to attacks. Stude	nts will gain knowle	dge about
	yptographic accelerators, PUF, random number generators, smart cards, biometric devices, and devices for internal security functions	s of the computer.	
MI-IBE	Information Security	ZK	2
	prmation and IS/ICT security management systems (ISMS), methods for information access control, and basic norms and internation		-
	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
	students get acquainted with classification methods used in four important internet, or generally network applications: in spam filtering ion systems and in intrusion detection systems. However, they will learn more than only how classification is performed when solving		
	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
	the latest trends in mobile development technologies for iOS platform. Class covers advanced topics, students need to know all the b		-
	BI-IOS.		
MI-IOT	Internet of Things	Z,ZK	4
The subject is f	focused on the area of hardware and software technologies for the strongly growing computer support of various devices. Its goal is fa	miliarization with a	vailable
	development elements (Raspberry Pi, Arduino Due) and with the language for efficient application development and modification (G	NU Forth).	
MI-IVS	Intelligent embedded systems	KZ	4
-	ded systems course for master's degree is focused on high-level technology embedded systems integrating artificial intelligence. The		
-	embedded system fundamentals course for the bachelor degree. The aim of the course is to teach students humanoid robot programmed and the students humanoi	-	
development. Lect	ures provide basis of motion control, sensor reading, application interfaces, robot navigation and development tools. In labs, students (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
	oduced to the basic principles of data compression. They will learn the necessary theoretical background and get an overview of data he overview covers principles of integer coding and of statistical, dictionary, and context data compression methods. In addition, stude	-	- 1
used in practice.	lossy data compression methods used in image, audio, and video compression methods. In addition, studi		
MI-KRY	Advanced Cryptology	Z,ZK	4
	n the essentials of cryptanalysis and the mathematical principles of constructing symmetric and asymmetric ciphers. They will know t		
	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-KRY.16	Advanced Cryptology	Z,ZK	5
Students will lear	n the essentials of cryptanalysis and the mathematical principles of constructing symmetric and asymmetric ciphers. They will know t	ne mathematical pr	inciples of
random number	generators. They will have an overview of cryptanalysis methods, elliptic curve cryptography and quantum cryptography, which they c	an apply to the inte	gration of
	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 will also discuss the cooperation of the state agencies and subjects dealing with defence of the cyberspace (especially CSIRT and CI		The course
MI-LOM.16		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 optimization of the software is the software in the software is the softwa		
	scheduling of tasks to processors, analysis of network flows), distribution and allocation of resources (transportation problems, travell		
issues from econo	mics, and modelling of conflicts via the game theory. They get an overview of computational complexity of optimization problems. The	y get orientation in	algorithms
	in linear programming.		
MI-MAI	Multimedia and Internet	Z,ZK	3
	ver principles and technologies for processing and network transmissions of multimedia signals, stereoscopy and visualizations in high		
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.	7 71/	
MI-MBI.16	Management of Business Informatics	Z,ZK	5
MI-MCS	This course is presented in Czech. Multicore Systems	KZ	4
	and architecture of systems based on multicore processors with multiple threads per core, structure and usage of cache hierarchy wit	I I	
	classification, parallel programming technics, simulation and monitoring tools for measurement and optimization of parallel algorithms.		-
	grams (Multiple Threads Multiple Data), measure and analyze latency and throughput of parallel algorithms and optimize them for cor		
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	,	
MI-MEP.16	Modelling of Business Processes	Z,ZK	5
	focused on introduction to the discipline of Enterprise Engineering. Students learn the importance of a proper methodological approa	, , ,	
	implementation of processes, organisation structures and information support in big enterprises and institutions.		
MI-MKY.16	Mathematics for Cryptology	Z,ZK	5
	amiliar with parts of mathematics necessary for deeper understanding of the methods used in symmetric and asymmetric cryptograph		athematical
	ringiples on which acquirity of anonyotion systems, any standy sign methods, any stagraphy over alliptic survey, and quantum any stagraph		
	rinciples on which security of encryption systems, cryptanalysis methods, cryptography over elliptic curves, and quantum cryptograph		
MI-MPC	Modern programming in C ++	Z,ZK	5
Students learn how		Z,ZK ses on programmin	

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 analysis		
-	ation. The third large topic is computer arithmetics and number representation in a computer along with error manipulation. The last top		
	r stability analysis. The topics are completed with demonstration of applications in computer science. The course focuses on clear pre		
MI-MPR	Master Project	Z	7
-	g of the semester, a student reserves her/his final thesis topic and gets together with its supervisor. Together they decide on partial ta ter. If the requirements they agreed upon are met, the supervisor awards the student an assessment for the course MI-MPR at the er		
-	Γ) supervisor fills his/her assessment into the paper "Form to award assessment by an external Final theses (FT) supervisor" (for the		
	is, then, ensure that the assessment is registered into the information system (IS) by asking their internal FT opponent to award the a		
the confirmation of	f 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 resp	oonsible
for the topic of the	e 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	e 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-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 o		
-	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 rela member of the top management).	lives of the student (e.	y. as a
MI-MSI	Mathematical Structures in Computer Science	Z,ZK	4
1011-10151	Mathematical Structures in Computer Science Mathematical semantics of programming languages.	2,21	4
MI-MTI	Modern Internet Technologies	Z,ZK	4
	hnologies of the modern Internet. links of the IP technology to the modern communication networks, mechanisms for multicasting and i		
	ns of virtual channels, and the new IPv6 architecture. They will understand the issues of monitoring and management of large computer		
	to the technologies of interconnection networks for HPC systems.		
MI-MTI.16	Modern Internet Technologies	Z,ZK	5
Students learn tec	hnologies of the modern Internet. links of the IP technology to the modern communication networks, mechanisms for multicasting and i	eal-time communicatio	on, more
efficient mechanisi	ms of virtual channels, and the new IPv6 architecture. They will understand the issues of monitoring and management of large computer	networks. They are intr	roduced
	to the technologies of interconnection networks for HPC systems.		
MI-MVI.16	Computational Intelligence Methods	Z,ZK	5
Students will und	erstand methods and techniques of computational intelligence that are mostly nature-inspired, parallel by nature, and applicable to m		ill learn
	how these methods work and how to apply them to problems related to data mining, control, intelligen games, optimizations,		
MI-MZI	Mathematics for data science	Z,ZK	4
	lents are introduced to those fields of mathematics that are necessary for understanding standard methods and algorithms used in da inear algebra (matrix factorisations, eigenvalues, diagonalization), continuous optimisation (optimisation with constraints, duality prince and the second state of the second state a		
meldde mainly.	selected notions from probability theory and statistics.	ipie, gradient methods	s) and
MI-NFA	Design for the FPGA and ASIC Technology	Z,ZK	4
	e basic knowledge needed to start a career in a design house. They will understand the FPGA and ASIC implementation technologie		
-	ose on the design. They are able to perform and to manage typical workflows, their analytic and synthetic steps, with an emphasis on		
	the structure and demands of software tools, as well as what to expect from them.		
MI-NFA.16	Design for the FPGA and ASIC Technology	Z,ZK	5
Students gain th	e basic knowledge needed to start a career in a design house. They will understand the FPGA and ASIC implementation technologie	s and the limitations th	nat the
technologies imp	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	y know
	the structure and demands of software tools, as well as what to expect from them.		
MI-NSS.16	Normalized Software Systems	ZK	5
	rn the foundations of Normalized Systems theory, which studies the evolvability of modular structures based on concepts from engin d entropy from thermodynamics. Initially, the theory was developed at the level of software architectures, where the concept of stability w		
, ,	natorial effects. These effects occur when the impact of a change to the software architecture is dependent on the change itself, as we		
	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		
	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 i	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	sting in software archite	ectures.
Normalized Syste	ems theory consists first of a set of principles which indicate where violations of stability and entropy-related issues occur in any giver	software architecture.	. These
principles indicate	that very fine-grained modular structures are required in order to control them. In the second part of the theoretical framework, it is sho	wn how software archi	itectures
	based on a set of 5 design patterns called elements. These elements provide the core functionality of information systems in terms of s		
	tors and triggers, while controlling for violations of the stability and entropy-related principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, and entropy-related by the second statement of the stability and entropy-related principles, allowing them to realize new levels of evolve and Sustained Principles, and entropy-related principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing them to realize new levels of evolve and Sustained Principles, allowing the sustained Principles, allow	-	
Recently, Normaliz	ed Systems theory was also applied to the modular structures in business processes and enterprise architectures, with the goal of cor for Enterprise Engineering.	structing a foundationa	artneory
MI-NUR.16	User Interface Design	Z,ZK	5
	rstand the theorical background of human-computer interaction and user interface (UI) design, will learn formal description of UIs, forma		
	rocesures. They get acquainted with graphical, speech, and multimodal UIs. Thanks to the gained knowledge, the students will be abl		
MI-OLI	Linux Drivers	Z,ZK	4
	g system is an important operating system for personal computer and also for embedded systems. Systems on chip and combining po		
increase the var	iability of peripheral subsystems requiring specific software drivers. This course is an advanced course in the Linux driver developme	nt for master's students	s. The
cc	purse provides knowledge of Linux operating system architecture, principles of development of various types drivers, including practic	al experience.	
MI-PAA	Problems and Algorithms	Z,ZK	5
	to evaluate discrete problems by complexity and by the purpose of optimisation (on-line tasks, multicriterial optimisation). They unders		operties
	f heuristics and exact algorithms and, therefore, are able to select, apply, and experimentally evaluate a suitable heuristics for a pract	-	
MI-PAL	Advanced Algorithms	Z,ZK	4
	earn the most important advanced algorithms in different domains of the computer science that are not covered by modules of the Bac		
other modules of the Master program. They will also learn how to cope with problems that, according to the present knowledge, are not solvable optimally in polynomially bounded time.			
MI-PAM	Efficient Preprocessing and Parameterized Algorithms	Z,ZK	4
There are many	optimization problems for which no polynomial time algorithms are known (e.g. NP-complete problems). Despite that it is often neces		
		sary to solve these pro	blems

	uts from practice-e.g., all solutions are relatively small. Parameterized algorithms exploit that by limiting the time complexity exponenties input size (which can be huge). Parameterized algorithms also represent a way to formalize the notion of effective polynomial tir		
	e in the classical complexity. Such a polynomial time preprocessing is then a suitable first step, whatever is the subsequent solution		-
	rized algorithm design methods and we will also show how to prove that for some problem (and parameter) such an algorithm (pro I also not miss out the relations to other approaches to hard problems such as moderately exponential algorithms or approximation	,,	ot exist. We
MI-PAP	Parallel Computer Architectures	Z,ZK	4
	good overview of present parallel architectures and processors:parallel (ILP) microarchitectures, multithreaded and multicore proc GPUs, and neural processors. Students also get hands-on experience with programming these 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 proc GPUs, and neural processors. Students also get hands-on experience with programming these systems.	essors, SoCs and	MPSoCs,
MI-PCM.16	Project And Change Management This course is presented in Czech.	KZ	3
MI-PDB	Advanced Database Systems verview of SQL application debugging and tuning. They will know the methods for evaluation and optimisation which are common t		4 Students will
-	ledge about database engines from NoSQL family and about theoretical basis for these engines - CAP theorem. Exact lectures lis	-	
	according to state of the art.		1
MI-PDB.16	Advanced Database Systems	Z,ZK	5
	selves in problems of evaluation and optimization of SQL queries. The next part of the course deals with new concepts of database related new data models (XML, graph databases, column databases) and languages for working with them (XQuery, XPath, CYPF		
	the course deals with performance evaluation of database machines.		
MI-PDD.16	Data Preprocessing	Z,ZK	5
	pare raw data for further processing and analysis. They learn what algorithms can be used to extract parameters from various data s		-
MI-PDM	learn the skills to apply these theoretical concepts to solve a specific problem in individual projects - e.g., parameter extraction fror Practical Data Mining	Z,ZK	5
	uced to the basic methods of discovering knowledge in data. In particular, they learn the basic techniques of data preprocessing, of	,	1
· ·	ransformation, and fundamental principles of knowledge discovery methods. Students will be aware of the relationships between n		
know the fundamental	Is of assessing model quality. Data mining software is extensively used in the module. Students will be able to apply basic data min	ing tools to comme	on problems
MI-PDP.16	(classification, regression, clustering). Parallel and Distributed Programming	Z,ZK	5
	nt of cloud, web, and communication technologies and due to the shift of the Moore law into multicore and manycore CPUs, paral	•	-
	ous. Students get acquainted with architectures of parallel and distributed computing systems, their models, theory of interconnec		
and environments for p	parallel programming of shared and distributed memory computers. On selected problems, they will learn the techniques of design of the second methods of performance available of the second methods of the second methods are second methods.	f efficient and scal	able parallel
MI-PIS.16	algorithms and methods of performance evaluation of their implementations. Advanced Information Systems	Z,ZK	5
	Advanced mornation bystems	<u> </u>	
	ion of business process logic and its formalization, with business process roles, business rules, and data processing, with the notion		ed company,
Students learn the noti enterprise services a	ion of business process logic and its formalization, with business process roles, business rules, and data processing, with the notion nd service solution of business logic. They get acquainted with these notions also for the other types of ISs. They learn about agili	n of service oriente y and adaptivity a	ind using of
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MI-ROZ.16	Pattern Recognition	Z,ZK	5
	hodule is to give a systematic account of the major topics in pattern recognition with emphasis on problems and applications of the st		to pattern
recognition. Stu	dents will learn the fundamental concepts and methods of pattern recognition, including probability models, parameter estimation, and	nd their numerical	aspects.
MI-RRI	Risk Management in Informatics	ZK	3
Information securit	y is very often considered as one of main objectives to secure targets of information processing. However, to focus on this info secur	ity as a matter of p	rotection of
IT systems against	viruses, malware etc. very often means misunderstanding and underestimating of real threats which are around us and which are mo	re dangerous then	viruses and
	he necessity to continue with business after disaster is also slightly ignored. International standards which are focused on informatics		
	started to anticipate necessity of risk management. There is no commonly accepted methodology used for this task. Threats which a		ble to see
	Idwide, invoke pressures to prepare plans for business continuity management even in the case of dramatic political changes, natura		
MI-RUB	Programming in Ruby	KZ	4
	This course is presented in Czech.		
MI-SCE1	Computer Engineering Seminar Master I	Z	4
	mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to		
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
articles and other p	rofessional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher semester.	s. The topics are r	iew ior each
MI-SCE2		Z	4
	Computer Engineering Seminar Master II mputer Engineering is a (s)elective course for students who want to deal with deeper topics of digital design, reliability and resistance to	1	
	dividually within the subject. Each student or group of students solves some interesting topic with the selected supervisor. Part of the		
	rofessional literature and/or work in K N laboratories. The capacity of the subject is limited by the possibilities of the seminar teacher		
	semester.		
MI-SCR	Statistical Analysis of Time Series	Z,ZK	4
	with the practical use of the basic time series modelling theory in engineering tasks, ranging from economics (stock exchange prices	, ,	
	g of signals and processes) to computer networks (network components load, attacks detection). The students learn to select a conve		
	lyze its properties and use it for forecasting of future or intermediate values. The stress is put on understanding and adoption of the ma		,
real-world example	s. Both the lab classes and the lectures exploit freely available software packages in order to provide easy and straightforward transfe	er of students' kno	wledge from
	the academic to the real world.		
MI-SEP	World Economy and Business	Z,ZK	4
This course is p	resented in Czech. However, there is an English variant in the program Informatics (N1801 / 4793). The course introduces students of	of technical univers	ity to the
international busi	ness. It does that predominantly by comparing individual countries and key regions of world economy. Students get to know about dil	ferent religions an	d cultures,
, ,	g business in diverse societies as well as indexes of economic freedom, corruption and economic development, which are needed for	•	
	p 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
-	pain theoretical and practical knowledge and experience in the area of current security threats in computer networks, specifically abo		
	basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anomalies and suspicious network tra-		
explanation and p	ractical 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).	incipals of handlin	g delected
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	, ,	-
	ICT for business and interrelations between information strategies and lobal business strategies. Furthermore, they gain the knowle	0, 0	
	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.	, , - : - , - : - ,	
MI-SOC.16	Systems on Chip	Z,ZK	5
	nowledge and skills in the design of large-scale digital systems. They will be familiar with architectures of such systems and communi		r parts. They
will use an appropr	iate workflow to design these architectures, their hardware and software. They will also have knowledge of contemporary methods of	large systems ver	ification and
	fault-tolerant systems design.		
MI-SPI.16	Statistics for Informatics	Z,ZK	7
Summary of probab	ility theory; Multivariate normal distribution; Entropy and its application to coding; Statistical tests: T-tests, goodness of fit tests, independent	dence test; Randor	n processes
	- stacionarity; Markov chains and limiting properties; Queuing theory		
MI-SWE	Semantic Web	Z,ZK	4
	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	cts as publishing, sharing, exchange, and acquisition of knowledge on the web. The presentation is based on the idea of the semanti	c web, including its	s standards
	and technologies (RDF, RDFS, OWL) and formal models.		_
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	cts as publishing, sharing, exchange, and acquisition of knowledge on the web. The presentation is based on the idea of the semanti and technologies (RDF, RDFS, OWL) and formal models.		s stanuarus
MI-SYB.16	System Security	Z,ZK	5
	arize themselves with the actual ICT security needs in all ICT disciplines. Students will gain knowledge of typical network attacks and pro	I '	1
	munication encryption techniques. They will learn how to work with certain aspects of encryption techniques - passwords and certifi	-	-
	of anti-virus, anti-spam and heuristic analyses used in modern anti-virus solutions or Unified Threat Management (UTM) based solut		
	ing 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
	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		
Additionally, you wil	I learn how to properly present and read scientific papers. The work in the seminar will prepare you to attend (and profit from) top machin	ne learning and Al	conferences
	and summer schools, as well as FIT's own Summer Research Program (VyLet).		
MI-TES.16	Systems Theory	Z,ZK	5
Today, humankin	d has the ability to develop systems of incredible complexity (e.g., trains, microprocessors, airplanes, nuclear power plants). Howeve	r, the costs of man	aging this
	ensuring the correct behavior of a given system have become critical. A key technique for mastering this complexity is the usage of m		-
aspects of the syst	ems that are important for the task at hand, and automated tools for analyzing those models. This subject will present theory and alg	orithms that form t	ne basis for
	the modeling and analysis of complex systems.		

MI-TNN	Theory of Neural Networks	Z,ZK	4	
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 theory. At	1 '	sic concepts	
pertaining to artific	cial neural Networks, such as neurons and connections between them, types of neurons from the point of view of signal transmission,	network topology,	somatic and	
	s, network training, and the role of time in neural networks. In connection with network topology, we get acquainted with its transforma			
	and in connection with somatic and synaptic mappings, with their composition into mappings computed by the Network, Finally in connection with training, we pay attention to the			
	aining and to the fact that training is actually a specific optimization task, recalling the most typical objective functions and the most im 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	-		
,	mportant Banach spaces of functions, in particular in the spaces of continuous functions, spaces of functions integrable with respect to			
functions with cor	tinuous derivatives, and Sobolev spaces. Within the topic probabilistic approach, we first get acquainted with training based on expec	tation and training	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 i			
	al expectancy of network outputs conditioned by its inputs using the expectancy based learning. We recall the strong and the weak la	-	-	
· ·	an 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 for its validity and with the hypothesis tests based of it. We will see now inose tests can be	, employed to sear		
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	י al reading group. T	he students	
are treated individ	ually 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	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.	work with scientific	papers and	
MI-TS3	Theoretical Seminar Master III	Z	4	
	ar is intended for students which want to come in deeper contact with contemporary theoretical computer science. It is mostly a classic	-		
	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			
are treated individ	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.	work with scientific	papers and	
MI-TSP	Testing and Reliability	Z,ZK	4	
	wedge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepare		-	
•	sitization 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.			
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	sitization 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 equipme	nt. They will	
MI-VEM	Scientific thinking	КZ	2	
	the course is to get acquainted with scientific methods and discovery of order and laws of the universe, including the aspects of huma	1	1	
	s in natural sciences, mathematics, computer science and humanities. Another aim is to introduce rules and requirements of scientific	-		
	papers and posters.			
MI-VMM.16	Retrieval from Multimedia	Z,ZK	5	
The student obtair	is general knowledge regarding interfaces of portals providing multimedia content, the principles of similarity search, the methods of feat	ture extraction from	n multimedia	
	objects, indexing, and structure of distributed search engines.	7 71/	4	
MI-VYC	Computability Classical theory of recursive functions and effective computability, with applications in provability theory.	Z,ZK	4	
MI-W20.16	Web 2.0	Z,ZK	5	
	arn new trends and technologies on the Web including theoretical foundations. Students will gain an overview about Web applications		-	
	t programmable Web (REST Architectures, Mashups), basic mechanisms for knowledge representation on the Web (microformats, met		-	
	data, etc.), mechanisms about collective intelligence (collaborative filtering, predictions of users' behaviours), social networks, and	security.		
MI-ZS10	Master internship abroad for 10 credits	Z	10	
	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 evolution of the interpolation in IS KOS. Every 40 ergelite agreement to 4 work		. ,	
	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-ZS20	Master internship abroad for 20 credits	Z	20	
Each student can	once within his / her master's degree have a foreign internship at a foreign university or other foreign scientific and/or research institu	tion. Before the int	ernship the	
	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		-	
	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	1		
	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		-	
a ioreign institut	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.	in the internship ex	Leeus ine	

NI-AML	Advanced machine learning	Z,ZK	5
The course introduc	zes students to selected advanced topics of machine learning and artificial intelligence. The topics present techniques in the field of rec	commendation syst	tems, image
processing, control and interconnection of physical laws with the field of machine learning. The aim of the exercise is to familiarize students with the methods discussed.			
NI-CAP	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 diversity	y of the world - exa	amples from
anthropological res	earch from our "exotic" cultures (topics: kinship, religion, social exclusion, migration, globalization, , material culture, language, health	n, history, death, et	tc) will be
	shown. The course is presented in Czech.		
NI-CCC	Creative Coding and Computational Art	KZ	4
Students work on p	ractical tasks, get acquainted with creative and yet proven methods of visualizing various types of data. The course freely follows the	basic graphics cou	irses (MGA,
BLE,) and introd	uces students to suitable visualization methods for traditional as well as for open data. It combines well-known visualization technique	es with artistic met	thods using
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	/letropolitan Planni	ing) and IIM
	(Institute of Intermedia FEL).		
NI-HSC	Side-Channel Analysis in Hardware	Z,ZK	4
This course is de	dicated to so-called side-channel information leakage in hardware devices. It focuses on both theoretical analysis and practical attack	<s. far<="" get="" students="" td=""><td>miliar with</td></s.>	miliar with
various kinds of si	de channels and they get deeper insight in power attacks. Students learn to implement various profiled and non-profiled attacks and	get familiar with hi	gher-order
attacks. T	hey also get practice in both designing the SCA countermeasures and analyzing the amount and characteristics of the side-channel	information leakag	je.
NI-IAM	Internet and Multimedia	Z,ZK	4
The NI-IAM cours	e is focused on principles and modern technologies for network transmissions of audiovisual (AV) signals. The syllabus includes acq	uisition of AV signa	als (input),
presentation of AV	signals (output), network communication protocols, device interfaces, codecs, data formats and stereoscopy. We will look at practical u	se case scenarios	of real-time
audiovisual transm	issions. Within the labs, students will practically assemble AV transmission chains using HW and SW technologies and verify the effe	ect of various comp	ponents on
the quality and late	ncy of AV transmissions. Students will learn how to build Internet infrastructure for end-to-end AV transmissions from the recording the	e scene up to the p	presentation
	for audience.		
NI-LSM	Statistical Modelling Lab	KZ	5
	ented on a single and multi-target tracking. The student both learns the existing methods and tries to implement them. The stress is p		
available information	on and its modeling using numpy and scipy. The second half of the semester is focused on the design of methods and algorithms, and		properties.
	At this point, the subject is on the border of own research and may result in the topic of final work (diploma or bachelor thesi		
NI-MOP	Modern Object-Oriented Programming in Pharo	KZ	4
	gramming is currently one of the most widespread paradigms of software creation, especially enterprise information systems, where i		
is used to build complex modern applications. In this course, we build on the knowledge acquired in the course BI-OOP and aim to further deepen the skills of design and implementation			
of object systems in modern pure object system Pharo (https://pharo.org). The course focuses on individual approach to students, their development needs and areas of interest. In			
addition to deepening object programming skills, which are generally applicable in other OO languages, students will also gain the opportunity to work on interesting projects and OO			
	ms of semestral work with the possibility of cooperation with practice and related bachelor, diploma, postgraduate our direct involvem		
NI-PG1	Computer Grafics 1	ZK	4
	n graphic courses (mainly BI-PGA and BI-PGR) and the knowledge from these courses is deepened by state-of-the-art knowledge. Th	•	
	ced computer graphics. Students will gain practical knowledge with realistic texturing and raytracing methods. An integral part of the o		
	subsequent implementation. The course will be followed by a course PG2 supplementing the knowledge of PG1 on other areas and	topics of computer	
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 o	ptimization algorithms are described. Basics of EDA (Electronic Design Automation) systems are given, together with combinatorial p	oroblems emerging	in EDA.

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2024-05-20, time 00:51.