### Recomended pass through the study plan

## Name of the pass: Teaching Informatics for Secondary Schools

Faculty/Institute/Others: Department: Pass through the study plan: Teaching Informatics for Secondary Schools Branch of study guranteed by the department: Welcome page Guarantor of the study branch: Program of study: U itelství informatiky pro st ední školy Type of study: Follow-up master full-time Note on the pass:

Coding of roles of courses and groups of courses:

P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):

KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semes	ster: 1					
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
32MC-P-ODID-01	General Didactics	Z,ZK	5	2P+1C		PP
32MC-P-PEDO-01	General Pedagogy	Z,ZK	5	2P+1C		PP
UNI-PS	Computers and networks	Z,ZK	6	2P+2C	Z	PP
32MC-P-PSEP-01	Psychology in Educational Process	Z,ZK	5	2P+1C		PP
32MC-P-U SP-01	Role of Teachers in Modern Society	ZK	3	2P+0C		PP
UNI-TP	Computer technology Martin Kohlík	Z,ZK	6	2P+2C	Z	PP

Number of semes	ster: 2					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
UNI-ADS	Algorithms and data structures	Z,ZK	7	2P+2C	L	PP
UNI-DI1	Didactics of Informatics I	Z,ZK	6	2P+2C	L	PP
UNI-IB	Information security Ji í Bu ek	Z,ZK	5	2P+2C	L	PP
UNI-PPP	Propedeutics of pedagogical practice	KZ	6	2P+2C	L	PP
		Min. cours.				
	Studijní základ - povinn volitelné p edm ty programu	2	Min/Max			
UNI-PV-5Z	U itelstvi informatiky pro st edni skoly NIE-KRY,NIE-PDB, (see the list of groups below)	Max. cours.	6/135			PV
		27				

Number of semester: 3							
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	
32MC-P-MSVV-01	Social Science Research Methods	Z,ZK	3	1P+1C		PP	
UNI-RPP	Reflection of teaching practice	Z	3	26XH	Z	PP	
UNI-SPD	Semester project for thesis	Z	3	90ZP	Z	PP	
UNI-SPP	Continuous teaching practice	KZ	15	450XH	Z	PP	
UNI-VSA	Development of SW applications	Z,ZK	6	2P+2C	L	PP	

#### Number of semester: 4

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
UNI-DI2	Didactics of Informatics II	KZ	7	1P+2C	L	PP
UNI-DIP	Diploma thesis	Z	9	270ZP	L	PP
UNI-MTUI	Modern technology and artificial intelligence	Z,ZK	5	2P+2C	L	PP
32MC-P-PEDS-01	Social Pedagogy	ZK	3	2P+0C		PP
		Min. cours.				
	U itelská propedeutika 2 - Povinn volitelné p edm ty	2	Min/Max			D\/
	32MC-P-DLAB-01,32MC-P-OSPN-01, (see the list of groups below)	Max. cours.	6/18			
		6				

# List of groups of courses of this pass with the complete content of members of individual groups

Kód		Name of the group or group (for specificati	f courses and on see here or	codes of members of this below the list of courses)	Com	pletion	Credi	ts Scope	Semester	Role
UNI-PV-	SZ	Studijní základ - p U itelství	ovinn volitelr informatiky pro	né p edm ty programu o st ední školy	Min. Max	cours. 2 cours. 27	<b>Min/M</b> 6/13	<b>ax</b> 5		PV
NIE-KRY	Advanced	Cryptology	NIE-PDB	Advanced Database Systems		NIE-PIS		Advanced Info	rmation Syste	ms
NIE-AIB	Algorithms	of Information Securi	NIE-ADP	Architecture and Design patterns		NIE-SIM		Digital Circuit	Simulation and	I V
NIE-DSV	Distributed	Systems and Computin	NIE-EPC	Effective C++ programming		NIE-EHV	/ Embedded Hardware			
NIE-BVS	Embedded	Security	NIE-ESW	Embedded Software		NIE-BKO	O Error Control Codes			
NIE-FME	Formal Me	thods and Specification	NIE-GPU	GPU Architectures and Programm	in	NIE-HWE	Hardware Security			
NIE-MKY	Mathemati	cs for Cryptology	NIE-AM1	Middleware Architectures 1		NIE-MTI		Modern Internet Technologies		
NIE-MCC	Multicore C	PU Computing	NIE-SIB	Network Security		NIE-NSS	,	Normalized So	oftware System	าร
NIE-REV	Reverse Er	ngineering	NIE-SBF	System Security and Forensics		NIE-TES		Systems Theo	ry	
NIE-TSP	Testing and	d Reliability	NIE-NUR	User Interface Design		NIE-VCC		Virtualization a	and Cloud Con	nputi
UNI-PV-UC	IPKA2	U itelská propede	utika 2 - Povir	n volitelné p edm ty	Min. Max	cours. 2 cours. 6	<b>Min/M</b> 6/18	ax		PV
32MC-P-DLAB-01	Didactics o	f Laboratories	32MC-P-OSPN-01	Personality: Pathology and Norma		32MC-P-	SHY-01	Psycho-hygier	he Aspects of	eachi
32MC-P-SPKO-01	Social and	Pedagogical Communica	32MC-P-TECR-01	Impacts of Information Technolog .	mpacts of Information Technolog 32MC-P-RIZZ-01 Risk Behavior of Pupils					

### List of courses of this pass:

Code	Name of the course	Completion	Credits
32MC-P-DLAB-01	Didactics of Laboratories	KZ	3
32MC-P-MSVV-01	Social Science Research Methods	Z,ZK	3
32MC-P-ODID-01	General Didactics	Z,ZK	5
32MC-P-OSPN+01	Personality: Pathology and Normality	KZ	3
32MC-P-PEDO-01	General Pedagogy	Z,ZK	5
32MC-P-PEDS-01	Social Pedagogy	ZK	3
32MC-P-PSEP-01	Psychology in Educational Process	Z,ZK	5
32MC-P-PSHY-01	Psycho-hygiene Aspects of Teaching Profession	Z,ZK	3
32MC-P-RIZZ-01	Risk Behavior of Pupils	KZ	3
32MC-P-SPKO-01	Social and Pedagogical Communication	KZ	3
32MC-P-TECR-01	Impacts of Information Technology on Society	Z,ZK	3
32MC-P-U SP-01	Role of Teachers in Modern Society	ZK	3

NIE-ADP	Architecture and Design patterns	Z,ZK	5
The objective of th	is course is to provide students with both work knowledge about the underlying foundations of object-oriented design and analysis as	well as with under	standing of
the challenges, iss	ues, and tradeoffs of advanced software design. In the first part of the course, the students will refresh and deepen their knowledge o	f object-oriented pr	ogramming
and get familiar wit	h the commonly used object-oriented design patterns that represent the best practices for solving common software design problems. I	In the second part t	he students
will be introduced to	o the principles of software architecture design and analysis. This includes the classical architectural styles, component based systems	, and some advanc	ed software
	architectures used in large-scale distributed systems.		
NIE-AIB	Algorithms of Information Security	<u>Z</u> ,ZK	5
Students will get ac	equainted with the algorithms of secure key generation and cryptographic error (not only biometric) data processing. Furthermore, stude	ents will learn the m	athematical
principles of cryp	prographic protocols (identification, authentication, and signature schemes). Another part of the course is dedicated to maiware detect learning in detection systems. The last tonic includes practical steganographic methods and attacks on steganographic systems	tion and the use of	machine
	Middleware Architectures 1	776	5
Students will stud	dv new trends, concepts, and technologies in the area of service-oriented architectures. The will gain an overview of information syste	em architecture we	b service
architecture and ac	lication servers. The will also study principles and technologies for middleware focused on application integrations, asynchronous comm	unications and hig	n availability
	of applications. This course replaces the course MIE-MDW.		
NIE-BKO	Error Control Codes	Z.ZK	5
The course expand	Is the basic knowledge of security codes used in current systems for error detection and correction. It provides the necessary mathem	natical theory and	principles of
linear, cyclic co	des and codes for the correction of multiple errors, clusters of errors and whole syllables (bytes). Students will also learn how to imple	ement these detect	ions and
COI	rrections for different types of transmissions (parallel, serial) when storing data in memory and when transmitting over telecommunica	ation channels.	
NIE-BVS	Embedded Security	Z,ZK	5
Students gain basi	c knowledge in selected topics of cryptography and cryptanalysis. The course focuses particularly on efficient implementations of crypto	ographic primitives	in hardware
and software (in en	nbedded systems). Students gain a good overview of functionality of (hardware) cryptographic accelerators, smart cards, and resources	s for securing intern	al functions
	of computer systems.		
NIE-DSV	Distributed Systems and Computing	Z,ZK	5
Students are introd	uced to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computing	processes and con	nmunication
channels. They lea	rn basic algorithms that assure correctness of computations realized by a group of loosely coupled processes and mechanisms that s	support high availat	oility of both
	data and services, and satety in case of failures.		
NIE-EHW	Embedded Hardware	Z,ZK	5
The course brings	basic laws that govern digital design and basic techniques to use them. It deals with both large and small scale systems. This is the	base of advanced	embedded
systems, that profi	t from their specialized structure for effective computation and acceleration. Design of fast custom computing machines is discussed,	including standard	ized means
		774	
NIE-EPC	Effective C++ programming language for software development. The source form		C C
and eff	to use the modern realities of contemporary versions of the C++ programming language for software development. The course focus	time requirements	ig ellectivity
			5
Embedded softwar	e course acquainted students with the specifics of software development for embedded systems. The course covers the areas from the ba	isic techniques of p	
in C language and	d code optimizations, through typical areas as the reliable software development, embedded operating systems, signal processing, u	p to sophisticated t	echniques
	combined with artificial intelligence.		-
NIE-FME	Formal Methods and Specifications	Z,ZK	5
Students are able t	o describe semantics of software formally and to use sound reasoning for construction of correct software. They learn to use some so	ftware tools that all	ow to prove
	basic properties of software.		
NIE-GPU	GPU Architectures and Programming	Z,ZK	5
Students will gain k	knowledge of the internal architecture of modern massively parallel GPU processors. They will learn to program them mainly in the CU	DA programming e	nvironment,
which is already a v	videspread programming technology of GPU processors. As an integral part of the effective computational use of these hierarchical com	putational structure	es, students
	will also learn optimization programming techniques and methods of programming multiprocessor GPU systems.		
NIE-HWB	Hardware Security	Z,ZK	5
The course provid	es the knowledge needed for the analysis and design of computer systems security solutions. Students get an overview of safeguard	s against abuse of	the system
using nardware m	leans. They will be able to safely use and integrate hardware components into systems and test them for resistance to attacks. Studei use an enterprise devices and devices for internal acquirity functions.	nts will gain knowle	edge about
			-
NIE-KKY Students will loar	Auvanced Cryptology	Z,ZK	C fo coloriori
random number	n the essentials of displanalysis and the mathematical principles of constructing symmetric and asymmetric ciphers. They will know it	an apply to the inte	aration of
	their own systems or to the creation of their own software solutions.	an apply to the inte	gration of
NIF-MCC	Multicore CPU Computing	7 7K	5
Students will get a	couginted in detail with hardware support and programming technologies for the creation of parallel multithreaded computations on mu	lticore processors	with shared
and virtually share	d memory, which are today the most common computing nodes of powerful computer systems. Students will gain knowledge of archi	tecturally specific of	ptimization
techniques used to	reduce the decrease in computing power due to the widening performance gap between the computational requirements of multi-cor	e CPUs and memo	ory interface
	throughput. On specific non-trivial multithreaded programs, students will also learn the basics of the art of creating these application	ations.	
NIE-MKY	Mathematics for Cryptology	Z,ZK	5
Students will gain	deeper knowledge of algebraic procedures solving the most important mathematical problems concerning the security of ciphers. In	particular, the cour	se focuses
on the problem o	of solving a system of polynomial equations over a finite field, the problem of factorization of large numbers and the problem of discre	te logarithm. The p	roblem of
	factorization will also be solved on elliptic curves. Students will further become familiar with modern encryption systems based on	lattices.	
NIE-MTI	Modern Internet Technologies	Z,ZK	5
Students learn	advanced networking technologies and protocols for both local area networks and wide area networks. They get acquainted with rout	ing techniques and	transfer
	Nerroelized Optimize		~
NIE-NSS Students will loars	INORMAIIZED SOTTWATE SYSTEMS	ZK	5 rom system
theory and entropy	are roundations or normalized systems areory that studies the evolvability or modulat structures based on concepts from engineering from thermodynamics. Students will understand a set of principles that indicate where violations of stability and entropy rolated issue	es occur in any div	en software
architecture. In the	second part of the course, students learn how to construct software architectures using a set of 5 design patterns called elements. The	lese elements prov	ide the core
functionality of info	rmation systems in terms of storing data, executing actions, workflows, connectors, and triaders, while handling violations of the stability	and entropy-relate	d principles.
	This knowledge allows students to realize new levels of evolvability in software architectures		

NIE-NUR	User Interface Design	Z,ZK	5
Students will under	stand the theorical background of human-computer interaction and user interface (UI) design, will learn formal description of UIs, formal	l user models, the f	undamental
notions and pr	ocesures. They get acquainted with graphical, speech, and multimodal UIs. Thanks to the gained knowledge, the students will be able	e to design advanc	ed Uls.
NIE-PDB	Advanced Database Systems	Z,ZK	5
Students orient the	emselves in problems of evaluation and optimization of SQL queries. The next part of the course deals with new concepts of database	e machines (so cal	led NoSQL
databases), with th	he related new data models (XML, graph databases, column databases) and languages for working with them (XQuery, XPath, CYPF	IER, Gremlin). The	last part of
	the course deals with periormance evaluation of database machines. This course is equivalent to the course MiE-PDB.	7 74	5
NIE-PIS	Advanced information Systems		C vacanco b
enterprise service	s and service solution of business logic They get acquainted with these notions also for the other types of ISs They learn about agili	ty and adaptivity a	nd using of
artificial intelligen	ce methods for implementation of these ideas in ISs. They understand modern object-oriented methodologies for modelling of business	ss processes, busi	ness rules.
	processed data, and enterprise ISs. They will get the rules and technologies for successful implementation of IS.		,
NIE-REV	Reverse Engineering	Z,ZK	5
Students will lear	n fundamentals of reverse engineering of computer software (methods of executing and initializing programs, organization of executal	ble files, work with	third-party
libraries). Special	attention will be paid to C++. Students will also become familiar with the principles of debugging tools, disassemblers and obfuscation	n methods. Finally,	the course
	will focus on code compression and decompression and executable file reconstruction.		
NIE-SBF	System Security and Forensics	Z,ZK	5
Students will be int	roduced to various aspects of system security (principles of endpoint security, principles of security policies, security models, authenti	cation concepts). S	Students will
also learn about fo	orensic analysis as a tool for investigating security incidents (techniques used by malicious software or attackers, forensic analysis tec	chniques, and the i	mportance
		7 71	F
NIE-SIB	INCLIVITING Security	Z,ZR	D fance The
course explains	basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anomalies and suspicious network tra	affic The course for	
explanation and r	practical examples of various mechanisms of securing network infrastructure and detection in real time. The course covers general pr	incipals of handling	detected
	security events (i.e. incident handling and incident response).		,
NIE-SIM	Digital Circuit Simulation and Verification	Z,ZK	5
Aim of the cours	e is to acquaint the students with principles of digital circuit simulation at RTL (Register Transfer Level) and TLM (Transaction Level N	lodeling) levels and	d with the
	properties of proper tools. The course covers today recent verification methods, too.		
NIE-TES	Systems Theory	Z,ZK	5
Today, humankir	d has the ability to develop systems of incredible complexity (e.g., trains, microprocessors, airplanes, nuclear power plants). However	r, the costs of man	aging this
complexity and of	ensuring the correct behavior of a given system have become critical. A key technique for mastering this complexity is the usage of m	odels that describe	only those
aspects of the sys	tems 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
	Teeting and Delichility	7 71/	-
NIE-ISP Students will gain	Iesting and Reliability and security They will get practical skills to be able to provide a security. They will get practical skills to be able to provide the security of the security and security.	Z,ZR	5 the help of
the intuitive path s	ensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with bu	ilt-in-self-test equir	ment They
	will be able to compute, analyze, and control the reliability and availability of the designed circuits.	in in con toot oquip	
NIE-VCC	Virtualization and Cloud Computing	Z.ZK	5
Students will ga	in knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and	organizations. The	y will get
acquainted with vi	rtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficie	ently operate and o	ptimize the
performance pa	arameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effection	ve technology toda	ay for the
management of co	mplex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in	n the use of moderr	n integration
	and development tools (Continuous integration and development).	7 71/	
UNI-ADS	Algorithms and data structures	Z,ZK	/
to the use of explai	ine most basic of the encient algorithms, data structures and graph theory that every computer scientist should know. As part of the ex-	equilar expressions	the use of
col	ntext-free grammars and the design and use of stack automata. They are introduced to the Turing machine and to the complexity clas	ses P and NP.	, the use of
UNI-DI1	Didactics of Informatics I	7 7K	6
The course builds	on the subjects General Pedagogy and General Didactics and applies the acquired knowledge to didactics in the field of informatics	and related techno	logies. The
student will	get acquainted with the ways of theoretical teaching of information technologies and in connection with their practical practice and ve	rification of knowle	dge.
UNI-DI2	Didactics of Informatics II	KZ	7
The course builds o	on the subject Didactics of Informatics I and applies the knowledge to the practical use of evaluation tools for various types of tests Mood	lle (theory), Marast	(examples,
mathematics, info	prmatics), Progtest (programs in C/C++), LearnShell (bash scripts). Students learn to work with the tools, prepare/program examples	and test them on e	ach other.
Students get acqua	ainted and help with preparing real tests from selected topics, get acquainted and help with the preparation of programming competiti	ons for secondary	school. The
	course is significantly built on independent work and processing of semester project (this corresponds to the credit load).		
UNI-DIP	Diploma thesis	Z	9
The eaching is bas	ed on individual consultations with the supervisor of the thesis or another consultant (didactic part). The scope of the 9 ECTS lessons	(i.e. about 270 hou	rs) includes
	consultations, preparation of the theoretical part, practical part, writing and defence of the thesis before the commission.		
UNI-IB	Information security	Z,ZK	5 d to surrout
topics of cyber se	uite area of description of basic cryptographic schemes and also introduces students to the basics of network and system security. Gr	eat attention is par	a to current
	web applications. Student learns how to avoid traps that can be set for users and thus basics of safe behavior of users and risk min	imization.	
UNI-MTUI	Modern technology and artificial intelligence	7.7K	5
Students will get ad	cquainted with selected tools that can be used for data acquisition and processing and subsequently for their analysis and visualization.	Using real data an	d problems.
the basics of mach	ine learning and artificial intelligence will be explained. In the next part of the course, the acquired knowledge will be used to work with	th tools for working	with image
	data. In the last part of the course, students will get acquainted with the basics of robotics, especially agent systems and motion p	lanning.	
UNI-PPP	Propedeutics of pedagogical practice	KZ	6
	The course is focused on the preparation of students for lessons before teaching practice.		
UNI-PS	Computers and networks	Z,ZK	6
Students are gener	rally explained the principles of the internal organization and architecture of computer systems. Using simple examples, they will underst	and how a standard	d multi-core,
vector- and GPU-a	accelerated computer connected to the Internet processes, stores and sends data in a multi-user operating system. The work at the c	ommand-line level	penetrates
	the entire subject and will be explained continuously.		

UNI-RPP	Reflection of teaching practice	Z	3			
In the practically focused subject, special attention will be paid to the joint search for suitable solutions to the most common difficulties of pedagogical practice, as well as to effective						
ways of coping with	ways of coping with dynamic changes in contemporary education. Teaching mainly builds on the targeted building of a safe space to reflect one's own dispositions for learning, to share					
and process emot	ions as well as challenging topics from practice, including presentation and communication of students' first pedagogical outputs. Pro	cedures included:	structured			
	discussion, feedback interviews and mentoring.					
UNI-SPD	Semester project for thesis	Z	3			
The aim of the co	urse is to deepen standards and requirements for theses. It takes place mainly in the form of individual consultations with supervisor	s of theses and inc	lependent			
work. At the begin	ning of the course there is a block meeting with students, which introduces the student to the requirements for theses and the interco	onnection of profes	sional and			
didactic issues. To	tal burden in the range of 3 ECTS. The student prepares a research of resources according to the supervisor's request, chooses a m	ethod of work, or	prepares a			
	separate chapter.					
UNI-SPP	Continuous teaching practice	KZ	15			
Before entering th	e practice, the student undergoes the propedeutic of the teaching practice. The first part of the direct practice includes, in particular,	hospitalization at a	particular			
school and the pro	pressing of hospitalization protocols. In the next part, students also directly enter the lessons and engage in activities related to the m	unning of the scho	ol. At least			
192 hours participa	ate in the direct teaching activity, of which 96 hours directly teach either alone or in a couple. Home preparation for teaching, protocol	processing, etc., i	e. a total of			
	450 hours is included in the 15 credits.					
UNI-TP	Computer technology	Z,ZK	6			
The course practic	ally focuses on embedded systems and low-level software. It explains that the basis is the design of algorithms and their implementat	ion, whether in ha	rdware or in			
software, with rega	rd to limiting conditions (size, speed, reliability). Topics are discussed in an overview form and practiced on specific examples in the la	boratory. Laborato	ry exercises			
are aimed at gettir	ig students acquainted with teaching methods, e.g. how to show that there is not only reconfigurable software (a program in rewritable	e memory) but als	o hardware			
(FPGA)	. It demonstrates how to adapt tasks to the teaching of secondary school students and their expected knowledge, e.g. by means of ir	nteractive tutorials.				
UNI-VSA	Development of SW applications	Z,ZK	6			
The lectures con	sist of topics devoted to methodology, SW systems architectures, technology platforms as well as support tools used in practice shar	ed code repositori	es, CI/CD			
(Continuous Integration / Continuous Delivery) tools, application repositories (Google Play, App Store, Github, Gitlab,). The space will also be devoted to the use of SW components						
and services provided to developers, often free of charge (cloud storage, bug logging, authentication/authorization using Google or Facebook accounts and others). The seminars/exercises						
are designed so that students can try out at least one of many possible ways of developing and deploying a simple SW application.						

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2025-05-24, time 01:17.