Recomended pass through the study plan

Name of the pass: Teaching Informatics for Secondary Schools 2025/26

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 semester: 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 David Van ek, Martin Kursch David Van ek David Van ek (Gar.)	Z,ZK	5	2P+1C		PP
32MC-P-PEDO-01	General Pedagogy Martin Kursch, Daniela Nováková Daniela Nováková Martin Kursch (Gar.)	Z,ZK	5	2P+1C		PP
32MC-P-PSEP-01	Psychology in Educational Process Andrea Hlubu ková Andrea Hlubu ková (Gar.)	Z,ZK	5	2P+1C		PP
32MC-P-U SP-01	Role of Teachers in Modern Society Miroslava Kova íková Miroslava Kova íková (Gar.)	ZK	3	2P+0C		PP
UNI-TP	Computer technology Hana Kubátová, Martin Kohlík, Martin Da hel Martin Kohlík Hana Kubátová (Gar.)	Z,ZK	6	2P+2C	Z	PP
		Min. cours.				
LINII DV 07	Studijní základ - povinn volitelné p edm ty programu	2	Min/Max			
UNI-PV-SZ	U iteľství informatiky pro st ední školy NIE-KRY,NIE-PDB, (see the list of groups below)	Max. cours.	6/135			PV
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Number of semester: 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 Tomáš Valla Tomáš Valla (Gar.)	Z,ZK	7	2P+2C	L	PP
UNI-DI1	Didactics of Informatics I Ji ina Scholtzová, Zden k Muziká Zden k Muziká (Gar.)	Z,ZK	6	2P+2C	L	PP
UNI-IB	Information security Róbert Lórencz, Josef Kokeš, David Pokorný Ji í Bu ek Róbert Lórencz (Gar.)	Z,ZK	5	2P+2C	L	PP
UNI-PS	Computers and networks Jan Fesl, Michal Št panovský, Petr Zemánek Petr Zemánek Michal Št panovský (Gar.)	Z,ZK	6	2P+2C	Z	PP
UNI-PPP	Propedeutics of pedagogical practice Ji ina Scholtzová, Zden k Muziká, Kate ina Mrázková Zden k Muziká Zden k Muziká (Gar.)	KZ	6	2P+2C	L	PP

Number of semester: 3

	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 Zden k Muziká	Z	3	26XH	Z	PP
UNI-SPD	Semester project for thesis Zden k Muziká	Z	3	90ZP	Z	PP
UNI-SPP	Continuous teaching practice Zden k Muziká	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 Zden k Muziká	KZ	7	1P+2C	L	PP
UNI-DIP	Diploma Thesis Tomáš Valla	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.				
UNI-PV-UCIPKA2	U itelská propedeutika 2 - Povinn volitelné p edm ty	2	Min/Max			PV
UNI-F V-UCIFICAZ	32MC-P-DLAB-01,32MC-P-OSPN-01, (see the list of groups below)	Max. cours.	6/18			ΓV
		6				

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

Kód		Name of the group ogroup (for specificati	f courses and on see here or	codes of members of this r below the list of courses)	Com	pletion	Credit	ts Scope	Semester	Role
UNI-PV	-sz			né p edm ty programu o st ední školy	Min.	cours. 2 . cours. 27	Min/M a 6/135			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	l 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		Error Control Codes		
NIE-FME	Formal Me	thods and Specification	NIE-GPU	GPU Architectures and Programmi	in	NIE-HWE	3	Hardware Security		
NIE-MKY	Mathemati	cs for Cryptology	NIE-AM1	Middleware Architectures 1		NIE-MTI	I Modern Internet Technologies			:S
NIE-MCC	Multicore C	CPU Computing	NIE-SIB	Network Security		NIE-NSS		Normalized Software Systems		
NIE-REV	Reverse E	ngineering	NIE-SBF	System Security and Forensics		NIE-TES		Systems Theo	ory	
NIE-TSP	Testing and	d Reliability	NIE-NUR	User Interface Design		NIE-VCC		Virtualization	and Cloud Cor	nputi
					Min.	cours.				
UNI-PV-UC	CIPKA2	U itelská propede	eutika 2 - Povii	nn volitelné p edm ty	Max	2 . cours. 6	Min/M a 6/18			PV
32MC-P-DLAB-01	Didactics of	l If Laboratories	32MC-P-OSPN-01	Personality: Pathology and Norma		32MC-P-I	PSHY-01	Psycho-hygie	ne Aspects of	Teachi
32MC-P-SPKO-01	Social and	Pedagogical Communica	32MC-P-TECR-01	Impacts 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

32MCP-PEDS-01 32MCP-PSEP-01 The course guides stu in the area of personal	General Pedagogy		
32MCP-PEDS-01 32MCP-PSEP-01 The course guides stu in the area of personal		Z,ZK	5
32MCP-PSEP-01 The course guides stu in the area of personal	n basic knowledge of educational phenomena, processes, laws, principles, categories, and theories that form the basis of pedagoç	gical thinking. Ed	lucation and
32MC-P-PSEP-01 The course guides stu in the area of personal	ed in the context of pedagogical sciences in connection with changes in the Czech education system over the past twenty years, n	amely in relatior	to curricula
32MC-P-PSEP-01 The course guides stu in the area of personal	reform, diversification of the system, alternative educational concepts, and changes in vocational education.		
The course guides stu in the area of personal	Social Pedagogy	ZK	3
The course guides stu in the area of personal	Psychology in Educational Process	Z,ZK	5
in the area of personal	dents toward future applications of psychological theory in practical teaching activities. It facilitates the acquisition and development		
•	development and understanding the personality traits of others. Furthermore, the course translates selected psychological knowledge	-	
and galanig are cauce	tional process. This mainly concerns the characteristics and development of cognitive and emotional processes, the psychological		_
	changes in individual developmental stages.	manto or marvida	a.o, a.ra .r.o
32MC-P-PSHY01	Psycho-hygiene Aspects of Teaching Profession	Z,ZK	3
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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	·	Z,ZK	5
1	Architecture and Design patterns		-
	ourse is to provide students with both work knowledge about the underlying foundations of object-oriented design and analysis as v		_
-	, and tradeoffs of advanced software design. In the first part of the course, the students will refresh and deepen their knowledge of	-	
-	e commonly used object-oriented design patterns that represent the best practices for solving common software design problems. In		
will be introduced to th	e principles of software architecture design and analysis. This includes the classical architectural styles, component based systems,	and some advar	iced software
	architectures used in large-scale distributed systems.		
NIE-AIB	Algorithms of Information Security	Z,ZK	5
Students will get acqua	ainted with the algorithms of secure key generation and cryptographic error (not only biometric) data processing. Furthermore, studen	ts will learn the i	mathematica
principles of cryptog	raphic protocols (identification, authentication, and signature schemes). Another part of the course is dedicated to malware detecti-	on and the use	of machine
	learning in detection systems. The last topic includes practical steganographic methods and attacks on steganographic system	ns.	
NIE-AM1	Middleware Architectures 1	Z,ZK	5
	lew trends, concepts, and technologies in the area of service-oriented architectures. The will gain an overview of information system	•	veb service
=	tion servers. The will also study principles and technologies for middleware focused on application integrations, asynchronous commu		
	of applications. This course replaces the course MIE-MDW.		g
NIE-BKO	Error Control Codes	Z,ZK	5
			-
·	ne basic knowledge of security codes used in current systems for error detection and correction. It provides the necessary mathema	-	
	and codes for the correction of multiple errors, clusters of errors and whole syllables (bytes). Students will also learn how to implen		cuons and
	tions for different types of transmissions (parallel, serial) when storing data in memory and when transmitting over telecommunicati		
NIE-BVS	Embedded Security	Z,ZK	5
Students gain basic kn	owledge in selected topics of cryptography and cryptanalysis. The course focuses particularly on efficient implementations of cryptog	graphic primitive	s in hardware
and software (in embe-	dded systems). Students gain a good overview of functionality of (hardware) cryptographic accelerators, smart cards, and resources t	for securing inte	rnal functions
	of computer systems.		
NIE-DSV	Distributed Systems and Computing	Z,ZK	5
Students are introduce	d to methods for coordination of processes in distributed environment characterised by nondeterministic time responses of computing p	rocesses and co	mmunication
channels. They learn t	asic algorithms that assure correctness of computations realized by a group of loosely coupled processes and mechanisms that su	pport high avail	ability of both
-	data and services, and safety in case of failures.	-	-
NIE-EHW	Embedded Hardware	Z,ZK	5
	sic laws that govern digital design and basic techniques to use them. It deals with both large and small scale systems. This is the b		I
-	m their specialized structure for effective computation and acceleration. Design of fast custom computing machines is discussed, in		
systems, that profit no		icidaling standar	uizeu means
= ===	of internal communication, parallelism extraction and utilization in special structures and system architectures.		
	Effective C++ programming	Z,ZK	5
NIE-EPC	use the modern features of contemporary versions of the C++ programming language for software development. The course focuse	es on programm	ing effectivity
	ncy in the form of writing maintainable and portable source code and creating correct programs with low memory and processor tin	ne requirements	
Students learn how to	Finals added On three no	-	5.
Students learn how to	Embedded Software	Z,ZK	5.
Students learn how to and efficie	EMDEGGEG SOπWare purse acquainted students with the specifics of software development for embedded systems. The course covers the areas from the bas		5
Students learn how to and efficient NIE-ESW Embedded software co	ourse acquainted students with the specifics of software development for embedded systems. The course covers the areas from the bas	ic techniques of	5 programming
Students learn how to and efficient NIE-ESW Embedded software co	ourse acquainted students with the specifics of software development for embedded systems. The course covers the areas from the bas ode optimizations, through typical areas as the reliable software development, embedded operating systems, signal processing, up	ic techniques of	5 programming
Students learn how to and efficient NIE-ESW Embedded software coin C language and co	ourse acquainted students with the specifics of software development for embedded systems. The course covers the areas from the based optimizations, through typical areas as the reliable software development, embedded operating systems, signal processing, up combined with artificial intelligence.	ic techniques of to sophisticated	5 programming techniques
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techniques used to reduce the decrease in computing power due to the widening performance gap between the computational requirements of multi-core CPUs and memory interface throughput. On specific non-trivial multithreaded programs, students will also learn the basics of the art of creating these applications. 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 course focuses on the problem of solving a system of polynomial equations over a finite field, the problem of factorization of large numbers and the problem of discrete logarithm. The problem 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 5 Students learn advanced networking technologies and protocols for both local area networks and wide area networks. They get acquainted with routing techniques and transfer technologies of modern internet, including multimedia data transfer, with various types of network virtualization, and with last-mile security. NIE-NSS Normalized Software Systems Students will learn the foundations of normalized systems theory that studies the evolvability of modular structures based on concepts from engineering, such as stability from system theory and entropy from thermodynamics. Students will understand a set of principles that indicate where violations of stability and entropy-related issues occur in any given 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. These elements provide the core functionality of information systems in terms of storing data, executing actions, workflows, connectors, and triggers, while handling violations of the stability and entropy-related principles. This knowledge allows students to realize new levels of evolvability in software architectures. **NIE-NUR** User Interface Design Z,ZK 5 Students will understand the theorical background of human-computer interaction and user interface (UI) design, will learn formal description of UIs, formal user models, the fundamental notions and procesures. They get acquainted with graphical, speech, and multimodal UIs. Thanks to the gained knowledge, the students will be able to design advanced UIs. Advanced Database Systems Students orient themselves in problems of evaluation and optimization of SQL queries. The next part of the course deals with new concepts of database machines (so called NoSQL databases), with the related new data models (XML, graph databases, column databases) and languages for working with them (XQuery, XPath, CYPHER, Gremlin). The last part of the course deals with performance evaluation of database machines. This course is equivalent to the course MIE-PDB. Advanced Information Systems Students learn the notion of business process logic and its formalization, with business process roles, business rules, and data processing, with the notion of service oriented company, enterprise services and service solution of business logic. They get acquainted with these notions also for the other types of ISs. They learn about agility and adaptivity and using of artificial intelligence methods for implementation of these ideas in ISs. They understand modern object-oriented methodologies for modelling of business processes, business rules, processed data, and enterprise ISs. They will get the rules and technologies for successful implementation of IS. NIF-RFV Reverse Engineering Z.ZK Students will learn fundamentals of reverse engineering of computer software (methods of executing and initializing programs, organization of executable 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 methods. Finally, the course will focus on code compression and decompression and executable file reconstruction. System Security and Forensics Students will be introduced to various aspects of system security (principles of endpoint security, principles of security policies, security models, authentication concepts). Students will also learn about forensic analysis as a tool for investigating security incidents (techniques used by malicious software or attackers, forensic analysis techniques, and the importance of memory or file system artifacts for attack analysis and detection). NIF-SIB **Network Security** The students will gain theoretical and practical knowledge and experience in the area of current security threats in computer networks, specifically about detection and defense. The course explains basic pricipals of security monitoring, packet-based and flow-based analysis, in order to detect anomalies and suspicious network traffic. The course focuses on explanation and practical examples of various mechanisms of securing network infrastructure and detection in real time. The course covers general principals of handling detected security events (i.e. incident handling and incident response). Digital Circuit Simulation and Verification 5 Aim of the course is to acquaint the students with principles of digital circuit simulation at RTL (Register Transfer Level) and TLM (Transaction Level Modeling) levels and with the properties of proper tools. The course covers today recent verification methods, too. **NIE-TES** Systems Theory Z.ZK Today, humankind has the ability to develop systems of incredible complexity (e.g., trains, microprocessors, airplanes, nuclear power plants). However, the costs of managing this complexity and of ensuring the correct behavior of a given system have become critical. A key technique for mastering this complexity is the usage of models that 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. Testing and Reliability Students will gain knowledge about circuit testing and about methods for increasing reliability and security. They will get practical skills to be able to prepare a test set with the help of the intuitive path sensitization and to use an ATPG for automatic test generation. They will be able to design easily testable circuits and systems with built-in-self-test equipment. They will be able to compute, analyze, and control the reliability and availability of the designed circuits. Virtualization and Cloud Computing Students will gain knowledge of architectures of large computer systems that are used in data centers and computer infrastructure of companies and organizations. They will get acquainted with virtualization principles, tools and technologies that serve to facilitate and automate configuration, testing and monitoring, and to efficiently operate and optimize the performance parameters of modern computer systems. Theoretically and practically, they will get acquainted with containerization as the most effective technology today for the management of complex computer systems and with specific technologies of cloud systems. Finally, they will learn the principles and gain practical skills in the use of modern integration and development tools (Continuous integration and development). **UNI-ADS** Algorithms and data structures The course covers the most basic of the efficient algorithms, data structures and graph theory that every computer scientist should know. As part of the exercise, students are introduced to the use of explained algorithms for solving practical problems. Furthermore, students gain basic knowledge of the design and use of finite automata, regular expressions, the use of context-free grammars and the design and use of stack automata. They are introduced to the Turing machine and to the complexity classes P and NP. UNI-DI1 Didactics of Informatics I Z,ZK 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 technologies. The student will get acquainted with the ways of theoretical teaching of information technologies and in connection with their practical practice and verification of knowledge. Didactics of Informatics II The course builds on the subject Didactics of Informatics I and applies the knowledge to the practical use of evaluation tools for various types of tests Moodle (theory), Marast (examples, mathematics, informatics), Progtest (programs in C/C++), LearnShell (bash scripts). Students learn to work with the tools, prepare/program examples and test them on each other. Students get acquainted and help with preparing real tests from selected topics, get acquainted and help with the preparation of programming competitions 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	sed on individual consultations with the supervisor of the thesis or another consultant (didactic part). The scope of the 9 ECTS lessons consultations, preparation of the theoretical part, practical part, writing and defence of the thesis before the commission.	(i.e. about 270 hou	irs) includes
UNI-IB	Information security	Z,ZK	5
The course covers	the area of description of basic cryptographic schemes and also introduces students to the basics of network and system security. G	reat attention is pai	id to current
topics of cyber se	ecurity, such as ethical hacking, penetration testing and malware. At the end of the course students are introduced to the issues of sec 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		security of
UNI-MTUI	Modern technology and artificial intelligence	Z,ZK	5
Students will get a	equainted 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
-	nine learning and artificial intelligence will be explained. In the next part of the course, the acquired knowledge will be used to work wi	_	-
	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 gene	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
_	accelerated computer connected to the Internet processes, stores and sends data in a multi-user operating system. The work at the c		
	the entire subject and will be explained continuously.		
UNI-RPP	Reflection of teaching practice	Z	3
In the practically f	ocused subject, special attention will be paid to the joint search for suitable solutions to the most common difficulties of pedagogical p	practice, as well as	to effective
	h dynamic changes in contemporary education. Teaching mainly builds on the targeted building of a safe space to reflect one's own dis		
	tions as well as challenging topics from practice, including presentation and communication of students' first pedagogical outputs. Pro	-	-
•	discussion, feedback interviews and mentoring.		
UNI-SPD	Semester project for thesis	Z	3
The aim of the c	ourse 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	dependent
work. At the begin	nning 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. T	otal burden in the range of 3 ECTS. The student prepares a research of resources according to the supervisor's request, chooses a n	nethod of work, or p	prepares a
	separate chapter.		
UNI-SPP	Continuous teaching practice	KZ	15
	he practice, the student undergoes the propedeutic of the teaching practice. The first part of the direct practice includes, in particular,	hospitalization at a	particular
_	rocessing of hospitalization protocols. In the next part, students also directly enter the lessons and engage in activities related to the r		-
192 hours particip	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 implementa		rdware or in
software, with rega	ard 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 getti	ng students acquainted with teaching methods, e.g. how to show that there is not only reconfigurable software (a program in rewritable	e memory) but also	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 in	nteractive tutorials.	
UNI-VSA	Development of SW applications	Z,ZK	6
	nsist of topics devoted to methodology, SW systems architectures, technology platforms as well as support tools used in practice share	1 ' 1	_
	gration / Continuous Delivery) tools, application repositories (Google Play, App Store, Github, Gitlab,). The space will also be devoted	•	
-	Not to developers, often free of charge (aloud storage, bug logging, outbortication/outborization using Coogle or Ecophoek accounts and		-

(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 http://bilakniha.cvut.cz/en/FF.html Generated: day 2025-11-27, time 09:09.