Study plan

Name of study plan: Open Informatics - Cyber Security

Faculty/Institute/Others: Faculty of Electrical Engineering Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Open Informatics Type of study: Follow-up master full-time Required credits: 85 Elective courses credits: 35 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses in the program Minimal number of credits of the block: 49 The role of the block: P

Code of the group: 2018_MOIEP Name of the group: Compulsory subjects of the programme Requirement credits in the group: In this group you have to gain 24 credits Requirement courses in the group: In this group you have to complete 4 courses Credits in the group: 24 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BE4M33PAL	Advanced Algorithms Ond ej Drbohlav, Marko Genyk-Berezovskyj, Daniel Pr ša Daniel Pr ša Daniel Pr ša (Gar.)	Z,ZK	6	2P+2C	Z	Р
BE4M35KO	Combinatorial Optimization Zden k Hanzálek Zden k Hanzálek Zden k Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	Р
BE4MSVP	Software or Research Project Ji í Šebek, Petr Pošík, Jaroslav Sloup, Katarína Žmolíková, Tomáš Drábek Petr Pošík	КZ	6		Z,L	Р
BE4M01TAL	Theory of Algorithms Marie Demlová, Natalie Žukovec Marie Demlová Marie Demlová (Gar.)	Z,ZK	6	3P+2S	L	Р

Characteristics of the courses of this group of Study Plan: Code=2018_MOIEP Name=Compulsory subjects of the programme

BE4M33PAL	Advanced Algorithms	Z,ZK	6		
Basic graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern matching.					
BE4M35KO	Combinatorial Optimization	Z,ZK	6		
The goal is to show the	problems and algorithms of combinatorial optimization (often called discrete optimization; there is a strong overlap with the ter	m operations rese	arch). Following		
the courses on linear alg	gebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programmi	ng, heuristics, ap	proximation		
algorithms and state spa	ace search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics, p	planning of humar	i resources,		
scheduling in production	I lines, message routing, scheduling in parallel computers.				
BE4MSVP	Software or Research Project	KZ	6		
Independent work on a	problem under the guidance of an advisor. Usually but not mandatory, the problem being solved is a subproblem of approach	ing diploma thesis	s and the project		
advisor is the diploma th	esis supervisor too. Therefore, we recommend choosing the topic of the diploma thesis at the beginning of the 3rd semester	and not underesti	mating its timely		
selection. The topic of th	selection. The topic of the project should be relevant to the major branch of the study. The software and research project course must have a clearly defined output, such as a technical				
report or a computer pro	report or a computer program. The output is defended, evaluated and graded. Important note: - By default, it is not possible to complete more than one subject of this type An exception				
may be granted by the guarantor of the major branch of the study. A possible reason for granting an exemption is that the work-project has a different topic and is led by another					
supervisor. A typical example is working on a project abroad. Note: The student enrolls in the course of SVP at the department of the supervisor. If the course does not list the course,					
then at the department 13139 (variant A4M39SVP). The contact email in case of further questions: oi@fel.cvut.cz. More instructions for entering and elaborating the project can be					
found on the website of the Department of Computer Graphics and Interaction http://dcgi.felk.cvut.cz/cs/study/predmetprojekt.					
BE4M01TAL	Theory of Algorithms	Z,ZK	6		
The course brings theoretical background of the theory of algorithms with the focus at first on the time and space complexity of algorithms and problems, secondly on the correctness					
of algorithms. Further it is dealt with the theory of complexity; the classes P, NP, NP-complete, PSPACE and NPSPACE are treated and properties of them investigated. Probabilistic					
algorithms are studied a	algorithms are studied and the classes RP and ZZP introduced.				

Code of the group: 2018_MOIEDIP Name of the group: Diploma Thesis

Requirement credits in the group: In this group you have to gain 25 credits Requirement courses in the group: In this group you have to complete 1 course Credits in the group: 25 Note on the aroup:

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
BDIP25	Diploma Thesis	Z	25	22s	L	Р

Characteristics of the courses of this group of Study Plan: Code=2018_MOIEDIP Name=Diploma Thesis

BDIP25 **Diploma** Thesis Ζ 25 Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.

Name of the block: Compulsory courses of the specialization Minimal number of credits of the block: 36 The role of the block: PO

Code of the group: 2018 MOIEPO2

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 36 credits

Requirement courses in the group: In this group you have to complete 6 courses

Credits in the group: 36

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BE2M32PST	Advanced Networking Technologies Leoš Bohá Leoš Bohá Leoš Bohá (Gar.)	Z,ZK	6	2P + 2L	Z,L	PO
BE4M36KBE	Communications Security Tomáš Van k Peter Macejko Tomáš Van k (Gar.)	Z,ZK	6	3P+2C	L	PO
BE4M36BSY	Introduction to Computer Security Sebastián García, Tomáš Pevný, Veronica Valeros, Ond ej Lukáš, Maria Rigaki, Martin epa, Lukáš Forst, Muris Sladi Tomáš Pevný Tomáš Pevný (Gar.)	Z,ZK	6	2P+2C	Z	PO
BE4M01MKR	Mathematical Cryptography Alena Gollová Alena Gollová Ji í Velebil (Gar.)	Z,ZK	6	4P+2S	L	PO
BE4M36ZKS	Software Quality Assurance Karel Frajták, Miroslav Bureš, Mat j Klíma Miroslav Bureš Miroslav Bureš (Gar.)	Z,ZK	6	2P+2C	z	PO
BE4M36SAN	Statistical data analysis Ji í Kléma Ji í Kléma Ji í Kléma (Gar.)	Z,ZK	6	2P+2C	Z	PO

Characteristics of the courses of this group of Study Plan: Code=2018_MOIEPO2 Name=Compulsory subjects of the branch

BE2M32PST Advanced Networking Technologies Z.ZK 6 The "Advanced Network Technologies" course is designed to expand students' insights into modern network technologies and deepen their understanding of advanced networking protocols within data networks. Students will engage in practical exercises involving Internet unicast routing, multicast routing, IPv6, and MPLS network design, using network simulation tools such as PacketTracer and EveNG. Given the course's emphasis on remote lab activities, instruction will predominantly be delivered online. BE4M36KBE Communications Security 7.7K 6 The course provides a complete source of information on the field of security of information systems and information technologies. The most of information in today's world is created, transferred, stored in electronic form so information security is very important part of it. On successful completion of this course, students should be able to define the cryptographic primitives symmetric / asymmetric encryption, digital signatures, cryptographic hash function, and message authentication codes. They should be able to explain the security features offered by the latest versions of the most important security protocols operating on the TCP/IP stack (IPsec, TLS, SSH, PGP) and describe known attacks against these security protocols BE4M36BSY Introduction to Computer Security Z,ZK 6 This course aims to teach students cybersecurity fundamentals by combining penetration testing with defense strategies. Using an innovative blend of lectures and practical tutorials, students engage in highly interactive classes. Each new concept is immediately reinforced with hands-on exercises, allowing students to apply what they have learned in real-time. Throughout the semester, the course integrates both attack and defense techniques. In realistic scenarios accessed via a cyber range, students will practice a wide range of skills: reconnaissance, scanning, exploiting vulnerabilities, privilege escalation, lateral movement, exfiltration, malware analysis, network security forensics, binary reversing, log analysis, intrusion detection systems, honeypots, and applications of machine learning and AI in cybersecurity. Classes are in English. Teachers speak English, Czech, Spanish, Greek, and Bosnian. BE4M01MKR Mathematical Cryptography 7.7K 6 The lecture will set mathematical foundations of modern cryptography (RSA, El-Gamal, elliptic curve cryptography, hashing). Also, the related algorithms for primality testing (numbers sieves) and discrete logarithms will be treated. Z,ZK BE4M36ZKS Software Quality Assurance 6

BE4M36SAN	Statistical data analysis	Z,ZK	6
This course builds on th	e skills developed in introductory statistics courses. It is practically oriented and gives an introduction to applied statistics. It ma	ainly aims at multiv	variate statistical
analysis and modelling,	i.e., the methods that help to understand, interpret, visualize and model potentially high-dimensional data. It can be seen as	a purely statistica	I counterpart to
machine learning and d	ata mining courses		

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

m

Code of the group: 2018_MOIEVOL Name of the group: Elective subjects Requirement credits in the group: Requirement courses in the group: Credits in the group: 0

Note on the group: ~Student can choose arbitrary subject of themagister's program (EEM - Electrical Engineering, Power Engineering and Management, EK - Electronics and Communications, KYR - Cybernetics and Robotics, OI - Open Informatics, OES - Open Electronics Systems) which is not part of his curriculum. Student can choose with consideration of recommendation of the branch guarantee. You can find a selection of optional courses organized by the departments on the web site http://www.fel.cvut.cz/cz/education/volitelne-predmety.html

List of courses of this pass:

Code	Name of the course	Completion	Credits	
BDIP25	Diploma Thesis	Z	25	
Independent final	comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or l	her branch of study	, which will	
be specified b	y branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the compreh	ensive final examir	nation.	
BE2M32PST	Advanced Networking Technologies	Z,ZK	6	
The "Advanced No	etwork Technologies" course is designed to expand students' insights into modern network technologies and deepen their understan	ding of advanced r	networking	
protocols within data	a networks. Students will engage in practical exercises involving Internet unicast routing, multicast routing, IPv6, and MPLS network de	esign, using networ	k simulation	
t	ools such as PacketTracer and EveNG. Given the course's emphasis on remote lab activities, instruction will predominantly be delive	ered online.		
BE4M01MKR	Mathematical Cryptography	Z,ZK	6	
The lecture will set	mathematical foundations of modern cryptography (RSA, El-Gamal, elliptic curve cryptography, hashing). Also, the related algorithms	s for primality testir	g (numbers	
	sieves) and discrete logarithms will be treated.			
BE4M01TAL	Theory of Algorithms	Z,ZK	6	
The course brings t	heoretical background of the theory of algorithms with the focus at first on the time and space complexity of algorithms and problem	s, secondly on the	correctness	
of algorithms. Furt	her it is dealt with the theory of complexity; the classes P, NP, NP-complete, PSPACE and NPSPACE are treated and properties of the	em investigated. P	robabilistic	
	algorithms are studied and the classes RP and ZZP introduced.			
BE4M33PAL	Advanced Algorithms	Z,ZK	6	
Basic	graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science -	pattern matching.		
BE4M35KO	Combinatorial Optimization	Z,ZK	6	
The goal is to show	the problems and algorithms of combinatorial optimization (often called discrete optimization; there is a strong overlap with the term c	perations research	i). Following	
the courses on lin	near algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programmir	ig, heuristics, appr	oximation	
algorithms and st	ate space search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics, pl	anning of human r	esources,	
	scheduling in production lines, message routing, scheduling in parallel computers.	7 71/		
BE4M36BSY	Introduction to Computer Security	Z,ZK	6	
This course aims to	b teach students cybersecurity fundamentals by combining penetration testing with defense strategies. Using an innovative biend of i	ectures and practic	al tutorials,	
Students engage I	n nignly interactive classes. Each new concept is immediately reinforced with hands-on exercises, allowing students to apply what the	ley nave learned in	real-time.	
Infougnout the semester, the course integrates both attack and defense techniques. In realistic scenarios accessed via a cyber range, students will practice a wide range of skills:				
intrusion detection	can mig, exploring vulnerabilities, privilege escalation, raterial movement, estimation, markate analysis, network security iorensics, c • existems honeworks and annifications of markine learning and Al in cyhersecurity. Classes are in English Tearchers speak English	Czech Spanish (Freek and	
	Bosnian.	ozoon, opunion, e		
BE4M36KBE	Communications Security	7 7K	6	
The course provide	s a complete source of information on the field of security of information systems and information technologies. The most of information	ion in today's work	t is created.	
transferred, stored	in electronic form so information security is very important part of it. On successful completion of this course, students should be ab	le to define the cry	ptographic	
primitives symmetric / asymmetric encryption, digital signatures, cryptographic hash function, and message authentication codes. They should be able to explain the security features				
offered by the latest versions of the most important security protocols operating on the TCP/IP stack (IPsec, TLS, SSH, PGP) and describe known attacks against these security				
	protocols.			
BE4M36SAN	Statistical data analysis	Z,ZK	6	
This course builds d	on the skills developed in introductory statistics courses. It is practically oriented and gives an introduction to applied statistics. It mainly	aims at multivaria	te statistical	
analysis and mode	ling, i.e., the methods that help to understand, interpret, visualize and model potentially high-dimensional data. It can be seen as a p	ourely statistical co	unterpart to	
	machine learning and data mining courses.			

BE4M36ZKS	Software Quality Assurance	Z,ZK	6		
BE4MSVP	Software or Research Project	KZ	6		
Independent work	Independent work on a problem under the guidance of an advisor. Usually but not mandatory, the problem being solved is a subproblem of approaching diploma thesis and the project				
advisor is the diplor	na thesis supervisor too. Therefore, we recommend choosing the topic of the diploma thesis at the beginning of the 3rd semester and	I not underestimati	ng its timely		
selection. The topic of the project should be relevant to the major branch of the study. The software and research project course must have a clearly defined output, such as a technical					
report or a computer program. The output is defended, evaluated and graded. Important note: - By default, it is not possible to complete more than one subject of this type An exception					
may be granted by the guarantor of the major branch of the study. A possible reason for granting an exemption is that the work-project has a different topic and is led by another					
supervisor. A typical example is working on a project abroad. Note: The student enrolls in the course of SVP at the department of the supervisor. If the course does not list the course,					
then at the depart	ment 13139 (variant A4M39SVP). The contact email in case of further questions: oi@fel.cvut.cz. More instructions for entering and e	laborating the proj	ect can be		
	found on the website of the Department of Computer Graphics and Interaction http://dcgi.felk. cvut.cz/cs/study/predmetproje	ekt.			

For updated information see <u>http://bilakniha.cvut.cz/en/f3.html</u> Generated: day 2025-06-04, time 09:12.