

# Study plan

## Name of study plan: Open Informatics - Computer Graphics

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	<b>Advanced Algorithms</b> Ondřej Drbohlav, Marko Genyk-Berezovskyj, Daniel Prša <b>Daniel Prša</b> Daniel Prša (Gar.)	Z,ZK	6	2P+2C	Z	P
BE4M35KO	<b>Combinatorial Optimization</b> Zdeněk Hanzálek <b>Zdeněk Hanzálek</b> Zdeněk Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	P
BE4MSVP	<b>Software or Research Project</b> Jiří Šebek, Petr Pošík, Jaroslav Sloup, Katarína Žmolíková, Tomáš Drábek <b>Petr Pošík</b>	KZ	6		Z,L	P
BE4M01TAL	<b>Theory of Algorithms</b> Marie Demlová, Natalie Žukovec <b>Marie Demlová</b> Marie Demlová (Gar.)	Z,ZK	6	3P+2S	L	P

### 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 term operations research). Following the courses on linear algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programming, heuristics, approximation algorithms and state space search methods. We focus on application of optimization in stores, ground transportation, flight transportation, logistics, planning of human resources, scheduling in production 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 approaching diploma thesis and the project advisor is the diploma thesis supervisor too. Therefore, we recommend choosing the topic of the diploma thesis at the beginning of the 3rd semester and not underestimating 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 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 <a href="http://dcgi.felk.cvut.cz/cs/study/predmetprojekt">http://dcgi.felk.cvut.cz/cs/study/predmetprojekt</a> .			
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 and the classes RP and ZPP 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 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
BDIP25	Diploma Thesis	Z	25	22s	L	P

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

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 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.		
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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\_MOIEPO3

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
BE4M39APG	<b>Algorithms of Computer Graphics</b> Jiří Žára, Jiří Bittner Jiří Bittner Jiří Žára (Gar.)	Z,ZK	6	2P+2C	Z	PO
BE4M39VG	<b>Computational Geometry</b> Petr Felkel Petr Felkel Petr Felkel (Gar.)	Z,ZK	6	2P+2S	Z	PO
BE4M39DPG	<b>Data Structures for Computer Graphics</b> Vlastimil Havran Vlastimil Havran Vlastimil Havran (Gar.)	Z,ZK	6	2P+2S	Z	PO
BE4M33GVG	<b>Geometry of Computer Vision and Graphics</b> Torsten Sattler, Viktor Korotynskiy, Tomáš Pajdla Tomáš Pajdla Tomáš Pajdla (Gar.)	Z,ZK	6	2P+2C	L	PO
BE4M39MMA	<b>Multimedia and Computer Animation</b>	Z,ZK	6	2P+2L	Z	PO
BE4M39VIZ	<b>Visualization</b> Ladislav molík Ladislav molík Ladislav molík (Gar.)	Z,ZK	6	2P+2C	L	PO

**Characteristics of the courses of this group of Study Plan: Code=2018\_MOIEPO3 Name=Compulsory subjects of the branch**

BE4M39APG	Algorithms of Computer Graphics	Z,ZK	6	In this course you will get acquainted with basic problems and their solutions in computer graphics. The main topic of the course are graphics primitives in 2D and 3D for modeling and rendering, color models, image representations, and basic photorealistic rendering algorithms.		
BE4M39VG	Computational Geometry	Z,ZK	6	The goal of computational geometry is analysis and design of efficient algorithms for determining properties and relations of geometric entities. The lecture focuses on geometric search, point location, convex hull construction for sets of points in d-dimensional space, searching nearest neighbor points, computing intersection of polygonal areas, geometry of parallelograms. New directions in algorithmic design. Computational geometry is applied not only in geometric applications, but also in common database searching problems.		
BE4M39DPG	Data Structures for Computer Graphics	Z,ZK	6	This course provides you with the fundamentals of data structures commonly used in computer graphics. In contrast to standard binary search trees used in one dimension, the presented theory focuses on multidimensional data used to describe 3D scenes. In addition to the theory, the course emphasizes individual and team projects, where the importance and advantages of multidimensional data are demonstrated on practical examples. The students will gain practical experience through their own individual projects.		
BE4M33GVG	Geometry of Computer Vision and Graphics	Z,ZK	6	We will explain fundamentals of image and space geometry including Euclidean, affine and projective geometry, the model of a perspective camera, image transformations induced by camera motion, and image normalization for object recognition. The theory will be demonstrated on practical task of creating mosaics from images, measuring the geometry of objects by a camera, and reconstructing geometrical properties of objects from their projections. We will build on linear algebra and optimization and lay down foundation for other subjects such as computational geometry, computer vision, computer graphics, digital image processing and recognition of objects in images.		
BE4M39MMA	Multimedia and Computer Animation	Z,ZK	6	The course is focused on methods often applied in the area of computer animation. Students will get an overview of algorithms and methods solving typical problems of 3D animation (inverse kinematics, animation of human body, dynamics, etc.). Part of the course is devoted to principles used during creative work with sound. The last part of lectures will give information about methods and technologies used in movie production (MOCAP, stereoscopy, visual effects).		
BE4M39VIZ	Visualization	Z,ZK	6	In this course, you will get the knowledge of theoretical background for visualization and the application of visualization in real-world examples. The visualization methods are aimed at exploiting both the full power of computer technologies and the characteristics (and limits) of human perception. Well-chosen visualization methods can help to reveal hidden dependencies in the data that are not evident at the first glance. This in turn enables a more precise analysis of the data or provides a deeper insight into the core of the particular problem represented by the data.		

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

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:

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BDIP25	Diploma Thesis	Z	25
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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 and the classes RP and ZPP introduced.			
BE4M33GVG	Geometry of Computer Vision and Graphics	Z,ZK	6
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BE4M33PAL	Advanced Algorithms	Z,ZK	6
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BE4MSVP	Software or Research Project	KZ	6
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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 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>.

For updated information see <http://bilakniha.cvut.cz/en/f3.html>

Generated: day 2025-04-19, time 11:11.