## Study plan

## Name of study plan: Open Informatics - Bioinformatics

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: 84

Elective courses credits: 36 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\_MOIDIP 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	Р

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

BDIP25	Diploma Thesis	Z	25
Independent final comp	rehensive 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 s	tudy, which will
be enecified by branch	department or branch departments. The diploma thesis will be defended in front of the heard of examiners for the comprehen	cive final examin	otion

Code of the group: 2018\_MOIP

Name of the group: Compulsory subjects of the programm

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
В4М35КО	Combinatorial Optimization Zdeněk Hanzálek <b>Zdeněk Hanzálek</b> Zdeněk Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	Р
B4M33PAL	Advanced algorithms Ondřej Drbohlav, Daniel Průša Daniel Průša (Gar.)	Z,ZK	6	2P+2C	Z	Р
B4MSVP	Software or Research Project Ivan Jelínek, Jaroslav Sloup, Jiří Šebek, Martin Šipoš, Drahomíra Hejtmanová, Jana Zichová, Petr Pošík, Martin Hlinovský, Katarína Žmolíková, Ivan Jelínek Ivan Jelínek (Gar.)	KZ	6		Z,L	Р
B4M01TAL	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\_MOIP Name=Compulsory subjects of the programm

B4M35KO | 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.

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B4M33PAL	Advanced algorithms	Z,ZK	6
Basic graph algorithms	and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pattern ma	atching.	
B4MSVP	Software or Research Project	KZ	6
B4M01TAL	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 ZZP introduced.

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 35

The role of the block: PO

Code of the group: 2018 MOIPO8

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 35 credits

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

Credits in the group: 35 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
B4M36BIN	Bioinformatics  Jiří Kléma Jiří Kléma Jiří Kléma (Gar.)	Z,ZK	5	2P+2C	L	РО
B4M33DZO	Digital image Ondřej Drbohlav, Daniel Sýkora Daniel Sýkora (Gar.)	Z,ZK	6	2P+2C	Z,L	РО
B4M36MBG	Molecular Biology and Genetics Martin Pospíšek Martin Pospíšek (Gar.)	Z,ZK	6	3P+1C	L	PO
BE4M33SSU	Statistical Machine Learning  Jan Drchal, Vojtěch Franc Vojtěch Franc (Gar.)	Z,ZK	6	2P+2C	Z	PO
B4M36SAN	Statistical Data Analysis Jiří Kléma <b>Jiří Kléma</b> Jiří Kléma (Gar.)	Z,ZK	6	2P+2C	Z	РО
B4M36SMU	Symbolic Machine Learning Filip Železný, Ondřej Kuželka, Gustav Šír Ondřej Kuželka Ondřej Kuželka (Gar.)	Z,ZK	6	2P+2C	L	РО

### Characteristics of the courses of this group of Study Plan: Code=2018\_MOIPO8 Name=Compulsory subjects of the branch

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B4M36BIN	Bioinformatics					Z,ZK	5
B4M33DZO	Digital image					Z,ZK	6

This course presents an overview of basic methods for digital image processing. It deals with practical techniques that have an interesting theoretical basis but are not difficult to implement. Seemingly abstract concepts from mathematical analysis, probability theory, or optimization come to life through visually engaging applications. The course focuses on fundamental principles (signal sampling and reconstruction, monadic operations, histogram, Fourier transform, convolution, linear and non-linear filtering) and more advanced editing techniques, including image stitching, deformation, registration, and segmentation. Students will practice the selected topics through six implementation tasks, which will help them learn the theoretical knowledge from the lectures and use it to solve practical problems

B4M36MBG	Molecular Biology and Genetics	Z,ZK	6
BE4M33SSU	Statistical Machine Learning	Z.ZK	6

The aim of statistical machine learning is to develop systems (models and algorithms) for learning to solve tasks given a set of examples and some prior knowledge about the task. This includes typical tasks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning concepts such as risk minimisation, maximum likelihood estimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classification and regression and to show how they can be learned by those concepts.

### B4M36SAN Statistical Data Analysis Z,ZK 6

This course builds on the skills developed in introductory statistics courses. It is practically oriented and gives an introduction to applied statistics. It mainly aims at multivariate 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 statistical counterpart to machine learning and data mining courses.

#### B4M36SMU Symbolic Machine Learning Z,ZK 6

This course consists of four parts. The first part of the course will explain methods through which an intelligent agent can learn by interacting with its environment, also known as reinforcement learning. This will include deep reinforcement learning. The second part focuses on Bayesian networks, specifically methods for inference. The third part will cover fundamental topics from natural language learning, starting from the basics and ending with state-of-the-art architectures such as transformer. Finally, the last part will provide an introduction to several topics from the computational learning theory, including the online and batch learning settings.

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\_MOIH

Name of the group: Humanities subjects

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0 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
B0M16FIL	Peter Zamarovský Peter Zamarovský Peter Zamarovský (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HVT	History of science and technology 2  Marcela Efmertová Marcela Efmertová (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16HSD1	History of economy and social studies  Marcela Efmertová	Z,ZK	5	2P+2S	Z,L	V
B0M16PSM	Psychology Jan Fiala Jan Fiala (Gar.)	Z,ZK	5	2P+2S	Z,L	V
B0M16TEO	Theology Vladimír Slámečka Vladimír Slámečka (Gar.)	Z,ZK	5	2P+2S	Z,L	V

Characteristics of the courses of this group of Study Plan: Code=2018\_MOIH Name=Humanities subjects

B0M16FIL		Z,ZK	5
B0M16HVT	History of science and technology 2	Z,ZK	5
This subject trees hist	eviced developments in electrical engineering bronches in the world and in the Creek Lande Its ultimate goal is to stimulate of	tudontal interest in	a tha hiatam, and

This subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history and traditions of the subject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the influence of technical engineers

B0M16HSD1	History of economy and social studies	Z,ZK	5	l
This subject deals with	the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its ain	ns and achieved	results as well as	l
the social and cultural d	evelopment and coexistence of the various ethnical groups in the Czech countries.			

B0M16PSM	Psychology	Z,ZK	5
B0M16TEO	Theology	Z,ZK	5

This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which graws our civilization up.

Code of the group: MTV

Name of the group: Physical education

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0 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
TVV	Physical education	Z	0	0+2	Z,L	V
TV-V1	Physical education	Z	1	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V
TVKLV	Physical Education Course	Z	0	7dní	L	V

Characteristics of the courses of this group of Study Plan: Code=MTV Name=Physical education

TVV	Physical education	Z	0
TV-V1	Physical education	Z	1
TVV0	Physical education	Z	0
TVKZV	Physical Education Course	Z	0
TVKLV	Physical Education Course	Z	0

Code of the group: 2018\_MOIVOL 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:

~The offer of elective courses arranged by departments can be found on the website https://fel.cvut.cz/en/education/volitelne-predmety.html\\

# List of courses of this pass:

	Name of the course	Completion	Credits
B0M16FIL		Z,ZK	5
B0M16HSD1	History of economy and social studies	Z,ZK	5
This subject deals v	with the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aims and the social and cultural development and coexistence of the various ethnical groups in the Czech countries.	nd achieved result	s as well as
B0M16HVT	History of science and technology 2	Z,ZK	5
-	historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate studer bject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life a engineers		-
B0M16PSM	Psychology	Z,ZK	5
B0M16TEO	Theology	Z,ZK	5
are gone through. T	des to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who - religion from which graws our civilization up.	want to get know	Christianity
B4M01TAL	Theory of Algorithms	Z,ZK	6
-	theoretical background of the theory of algorithms with the focus at first on the time and space complexity of algorithms and problems,	-	
	ther it is dealt with the theory of complexity; the classes P, NP, NP-complete, PSPACE and NPSPACE are treated and properties of the algorithms are studied and the classes RP and ZZP introduced.		
B4M33DZO	Digital image	Z,ZK	6
implement. Seem fundamental princip	sents an overview of basic methods for digital image processing. It deals with practical techniques that have an interesting theoretical bringly abstract concepts from mathematical analysis, probability theory, or optimization come to life through visually engaging application ples (signal sampling and reconstruction, monadic operations, histogram, Fourier transform, convolution, linear and non-linear filtering ding image stitching, deformation, registration, and segmentation. Students will practice the selected topics through six implementation learn the theoretical knowledge from the lectures and use it to solve practical problems	ons. The course fo ) and more advar	ocuses on nced editing
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B4M33PAL	Advanced algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer exists a	Z,ZK	О
	graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - pa		
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For updated information see <a href="http://bilakniha.cvut.cz/en/f3.html">http://bilakniha.cvut.cz/en/f3.html</a> Generated: day 2025-12-11, time 16:27.