### Recomended pass through the study plan

# Name of the pass: Specialization Computer Vision and Image Processing - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering

Department:

Pass through the study plan: Open Informatics - Computer Vision and Image Processing

Branch of study guranteed by the department: Welcome page

Guarantor of the study branch: Program of study: Open Informatics 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

Number of Serie	otor: i					
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
BEZM	Safety in Electrical Engineering for a master's degree Vladimir Kůla, Radek Havlíček, Ivana Nová, Josef Černohous, Pavel Mlejnek Radek Havlíček Vladimír Kůla (Gar.)	Z	0	2BP+2BC	Z	Р
B4M33PAL	Advanced algorithms Ondřej Drbohlav, Daniel Průša Daniel Průša (Gar.)	Z,ZK	6	2P+2C	Z	Р
B4M33DZO	Digital image Ondřej Drbohlav, Daniel Sýkora Daniel Sýkora (Gar.)	Z,ZK	6	2P+2C	Z,L	РО
BE4M33SSU	Statistical Machine Learning Jan Drchal, Vojtěch Franc Vojtěch Franc Vojtěch Franc (Gar.)	Z,ZK	6	2P+2C	Z	РО
2018_MOIVOL	Volitelné odborné předměty	Min. cours.	Min/Max 0/999			V

#### 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
B4M35KO	Combinatorial Optimization Zdeněk Hanzálek Zdeněk Hanzálek (Gar.)	Z,ZK	6	3P+2C	L	Р
B4M01TAL	Theory of Algorithms Marie Demlová, Natalie Žukovec Marie Demlová Marie Demlová (Gar.)	Z,ZK	6	3P+2S	L	Р
B4M33GVG	Geometry of Computer Vision and Graphics Torsten Sattler, Viktor Korotynskiy, Tomáš Pajdla Tomáš Pajdla Tomáš Pajdla (Gar.)	Z,ZK	6	2P+2C	L	РО
B4M33MPV	Computer Vision Methods Jan Čech, Georgios Tolias, Jiří Matas, Dmytro Mishkin <b>Jiří Matas</b> Jiří Matas (Gar.)	Z,ZK	6	2P+2C	L	РО
2018_MOIVOL	Volitelné odborné předměty	Min. cours.	Min/Max 0/999			V

#### 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
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

B4M33TDV	Three-dimensional Computer Vision Radim Šára Radim Šára Radim Šára (Gar.)	Z,ZK	6	2P+2C	Z	PO
B4M39VG	Computational Geometry Petr Felkel Petr Felkel (Gar.)	Z,ZK	6	2P+2S	Z	РО
2018_MOIVOL	Volitelné odborné předměty	Min. cours.	Min/Max			.,
		0	0/999			V

### 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
BDIP25	Diploma Thesis	Z	25	22s	L	Р
2018_MOIVOL	Volitelné odborné předměty	Min. cours.	Min/Max			v
		0	0/999			

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

Kód	Name of the group of courses and codes of members of this group (for specification see here or below the list of courses)	Completion	Credits	Scope	Semester	Role
2010 MOIVOI	VOL Volitelné odborné předměty  Min. cours. Min/Max 0/999	Min. cours.	Min/Max			,,
2018_MOIVOL			V			

## List of courses of this pass:

Code	Name of the course	Completion	Credits
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	s, secondly on the	correctness
of algorithms. Fur	ther it is dealt with the theory of complexity; the classes P, NP, NP-complete, PSPACE and NPSPACE are treated and properties of th	em investigated. P	robabilistic
	algorithms are studied and the classes RP and ZZP introduced.		
B4M33DZO	Digital image	Z,ZK	6
This course pre	sents 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. Seen	ningly abstract concepts from mathematical analysis, probability theory, or optimization come to life through visually engaging applicat	tions. The course f	ocuses on
fundamental princ	ples (signal sampling and reconstruction, monadic operations, histogram, Fourier transform, convolution, linear and non-linear filterin	g) and more advar	nced editing
techniques, inclu	ding image stitching, deformation, registration, and segmentation. Students will practice the selected topics through six implementatio	n tasks, which will	help them
	learn the theoretical knowledge from the lectures and use it to solve practical problems		
B4M33GVG	Geometry of Computer Vision and Graphics	Z,ZK	6
We will explain fu	ndamentals of image and space geometry including Euclidean, affine and projective geometry, the model of a perspective camera, im	nage transformatio	ns induced
by camera motio	n, and image normalization for object recognition. The theory will be demonstrated on practical task of creating mosaics from images	, measuring the ge	eometry of
objects by a carr	era, and reconstructing geometrical properties of objects from their projections. We will build on linear algebra and optimization and $\mathbb R$	ay down foundatio	n for other
	subjects such as computational geometry, computer vision, computer graphics, digital image processing and recognition of objects	in images.	
B4M33MPV	Computer Vision Methods	Z,ZK	6
The course covers	selected computer vision problems: search for correspondences between images via interest point detection, description and matchi	ng, image stitching	g, detection,
•	d segmentation of objects in images and videos, image retrieval from large databases and tracking of objects in video sequences. Thi	•	
inter-university pr	ogramme prg.ai Minor. It pools the best of Al education in Prague to provide students with a deeper and broader insight into the field	of artificial intellige	ence. More
	information is available at https://prg.ai/minor.		
B4M33PAL	Advanced algorithms	Z,ZK	6
Basic	graph algorithms and graph representation. Combinatorial algorithms. Application of formal languages theory in computer science - properties of the science - properties -	oattern matching.	
B4M33TDV	Three-dimensional Computer Vision	Z,ZK	6
This course introd	uces methods and algorithms for 3D geometric scene reconstruction from images. The student will understand these methods and th	eir essence well e	nough to be
able to build variar	nts of simple systems for reconstruction of 3D objects from a set of images or video, for inserting virtual objects to video-signal source	e, or for computing	ego-motion
trajectory from a	sequence of images. The labs will be hands-on, the student will be gradually building a small functional 3D scene reconstruction syste	em and using it to	compute a
	virtual 3D model of an object of his/her choice.		
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 of	perations research	n). Following
	inear algebra, graph theory, and basics of optimization, we show optimization techniques based on graphs, integer linear programmin		
algorithms and s	tate 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.

B4M39VG	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 dir	rections in algorithmic design. Computational geometry is applied not only in geometric applications, but also in common database se	earching problems.					
B4MSVP	Software or Research Project	KZ	6				
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 h	ner branch of study	, which will				
be specified b	by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehenses the comprehense of the board of examiners for the comprehenses the comprehense of the board of examiners for the board of the bo	ensive final examir	nation.				
BE4M33SSU	Statistical Machine Learning	Z,ZK	6				
The aim of statisti	cal machine learning is to develop systems (models and algorithms) for learning to solve tasks given a set of examples and some pri	or knowledge abou	ut the task.				
This includes typic	al tasks in speech and image recognition. The course has the following two main objectives 1. to present fundamental learning conce	pts such as risk m	inimisation,				
maximum likelihoo	d estimation and Bayesian learning including their theoretical aspects, 2. to consider important state-of-the-art models for classification	n and regression	and to show				
how they can be learned by those concepts.							
BEZM	Safety in Electrical Engineering for a master's degree	Z	0				
The course provides for students of all programs periodic training guidelines for health and occupational safety and gives knowledge of electrical hazard of given branch of study.							
	Students receive indispensable qualification according to the current Directive of the Dean.						

For updated information see <a href="http://bilakniha.cvut.cz/en/f3.html">http://bilakniha.cvut.cz/en/f3.html</a> Generated: day 2025-12-10, time 19:49.