# Study plan

## Name of study plan: Open Informatics - Internet of Things 2016

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: Bachelor full-time

Required credits: 152
Elective courses credits: 28
Sum of credits in the plan: 180

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 122

The role of the block: P

Code of the group: 2015\_BOIAPP
Name of the group: Subjects in english
Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 0 Note on the group:

Note on the gr	oup:					
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
BE4B33SEA	Subject in english - abroad	Z,ZK	0		Z,L	Р
BE5B32PKS	Computer and Communication Networks Leoš Bohá, Tomáš Van k, Pavel Bezpalec Zbyn k Kocur Leoš Bohá (Gar.)	Z,ZK	6	2P + 2C	Z	Р
BE5B35APO	Computer Architectures Pavel Píša, Richard Šusta Pavel Píša Pavel Píša (Gar.)	Z,ZK	6	2P+2L	L	Р
BE4B38PSIA	Computer Networks Ji í Novák, Jan Holub <b>Ji í Novák</b> Ji í Novák (Gar.)	Z,ZK	5	2P+2L	L	Р
BE4B36FUP	Functional Programming Niklas Maximilian Heim, Rostislav Hor ík Rostislav Hor ík Michal P chou ek (Gar.)	Z,ZK	6	2P+2C	L	Р
BE4B36ZUI	Introduction to Artificial Intelligence Branislav Bošanský, Viliam Lisý Branislav Bošanský Branislav Bošanský (Gar.)	Z,ZK	6	2P+2C	L	Р
BE5B35LSP	Logic Systems and Processors Richard Šusta, Martin Hlinovský Martin Hlinovský Richard Šusta (Gar.)	Z,ZK	6	3P+2L	Z	Р
BE5B33RPZ	Pattern Recognition and Machine Learning Ond ej Drbohlav, Ji í Matas, Jan Šochman Ji í Matas Ji í Matas (Gar.)	Z,ZK	6	2P+2C	Z	Р
BE4B35PSR	Real-time Systems Programming Michal Sojka Michal Sojka (Gar.)	Z,ZK	6	2P+2C	Z	Р
BE4B39VGO	Creating graphic content  Ladislav molík Ladislav molík (Gar.)	Z,ZK	6	2P+2C+8C	Z	Р

Characteristics of the courses of this group of Study Plan: Code=2015 BOIAPP Name=Subjects in english

Offar acteristics of	onaracteristics of the courses of this group of olddy friant. Gode=2015_BOIATT Name=oubjects in english						
BE4B33SEA	Subject in english - abroad	Z,ZK	0				
The subject serves for	validation of the duty to complete at least one compulsory course of the program in English.						
BE5B32PKS	Computer and Communication Networks	Z,ZK	6				
The aim of the course i	The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rath						
primarily practically then theoretically.							
BE5B35APO	Computer Architectures	Z,ZK	6				

Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware.

BE4B38PSIA Computer Networks

7.7K

5

Subject is devoted to principles and technologies of Computer Networks. Physical layer media, analog and digital modulations, network topologies, MAC methods, ARQ algorithms, data communication models, coding and cryptography basics are introduced. Widely used LAN technologies are then presented together with their features. Internet protocols are explained and internetworking approaches are presented.

BE4B36FUP Functional Programming

Z,ZK

6

This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

BE4B36ZUI Introduction to Artificial Intelligence

Z.ZK

6

The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

BE5B35LSP Logic Systems and Processors

7 7K

6

The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing.

BE5B33RPZ Pattern Recognition and Machine Learning

7 7K

6

The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme 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 intelligence. More information is available at https://prg.ai/minor.

BE4B35PSR Real-time Systems Programming

Z,ZK

6

The goal of this course is to provide students with basic knowledge about software development for real-time systems, for example in control and embedded applications. The main focus is on embedded systems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formally verify timing correctness such systems. Another set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have catastrophic consequences. During labs, students will first solve a few simple tasks to familiarize them with basic components of VxWorks RTOS and to benchmark the used OS and hardware (Xilinx Zynq). The obtained metrics represent the typical criteria for assessing the suitability of a given platform for the given application. After the simple tasks, students will solve complex task of time-critical motion control application which will require full utilization of RTOS features. All the tasks at the labs will be implemented in C (or C++) language.

BE4B39VGO Creating graphic content

7 71

6

The aim of this course is to provide theory behind geometric modeling and modeling of materials, give students an overview of methods used in the process of creating 2D and 3D graphics and how to apply those methods in praxis. At the seminars, students will learn how to design and create three-dimensional scene, create and apply textures imitating materials (e.g., wall finishes, wood, sky) and geometrical details, and position and set-up lights in the scene.

Code of the group: 2015\_BOIBAP Name of the group: Bachelor Project

Requirement credits in the group: In this group you have to gain 20 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 20

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
BBAP20	Bachelor thesis Roman mejla Roman mejla (Gar.)	Z	20	12S	L,Z	Р

Characteristics of the courses of this group of Study Plan: Code=2015\_BOIBAP Name=Bachelor Project

BBAP20	Bachelor thesis	Z	20
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Code of the group: 2015 BOIBBE

Name of the group: Safety of the bachelor's studies

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses

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
BEZB	Safety in Electrical Engineering for a bachelor's degree Ivana Nová, Radek Havlí ek, Vladimír K la Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z,L	Р
BEZZ	Basic health and occupational safety regulations Ivana Nová, Radek Havlí ek, Vladimír K la Radek Havlí ek Vladimír K la (Gar.)	Z	0	2BP+2BC	Z	Р

Characteristics of the courses of this group of Study Plan: Code=2015\_BOIBBE Name=Safety of the bachelor's studies

BEZB	Safety in Electrical Engineering for a bachelor's degree	Z	0					
The purpose of the safe	The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course							
contains fundamentals	of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work	on electrical equi	pment.					
BEZZ	Basic health and occupational safety regulations	Z	0					
The guidelines were wo	The guidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague,							
which was provided by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety								
regulations forms an integral and permanent part of qualification requirements. This program is obligatory.								

Code of the group: 2015\_BOIH

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
B0B16ET1	Ethic 1 Vladimír Sláme ka Vladimír Sláme ka Vladimír Sláme ka (Gar.)	KZ	4	2P+2C	Z	Р
B0B16FIL	Philosophy Peter Zamarovský Peter Zamarovský (Gar.)	ZK	2	2P+0S	Z,L	Р
B0B16FI1	Philosophy 1 Peter Zamarovský Peter Zamarovský (Gar.)	KZ	4	2P+2S	Z	Р
B0B16HTE	History of technology and economic Marcela Efmertová, Jan Mikeš Marcela Efmertová (Gar.)	ZK	2	2P+0S	Z,L	Р
B0B16HT1	History of science and technology 1 Marcela Efmertová, Jan Mikeš Marcela Efmertová (Gar.)	KZ	4	2P+2S	Z	Р
B0B16HI1	History 1 Milena Josefovi ová Milena Josefovi ová (Gar.)	KZ	4	2P+2S	Z	Р
B0B16MPS	Psychology Jan Fiala Jan Fiala (Gar.)	Z,ZK	4	2P+2S	Z,L	Р
B0B16MPL	Psychology for managers  Jan Fiala Jan Fiala (Gar.)	ZK	2	2P+0S	Z,L	Р
A003TV	Physical Education	Z	2	0+2	L,Z	Р

Characteristics of the courses of this group of Study Plan: Code=2015\_BOIH Name=Humanities subjects

Ethic 1	KZ	4
provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various	situations of hum	an life. Essential
e discussions in which students can react to lectures but also to actual questions coming with news and look for the communa	l answers.	
Philosophy	ZK	2
important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy.	sophy and connec	tion of old
with recent problems of science, technology, economics and politics.		
Philosophy 1	KZ	4
important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy.	sophy and connec	tion of old
with recent problems of science, technology, economics and politics.		
History of technology and economic	ZK	2
History of science and technology 1	KZ	4
History 1	KZ	4
Psychology	Z,ZK	4
Psychology for managers	ZK	2
Physical Education	Z	2
	e discussions in which students can react to lectures but also to actual questions coming with news and look for the communa    Philosophy	provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situations of humb ethics but also to actual questions coming with news and look for the communal answers.    Philosophy

Code of the group: 2015\_BOIP

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 102 credits

Requirement courses in the group: In this group you have to complete 17 courses

Credits in the group: 102 Note on the group:

Genyk-Berczowsky/ (Gar.)   Computer Architectures   Pavel Piāa Robard Susta, Patr St pán Pavel Piāa (Gar.)   Z,ZK   5   2P+2L   L	Code	members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
Pavel Pista, Richard Susta, Petr St pån Pavel Pisa (Gar.)   Z.ZK   S   Z+2C-4D   L	B4B33ALG	Marko Genyk-Berezovskyj, Daniel Pr ša Marko Genyk-Berezovskyj Marko	Z,ZK	6	2P+2C	Z	Р
Martin immå Martin immå Martin immå (Gar.)   Martin immå Martin immå (Gar.)   Martin immå Martin immå (Gar.)   Martin immå (Martin immå (Gar.)   Martin immå (Martin immå (Gar.)   Martin immå (Gar.	B0B35APO		Z,ZK	5	2P+2L	L	Р
Petr Habala Petr Habala Petr Habala (Gar.)   Z.,ZK   S   Z+2-2   Z	B0B36DBS		Z,ZK	6	2P+2C+4C	L	Р
Ji I Velebil , Natalie Zukovec, Daniel Gromada, Josef Dvo ák, Mat j Dostál JI I   Z,ZK   S   AP+2S   Z	B4B01DMA		Z,ZK	5	2P+2S	Z	Р
Nafalie Zukowec, Mat j Dostál, Alena Gollová Alena Gollová Marie Demilová (Gar.)  Mathematical Analysis 1 Josef Dvo ák, Martin K epela, Josef Tkadlec, Veronika Sobotiková Josef Tkadlec Josef Tkadlec (Gar.)  Mathematical Analysis 2 Robert Tkadlec (Gar.)  Operating Systems Michal Sojka (Mirola) Korbeiá, Petr Hájek, Martin Bohata, Jaroslav Tišer, Paola Vivi, Hana Tur inová Petr Hájek, Jaroslav Tišer, Gar.)  Joperating Systems Michal Sojka, Petr St pán Michal Sojka (Gar.)  Optimization  Optimization  Optimization  Optimization  Parallel and Distributed Computing Jakob (Gar.)  Parallel and Distributed Computing Jakob (Gar.)  Parallel and Distributed Computing Jakob (Gar.)  BatasaPSIA  Computer Networks Ji i Novák, Jan Holub Ji í Novák Ji i Novák (Gar.)  Probability and Statistics  Probability and Statistics  Micoslav Korbelá, Veronika Sobotiková, Kate ina Helisová, Matvei Slavenko Kate ina Helisová Petr Hájek (Gar.)  Procedural Programming Jan Faigi Jan Faigi (Gar.)  Programming in Java Ji i Vok inek, Martin Mudroch, Ladislav Serédi Ji í Vok ínek Ji í Vok inek, Martin Mudroch, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)  Valassisted project Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelinek, Katarina Z 6 0+2 Z,L  Staracteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B0B01LAG	Ji í Velebil, Natalie Žukovec, Daniel Gromada, Josef Dvo ák, Mat j Dostál <b>Ji í</b>	Z,ZK	8	4P+2S	Z	Р
Josef Dvo ák, Martin K épela, Josef Tkadlec, Veronika Sobotiková Josef Tkadlec Josef Tkadlec (Gar.)  Mathematical Analysis 2 Karel Pospiši, Miroslav Korbelá, Petr Hájek, Martin Bohata, Jaroslav Tišer, Paola Vivi, Hana Tur Invoka Petr Hájek Jaroslav Tišer (Gar.)  Joperating Systems Michal Sojka, Petr Ši pán Michal Sojka Michal Sojka (Gar.)  Operating Systems Michal Sojka, Petr Ši pán Michal Sojka Michal Sojka (Gar.)  Optimization Tomáš Werner, Petr Olšák, Mirko Navara, Tomáš Kroupa Tomáš Werner Tomáš Werner (Gar.)  Parallel and Distributed Computing Jakub Mare ek, Michal Jakob, Daria Mikhaylovskaya Michal Jakob Michal Jakob (Gar.)  Computer Networks Ji I Novák Ji i Novák Ji i Novák (Gar.)  Probability and Statistics Miroslav Korbelá, Veronika Sobotiková, Kate ina Helisová, Matvei Slavenko Kate ina Helisová Petr Hájek (Gar.)  Procedural Programming Jan Faigl Jan Faigl Gar.)  Programming in Java Ji Vok inek, Martin Mudroch, Ladislav Serédi Ji i Vok inek Ji í Vok inek Ji Vok inek, Martin Mudroch, Ladislav Serédi Ji i Vok inek Ji i Vok inek Ji Mossisted project Tomáš Svoboda, Petr Pošík, Ji šebek, Jaroslav Sloup, Ivan Jelinek, Katarina Znoliková Petr Pošík Projak Prošík Ji Maracteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B0B01LGR	Natalie Žukovec, Mat j Dostál, Alena Gollová Alena Gollová Marie Demlová	Z,ZK	5	3P+2S	Z,L	Р
Rarel Pospišil, Miroslav Korbelá, Petr Hájek, Martin Bohata, Jaroslav Tišer, Paola Vivi, Hana Tur inová Petr Hájek Jaroslav Tišer (Gar.)   Operating Systems Michal Sojka, Petr Št pán Michal Sojka Michal Sojka (Gar.)   Optimization Tomáš Werner, Petr Olšák, Mirko Navara, Tomáš Kroupa Tomáš Werner Z,ZK 7 4P+2C Z,L Tomáš Werner (Gar.)   Optimization Tomáš Werner (Bar.)	B0B01MA1	Josef Dvo ák, Martin K epela, Josef Tkadlec, Veronika Sobotíková <b>Josef</b>	Z,ZK	7	4P+2S	Z,L	Р
Michal Sojka, Petr Št pán Michal Sojka Michal Sojka (Gar.)	B0B01MA2	Karel Pospíšil, Miroslav Korbelá, Petr Hájek, Martin Bohata, Jaroslav Tišer,	Z,ZK	7	4P+2S	L,Z	Р
Tomáš Werner, Petr Olšák, Mirko Navara, Tomáš Kroupa Tomáš Werner Tomáš Werner (Gar.)  Parallel and Distributed Computing Jakub Mare ek, Michal Jakob, Daria Mikhaylovskaya Michal Jakob Michal Jakob (Gar.)  2,ZK 6 2P+2C L  Computer Networks Ji í Novák, Jan Holub Ji í Novák (Gar.)  Probability and Statistics Miroslav Korbelá, Veronika Sobotíková, Kate ina Helisová, Matvei Slavenko Kate ina Helisová Petr Hájek (Gar.)  Procedural Programming Jan Faigl Jan Faigl (Gar.)  Programming in Java Ji í Vok ínek, Martin Mudroch, Ladislav Serédi Ji í Vok ínek Ji í Vok ínek (Gar.)  Programming Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2 Z,L  Characteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B4B35OSY		Z,ZK	4	2P+2C	Z	Р
Jakub Mare ek, Michal Jakob, Daria Mikhaylovskaya Michal Jakob Michal Z,ZK 6 2P+2C L  Gentlement	B0B33OPT	Tomáš Werner, Petr Olšák, Mirko Navara, Tomáš Kroupa Tomáš Werner	Z,ZK	7	4P+2C	Z,L	Р
Ji í Novák, Jan Holub Ji í Novák (Gar.)   Z,ZK   S   Z   Z   Z   Z   Z   Z   Z   Z   Z	B4B36PDV	Jakub Mare ek, Michal Jakob, Daria Mikhaylovskaya <b>Michal Jakob</b> Michal	Z,ZK	6	2P+2C	L	Р
Miroslav Korbelá, Veronika Sobotíková, Kate ina Helisová, Matvei Slavenko Kate ina Helisová Petr Hájek (Gar.)  Procedural Programming Jan Faigl Jan Faigl (Gar.)  Programming in Java Ji í Vok ínek, Martin Mudroch, Ladislav Serédi Ji í Vok ínek Ji í Vok ínek (Gar.)  Solving Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)  Unassisted project Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2  Characteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B4B38PSIA		Z,ZK	5	2P+2L	L	Р
Jan Faigl Jan Faigl Jan Faigl (Gar.)  Programming in Java Ji í Vok ínek, Martin Mudroch, Ladislav Serédi Ji í Vok ínek Ji í Vok ínek (Gar.)  B4B33RPH  Solving Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)  Unassisted project Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2 Characteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B0B01PST	Miroslav Korbelá, Veronika Sobotíková, Kate ina Helisová, Matvei Slavenko	Z,ZK	7	4P+2S	Z	Р
Ji í Vok ínek, Martin Mudroch, Ladislav Serédi <b>Ji í Vok ínek</b> Ji í Vok ínek Z,ZK 6 2P+3C+7D L  B4B33RPH Solving Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)  B4BPROJ6 Unassisted project Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2 Z,L  Scharacteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B0B36PRP		Z,ZK	6	2P+2C	Z	Р
Tomáš Švoboda, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)  Unassisted project Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2 Z,L  Zmolíková Petr Pošík  Characteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B0B36PJV	Ji í Vok ínek, Martin Mudroch, Ladislav Serédi <b>Ji í Vok ínek</b> Ji í Vok ínek	Z,ZK	6	2P+3C+7D	L	Р
B4BPROJ6  Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína Z 6 0+2 Z,L Characteristics of the courses of this group of Study Plan: Code=2015_BOIP Name=Compulsory subjects of the programme	B4B33RPH	Solving Problems and other Games Tomáš Svoboda, Petr Pošík Petr Pošík Tomáš Svoboda (Gar.)	KZ	6	2P+3C	Z	Р
	34BPROJ6	Tomáš Svoboda, Petr Pošík, Ji í Šebek, Jaroslav Sloup, Ivan Jelínek, Katarína	Z	6	0+2	Z,L	Р
	Characteristics of the	e courses of this group of Study Plan: Code=2015_BOIP Name=	-Compulsory	/ subject	s of the	programme	•
54B33ALG   AIgorithms   Z,ZK   B	B4B33ALG AI	lgorithms				Z,ZK	6

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their

B0B35APO **Computer Architectures** Z,ZK 5 B0B36DBS **Database Systems** Z,ZK

The course is designed as a basic database course mainly aimed at the student ability to design a relational data model and to use the SQL language for data definition as well as for data querying and to choose the appropriate degree of transaction isolation. Students will also get acquainted with the most commonly used indexing techniques, database system architecture and their management. They will verify their knowledge during the elaboration of a continuously submitted seminar task.

B4B01DMA Discrete Mathematics Z,ZK

In this course students meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n, diophantine equations, binary relations, mappings, cardinality of sets, induction, and recurrence equations. The second aim of this course is to teach students the language of mathematics, both passively and actively, and introduce them to mathematics as science.

Linear Algebra B0B01LAG

The course covers the initial parts of linear algebra. Firstly, the basic notions of a linear space and linear mappings are covered (linear dependence and independence, basis, coordinates, etc). The calculus of matrices (determinants, inverse matrices, matrices of a linear map, eigenvalues and eigenvectors, diagonalisation, etc) is covered next. The applications include solving systems of linear equations, the geometry of a 3D space (including the scalar product and the vector product) and SVD.

Logic anad Graphs B0B01LGR

This course covers basics of mathematical logic and graph theory. Syntax and semantics of propositional and predicate logic are introduced. The importance of the notion of consequence and of the relationship between a formula and its model is stressed. Further, basic notions from graph theory are introduced.

Z,ZK

B0B01MA1 Mathematical Analysis 1

The aim of the course is to introduce students to basics of differential and integral calculus of functions of one variable.

B0B01MA2 Mathematical Analysis 2 The subject covers an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals. Other part contains function series and power series with application to Taylor and Fourier series. B4B35OSY **Operating Systems** Z,ZK Lecture introduces operation system's basic concepts and principles as processes, threads, communication and synchronization, virtual memory, drivers, file systems, basic security aspects. These topics are theoretically described and demonstrated on Linux and Windows OS with multi-core systems. Practical exercises from OS in C programming language will be solved on labs. Students will work with Linux OS and micro-kernel NOVA. B0B33OPT Z,ZK Optimization The course provides an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrated with a number of examples. You will refresh and extend many topics that you know from linear algebra and calculus courses. B4B36PDV Parallel and Distributed Computing B4B38PSIA Computer Networks Z,ZK 5 B0B01PST Z,ZK Probability and Statistics B0B36PRP Procedural Programming Z,ZK6 The course accompanies basic programming emphasizing the data representation in computer memory. Furthermore, the concepts of linked data structures and processing user inputs are developed. Students master the practical implementation of simple individual tasks. The course emphasizes acquiring programming habits for creating readable and reusable programs. At the same time, the effort is to build students an overview of the program operation, data model, memory access, and management. Therefore, the C programming language is used that provides a direct link between the program data structures and their representation in the computer memory. Students will get acquainted not only with program compilation and linking but also with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and accuracy of implementation. Student independence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a larger program using existing implementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the selected tasks. B0B36PJV Programming in Java The course builds on the basics of algorithms and programming from the first semester and introduces students to the Java environment. The course also focus on the object concept

of the Java language. The topics of the course includes exceptions, event handling, and building a graphical interface. Basic library methods, working with files and using generic types will be introduced. An important topic is models of multithreaded applications and their implementation. Practical exercises of practical skills and knowledge of Java is tested in the form of solving partial tasks and semester work, which will be submitted continuously through the source code version control system. The semester work scoring consists of points for the correctness and efficiency of the code, as well as points that take into account the quality of the source codes, their readability and reusability. B4B33RPH Solving Problems and other Games

The main motivation is to let students to deal with real-world problems properly. When working on real problems the student shall learn how to decompose the big problem, how to define interfaces, how to test and validate individual steps and so on. Many problems will actually be beyond the first-year-student skills. And many problem will not be solved in the optimal way. The unsolved parts should motivate the students to study difficult theoretical subjects. They should generate the important questions. Ideally, at the end of the subject, the student should be eager to study deeper about informatics. The course also explains the basis of the object oriented design, software testing, ways for writing readable and robust

B4BPROJ6 Unassisted project Ζ 6

Code of the group: 2015\_BZAJ

Name of the group: Exam from the english language

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete 2 courses

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
B0B04B1K	English language B1 - classified assessment Markéta Havlí ková, Pavla Péterová, Erik Peter Stadnik, Michael Ynsua, Dana Saláková, Petra Juna Jennings Petra Juna Jennings (Gar.)	KZ	0	0C	Z,L	Р
B0B04B2Z	English language B2 - exam Michael Ynsua, Dana Saláková, Petra Juna Jennings Petra Juna Jennings (Gar.)	Z,ZK	0	0C	Z,L	Р

Characteristics of the courses of this group of Study Plan: Code=2015\_BZAJ Name=Exam from the english language

B0B04B1K	English language B1 - classified assessment	KZ	0
verifying of the student	s skills of B1 level		•
B0B04B2Z	English language B2 - exam	Z,ZK	0

I) The B2 English Exam is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the Study and Examination Rules and Regulations for Students at CTU (Part III, Article 4), a compulsory subject is one "whose completion is a necessary condition in order to successfully complete the study programme." In addition, this requires the "passing of an examination evaluated on the scale A, B, C, D, or E..." (SERR Part III, Article 6). II) According to the Common European Framework of Reference for Languages (CEFR), an international standard for describing language ability, the definition of an English language learner who has achieved the B2 (Upper-Intermediate) level is one who "...can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options." III) Students who have successfully passed an approved international exam within the past five years may present their certificate to the Department of Languages, Faculty of Electrical Engineering. Upon approval, students are then exempt from both the Written Test and the Oral Part. For a list of approved international exams go the department website: http://jazyky.fel.cvut.cz/

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 30

The role of the block: PO

Code of the group: 2015\_BOIPO2

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 30 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 30 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
B4B17EAM	Electromagnetism Zbyn k Škvor, Pavel Hazdra <b>Jan Kra ek</b> Zbyn k Škvor (Gar.)	Z,ZK	6	2P+2C	Z	РО
B0B35LSP	Logic systems and processors Richard Šusta, Martin Hlinovský Martin Hlinovský Zden k Hurák (Gar.)	Z,ZK	6	2P+2L	L	РО
B4B38NVS	Embedded Systems Design Jan Fischer, Vojt ch Petrucha Jan Fischer Jan Fischer (Gar.)	Z,ZK	6	2P+2L	Z	РО
B4B32PKS	Computer and Communication Networks Leoš Bohá, Tomáš Van k Ivan Pravda Leoš Bohá (Gar.)	Z,ZK	6	2P + 2C	L	РО
B4B35PSR	Real-time Systems Programming Michal Sojka Michal Sojka Michal Sojka (Gar.)	Z,ZK	6	2P+2C	Z	РО

### Characteristics of the courses of this group of Study Plan: Code=2015\_BOIPO2 Name=Compulsory subjects of the branch

B4B17FAM Electromagnetism The subject introduces the basics of electrical engineering, electromagnetic fields, and simple active/passive electronic circuits. We will also explore optics, acoustics, and antennas. Emphasis is placed on understanding the physical principles behind these phenomena. During the lessons, we not only write on the board but also demonstrate computer simulations and conduct small experiments.

#### B0B35LSP Logic systems and processors

Z,ZK The course introduces computing resources' basic hardware structures, design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware

level and designing embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards that hundreds of leading universities worldwide also use. The course ends with RISC-V processor structure, cache, and pipeline processing. [last updated January 2024]

B4B38NVS	Embedded Systems Design	∠,∠K	6
The course deals with	design of embedded systems using ARM based microcontrollers.		
B4B32PKS	Computer and Communication Networks	<i>7 7</i> K	6

The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The second part of the course introduces students to concepts of ensuring the information security in the communication networks. An integral part of the course is also an explanation of the principles for ensuring the adequate quality of services in data networks and features of some file sharing application protocols. The course is aimed rather primarily practically then theoretically

### Real-time Systems Programming

The goal of this course is to provide students with basic knowledge about software development for real-time systems, for example in control and embedded applications. The main focus is on embedded systems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formally verify timing correctness such systems. Another set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have catastrophic consequences. During labs, students will first solve a few simple tasks to familiarize them with basic components of VxWorks RTOS and to benchmark the used OS and hardware (Xilinx Zyng). The obtained metrics represent the typical criteria for assessing the suitability of a given platform for the given application. After the simple tasks, students will solve complex task of time-critical motion control application which will require full utilization of RTOS features. All the tasks at the labs will be implemented in C (or C++) language

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: 2015\_BJKA

Name of the group: English language courses

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
B0B04A21	English Language A2-1 Dana Saláková	Z		2s	Z	V
B0B04A22	English Language A2-2 Dana Saláková	Z	0	2s	L	V
B0B04B11	English Language B1-1 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	0	2C	Z	V

B0B04B12	English Language B1-2 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	0	2C	L	V
B0B04B21	English Language B2-1 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	3	2C	Z	V
B0B04B22	English Language B2-2 Petra Juna Jennings Petra Juna Jennings (Gar.)	Z	3	2C	Z,L	V

Characteristics o	f the courses of this group of Study Plan: Code=2015_BJKA Name=English language cours	ses	
B0B04A21	English Language A2-1	Z	
The course is open to	students who are beginners in their second language. Course objective: Achieving competence in basic English.		
B0B04A22	English Language A2-2	Z	0
The course is open to	students who are beginners in their second foreign language. The course objective is to develop and sustain their basic knowl	edge of the Engli	sh language.
B0B04B11	English Language B1-1	Z	0
Course objective: Broa	dening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary	expansion; unde	rstanding spoken
English.			
B0B04B12	English Language B1-2	Z	0
Course objective: Broa	dening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary	expansion; unde	rstanding spoken
English.			
B0B04B21	English Language B2-1	Z	3
This course is designe	d as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglický jazyk	B2 - zkouška - B0	B04B2Z*). While
the course is focused of	on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher marl	k), it also focuses	more on the
academic and technica	al vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appro	priate level of Eng	glish for Erasmus
/ International Study.			
B0B04B22	English Language B2-2	Z	3
This course is designe	d as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglický jazyk I	32 - zkouška - B0	B04B2Z *). While
the course is focused	on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher marl	k), it also focuses	more on the
academic and technica	al vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appro	priate level of Eng	glish for Erasmus
/ International Study.			

Code of the group: BTV

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
A003TV	Physical Education	Z	2	0+2	L,Z	V
TV-V1	Physical education	Z	1	0+2	Z,L	V
TVV0	Physical education	Z	0	0+2	Z,L	V

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

A003TV	Physical Education	Z	2
TVV	Physical education	Z	0
TV-V1	Physical education	Z	1
TVV0	Physical education	Z	0

Code of the group: BTVK

Name of the group: Physical education courses

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

Credits in the group: 0

11010 011 1110 9	,, oap.					
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
TVKLV	Physical Education Course	Z	0	7dní	L	V
TVKZV	Physical Education Course	Z	0	7dní	Z	V

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

TVKLV Physical Education Course Z 0	
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TVKZV Physical Education Course Z 0

Code of the group: 2015\_BOIVOL 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:

~Nabídku volitelných předmětů uspořádaných podle kateder najdete na webových stránkách http://www.fel.cvut.cz/cz/education/volitelne-predmety.html\\

## List of courses of this pass:

Code	Name of the course	Completion	Credits
A003TV	Physical Education	Z	2
B0B01LAG	Linear Algebra	Z,ZK	8
The course covers t	he initial parts of linear algebra. Firstly, the basic notions of a linear space and linear mappings are covered (linear dependence and inde	ependence, basis,	coordinates,
etc). The calculus	of matrices (determinants, inverse matrices, matrices of a linear map, eigenvalues and eigenvectors, diagonalisation, etc) is covered		ons include
	solving systems of linear equations, the geometry of a 3D space (including the scalar product and the vector product) and S'		r
B0B01LGR	Logic anad Graphs	Z,ZK	5
This course covers	basics of mathematical logic and graph theory. Syntax and semantics of propositional and predicate logic are introduced. The importance		onsequence
D0D041444	and of the relationship between a formula and its model is stressed. Further, basic notions from graph theory are introduce		_
B0B01MA1	Mathematical Analysis 1	Z,ZK	7
DODOANAO	The aim of the course is to introduce students to basics of differential and integral calculus of functions of one variable.	7 71/	7
B0B01MA2	Mathematical Analysis 2 s an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals.	Z,ZK	7
The Subject cover	s an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals.  series and power series with application to Taylor and Fourier series.	Other part contain	is fufficitori
B0B01PST	Probability and Statistics	Z,ZK	7
B0B04A21	·	Z,ZR	,
DUDU4A2 I	English Language A2-1  The course is open to students who are beginners in their second language. Course objective: Achieving competence in basic E	_	
B0B04A22	English Language A2-2	Z	0
	en to students who are beginners in their second foreign language. The course objective is to develop and sustain their basic knowle		_
B0B04B11	English Language B1-1	Z	0
	roadening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary exp	_	-
	English.	,	g -p
B0B04B12	English Language B1-2	Z	0
	roadening the basic knowledge of general English; mastering basic specialised language; focusing on text analysis and vocabulary exp		ding spoken
-	English.		
B0B04B1K	English language B1 - classified assessment	KZ	0
'	verifying of the student's skills of B1 level	'	'
B0B04B21	English Language B2-1	Z	3
	gned as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglický jazyk B2-		-
	used on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark)		
academic and techi	nical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropria	ite level of English	for Erasmus
D0D04D00	/ International Study.	7	2
B0B04B22	English Language B2-2 gned as a full-year, two semester preparation course for the university's compulsory B2-level English Examination (Anglický jazyk B2 -	Z zkouška POPO4E	3
_	ised on helping students reach a level required to pass the B2-level English Examination (or improve their English for a higher mark)		
	nical vocabulary and grammar expected of students at the university level. *NOTE: This exam is also used for determining an appropria		
	/ International Study.		
B0B04B2Z	English language B2 - exam	Z.ZK	0
I) The B2 English E	xam is a compulsory subject for all Faculty of Electrical Engineering students at the Czech Technical University. According to the Stu	,	n Rules and
Regulations for Stu	dents at CTU (Part III, Article 4), a compulsory subject is one "whose completion is a necessary condition in order to successfully co	mplete the study p	rogramme."
In addition, this re	equires the "passing of an examination evaluated on the scale A, B, C, D, or E" (SERR Part III, Article 6). II) According to the Comm	non European Frar	mework of
	uages (CEFR), an international standard for describing language ability, the definition of an English language learner who has achieve		
	.can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field	•	
	uency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce		
_	and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options." III) Students who have succ		
miernational exam	within the past five years may present their certificate to the Department of Languages, Faculty of Electrical Engineering. Upon approach from both the Written Test and the Oral Part. For a list of approved international exams go the department website: http://jazyky.fel		nen exempt
B0B16ET1	Ethic 1	KZ	4
	s to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situ		l
-	the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the co		io. Lootiilai
Pa. 10 01	, and the second		

B0B16FI1	Philosophy 1	KZ	4
We deal with the	e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy.	ophy and connecti	ion of old
	philosophical thoughts with recent problems of science, technology, economics and politics.		1
B0B16FIL	Philosophy	ZK	2
We deal with the	e most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophical thoughts with recent problems of aciency transplants and political	ophy and connecti	ion of old
DOD16UI1	philosophical thoughts with recent problems of science, technology, economics and politics.	V7	1
B0B16HI1	History 1	KZ	4
B0B16HT1	History of science and technology 1	KZ	4
B0B16HTE	History of technology and economic	ZK	2
B0B16MPL	Psychology for managers	ZK	2
B0B16MPS	Psychology	Z,ZK	4
B0B33OPT	Optimization The theory is illustrated as a finite discussion.	Z,ZK	7
i ne course provide	s an introduction to mathematical optimization, specifically to optimization in real vector spaces of finite dimension. The theory is illustrate You will refresh and extend many topics that you know from linear algebra and calculus courses.	ed with a number o	or examples.
B0B35APO	Computer Architectures	Z,ZK	5
B0B35LSP	Logic systems and processors	Z,ZK	6
	ces computing resources' basic hardware structures, design, and architecture. It provides an overview of the possibilities of performing data	•	-
	g embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used to	•	
description in VHI	DL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct de	esign procedure us	sing circuit
simulation. Practica	Il problems are solved using development boards that hundreds of leading universities worldwide also use. The course ends with RISC-	-V processor struc	ture, cache,
Doboobbo	and pipeline processing. [last updated January 2024]	7.71	
B0B36DBS	Database Systems	Z,ZK	6
	gned as a basic database course mainly aimed at the student ability to design a relational data model and to use the SQL language fo I to choose the appropriate degree of transaction isolation. Students will also get acquainted with the most commonly used indexing to		
data querying and	architecture and their management. They will verify their knowledge during the elaboration of a continuously submitted seminar		ioc oyotom
B0B36PJV	Programming in Java	Z,ZK	6
	on the basics of algorithms and programming from the first semester and introduces students to the Java environment. The course als		-
of the Java languag	ge. The topics of the course includes exceptions, event handling, and building a graphical interface. Basic library methods, working with	n files and using g	eneric types
	An important topic is models of multithreaded applications and their implementation. Practical exercises of practical skills and knowledge	•	
of solving partial ta	sks and semester work, which will be submitted continuously through the source code version control system. The semester work sco		oints for the
DODOCDDD	correctness and efficiency of the code, as well as points that take into account the quality of the source codes, their readability and re	<u>-</u>	
B0B36PRP	Procedural Programming  panies basic programming emphasizing the data representation in computer memory. Furthermore, the concepts of linked data structur	Z,ZK	6
	tudents master the practical implementation of simple individual tasks. The course emphasizes acquiring programming habits for crea	-	-
	me time, the effort is to build students an overview of the program operation, data model, memory access, and management. Therefore,	_	
is used that provide	es a direct link between the program data structures and their representation in the computer memory. Students will get acquainted not		
	o a shoot min both con the program data of detailed and then representation in the compation memory, etademic min get adductined not	only with program	compilation
•	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and	d accuracy of impl	ementation.
Student independ	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lateral profile is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lateral profile is developed by a set of homework with the possibility of optional and bonus assignments.	d accuracy of impl arger program usir	ementation.
Student independ	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a laplementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the se	d accuracy of implarger program using elected tasks.	ementation.
Student independing im B4B01DMA	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a laplementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the search of the s	d accuracy of impl arger program usin elected tasks. Z,ZK	ementation. ng existing
Student independing In this course student	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a laplementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set and the matrics bents meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n,	d accuracy of impl arger program usin elected tasks. Z,ZK diophantine equat	ementation. ng existing  5 tions, binary
Student independing In this course student	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a laplementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the search of the s	d accuracy of impl arger program usin elected tasks. Z,ZK diophantine equat	ementation. ng existing  5 tions, binary
Student independing In this course student	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lap plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set and the matrics.  Discrete Mathematics  In the final task is an integration of a large plementation. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set and the matrics.  Discrete Mathematics will explore divisibility and calculations modulo n, and set and recurrence equations. The second aim of this course is to teach students the language of mathematics.	d accuracy of impl arger program usin elected tasks. Z,ZK diophantine equat	ementation. ng existing  5 tions, binary
Student independing B4B01DMA In this course stude relations, mappin B4B17EAM The subject introdu	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lare plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set and the plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set and the set of the set o	d accuracy of implarger program using elected tasks.  Z,ZK diophantine equatematics, both pass  Z,ZK ics, acoustics, and	sementation.  g existing  5 tions, binary sively and  6 d antennas.
Student independing B4B01DMA In this course stude relations, mappin B4B17EAM The subject introdu	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lare plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the second sents meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n, ngs, cardinality of sets, induction, and recurrence equations. The second aim of this course is to teach students the language of mathematically, and introduce them to mathematics as science.    Electromagnetism	d accuracy of implarger program using elected tasks.  Z,ZK diophantine equatematics, both pass  Z,ZK ics, acoustics, and	sementation.  g existing  5 tions, binary sively and  6 d antennas.
Student independent immediate immedi	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lare plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the second sents meet some important topics from the field of discrete mathematics. Namely, they will explore divisibility and calculations modulo n, ngs, cardinality of sets, induction, and recurrence equations. The second aim of this course is to teach students the language of mathematics at science.    Electromagnetism	d accuracy of implarger program using elected tasks.  Z,ZK diophantine equatematics, both pass  Z,ZK ics, accustics, and onstrate computer	5 tions, binary sively and 6 d antennas. simulations
Student independent immediate immedi	with debugging and profiling. Labs aim to acquire practical skills of implementing simple individual tasks, emphasizing functionality and dence is developed by a set of homework with the possibility of optional and bonus assignments. The final task is an integration of a lare plementations. Evaluation of coding style motivated by writing legible, understandable, and maintainable codes is also a part of the set of t	d accuracy of implarger program using elected tasks.  Z,ZK diophantine equatematics, both pass  Z,ZK ics, accustics, and postrate computer  Z,ZK	5 tions, binary sively and 6 d antennas. simulations
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The main focus is on embedded systems equipped with a real-time operating system (RTOS). Lectures will cover real-time systems theory, which can be used to formally verify timing correctness such systems. Another set of lectures will introduce methods and techniques used for development of safety-critical systems, whose failure may have catastrophic consequences. During labs, students will first solve a few simple tasks to familiarize them with basic components of VxWorks RTOS and to benchmark the used OS and hardware (Xilinx Zyng). The obtained metrics represent the typical criteria for assessing the suitability of a given platform for the given application. After the simple tasks, students will solve complex task of time-critical motion control application which will require full utilization of RTOS features. All the tasks at the labs will be implemented in C (or C++) language. **Functional Programming** This course introduces students into the techniques of functional programming, the advantages and disadvantages of this programming paradigm, and its use in practice. This approach is declarative in the sense that the programmer symbolically describes the problem to be solved, rather than specifying the exact sequence of operations required to solve it. It allows focusing on the essence of the solved problem and implementing even more complex algorithms compactly. Functional programming has notable advantages for parallelization and automated verification of algorithms, and the most useful functional programming concepts are increasingly often introduced to standard programming languages. Because of the focus of functional programming on symbols, rather than numbers, functional programming has been heavily used in in artificial intelligence fields, such as agent systems or symbolic machine learning. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor. BE4B36ZUI Introduction to Artificial Intelligence Z,ZK 6 The aim of the course is to cover the basics of symbolic artificial intelligence. We will focus on algorithms of informed and uninformed state space search, problem representation and solving, representation of knowledge using formal logic, methods of automated reasoning, and an introduction to Markov decision making, and to two-player games. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor. BE4B38PSIA Computer Networks Subject is devoted to principles and technologies of Computer Networks. Physical layer media, analog and digital modulations, network topologies, MAC methods, ARQ algorithms, data communication models, coding and cryptography basics are introduced. Widely used LAN technologies are then presented together with their features. Internet protocols are explained and internetworking approaches are presented. BE4B39VGO Creating graphic content Z.ZK 6 The aim of this course is to provide theory behind geometric modeling and modeling of materials, give students an overview of methods used in the process of creating 2D and 3D graphics and how to apply those methods in praxis. At the seminars, students will learn how to design and create three-dimensional scene, create and apply textures imitating materials (e.g., wall finishes, wood, sky) and geometrical details, and position and set-up lights in the scene. BE5B32PKS Computer and Communication Networks Z.ZK 6 The aim of the course is to familiarize students with current trends in the switched local networks and the key functions of routing protocols in IP networks. The course is aimed rather primarily practically then theoretically. BE5B33RPZ Pattern Recognition and Machine Learning The basic formulations of the statistical decision problem are presented. The necessary knowledge about the (statistical) relationship between observations and classes of objects is acquired by learning on the raining set. The course covers both well-established and advanced classifier learning methods, as Perceptron, AdaBoost, Support Vector Machines, and Neural Nets. This course is also part of the inter-university programme prg.ai Minor. It pools the best of AI education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor. BE5B35APO **Computer Architectures** Z,ZK Subject provides overview of basic building blocks of computer systems. Explanation starts from hardware side where it extends knowledge presented in the previous lectures of Structures of computer systems. Topics cover building blocks description, CPU structure, multiple processors interconnections, input/output subsystem and basic overview of network and buses topologies. Emphasis is placed on clarification of interconnection of hardware components with software support, mainly lower levels of operating systems, device drivers and virtualization techniques. General principles are more elaborated during presentation of examples of multiple standard CPU architectures. Exercises are more focused on the software view to the contrary. Students are lead from basic programming on CPU level to the interaction with raw hardware. BE5B35LSP Logic Systems and Processors The course introduces the basic hardware structures of computing resources, their design, and architecture. It provides an overview of the possibilities of performing data operations at the hardware level and the design of embedded processor systems with peripherals on modern FPGA programmable logic circuits, which are increasingly widely used today. Students will learn their description in VHDL, from logic to more complex sequential circuits to practical finite state machine (FSM) designs. They will also master the correct design procedure using circuit simulation. Practical problems are solved using development boards used at hundreds of leading universities around the world. The course ends with RISC-V processor structure, cache, and pipeline processing. Safety in Electrical Engineering for a bachelor's degree The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course contains fundamentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work on electrical equipment. BF77 Basic health and occupational safety regulations The quidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague, which was provided by the Rector's Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety regulations forms an integral and permanent part of qualification requirements. This program is obligatory. TV-V1 Physical education 7 1 TVKLV Z Physical Education Course 0 Z TVKZV Physical Education Course 0 Z TVV Physical education 0 TVV0 Physical education Z 0

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