Recomended pass through the study plan

Name of the pass: Branch Avionics - Passage through study

Faculty/Institute/Others:
Department:
Pass through the study plan: Aerospace Engineering
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Welcome page
Type of study: unknown 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

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** *Vladimír Kůla, Radek Havlíček, Ivana Nová, Josef Černohous, Pavel Mlejnek **Radek Havlíček** Vladimír Kůla (Gar.)*	Z	0	2BP+2BC	Z	P
B9M38PRM	**Project Management and Marketing** *Petr Žemlička, Štěpánka Uličná **Petr Žemlička** Petr Žemlička (Gar.)*	Z,ZK	2	2P+1C	Z	P
B9M38PSL	**Aircraft Avionics** *Jan Roháč **Jan Roháč** Jan Roháč (Gar.)*	Z,ZK	6	2P+2L	Z	P
B9M38AML	**Aerodynamics and Mechanics of Flight** *Jiří Nožička, Jakub Suchý **Jiří Nožička** Jiří Nožička (Gar.)*	Z,ZK	6	2P+4L	Z	PO
B3M37KIN	**Space Engineering** *Václav Navrátil, Kristian Hengster-Movric, René Hudec, Martin Hromčík, Martin Urban, Petr Ondráček **René Hudec** René Hudec (Gar.)*	Z,ZK	6	2P+2L	Z	PO
BE9M04PRE	**Presentation Skills** *Erik Peter Stadnik, Petra Juna Jennings **Petra Juna Jennings** Petra Juna Jennings (Gar.)*	KZ	2	2C	Z	PO
2016_MLAKVOL	**Volitelné odborné předměty**	Min. cours. 0	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
B9M38TYP	**Team Project** *Jan Roháč, Martin Šipoš **Jan Roháč** Jan Roháč (Gar.)*	KZ	6	0P+6C	L	P
BE9M04AKP	**Academic Writing** ***Petra Juna Jennings*** *Petra Juna Jennings (Gar.)*	KZ	2	2C	L	PO
B9M36BEP	**Unmanned Vehicles** *Milan Rollo **Milan Rollo** Milan Rollo (Gar.)*	Z,ZK	4	2P+2L	L	PO
B9M38INA	**Integrated Avionics** *Jan Roháč, Martin Šipoš **Jan Roháč***	Z,ZK	6	2P+2L	L	PO
2016_MLAKPV	**Povinně volitelné předměty** *B3M33ARO1,B9M38EML,..... (see the list of groups below)*	Min. cours. 2 Max. cours. 2	Min/Max 8/44			PV
2016_MLAKVOL	**Volitelné odborné předměty**	Min. cours. 0	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
B9M38LKS	**Aircraft Structures and Materials** *Robert Theiner* ***Jan Roháč*** *Robert Theiner (Gar.)*	Z,ZK	5	3P+1C	Z	P
B3M37LRS	**Aeronautical radio systems** *Pavel Kovář* ***Pavel Kovář*** *Pavel Kovář (Gar.)*	Z,ZK	6	2P+2L	Z	P
B9M38POL	**Aircraft Propulsion** *Jan Klesa* ***Jan Roháč*** *Jan Roháč (Gar.)*	Z,ZK	5	3P+1C	Z	P
B9M35SRL	**Flight Control Systems** *Martin Hromčík* ***Martin Hromčík*** *Martin Hromčík (Gar.)*	Z,ZK	6	2P+2L	Z	PO
2016_MLAKPV	**Povinně volitelné předměty** *B3M33ARO1,B9M38EML,..... (see the list of groups below)*	Min. cours. 2 Max. cours. 2	Min/Max 8/44			PV
2016_MLAKVOL	**Volitelné odborné předměty**	Min. cours. 0	Min/Max 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
BDIP30	**Diploma Thesis**	Z	30	22s	L	P

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
2016_MLAKPV	**Povinně volitelné předměty**	**Min. cours. 2** **Max. cours. 2**	**Min/Max** 8/44			**PV**

B3M33ARO1	Autonomous Robotics	B9M38EML	Experimental Methods in Aeronaut ...	B1M13JAS1	Quality and Reliability
B9M35OFD	Estimation, Filtering and Detect ...	A0M33PAR	Practical Robotics	B2M37RNVA	Radio Navigation
A0M37RLP	Air traffic control	B2M37SSPA	Statistical Signal Processing	B9M38VBM	Videometry and Contactless Measu ...

2016_MLAKVOL	**Volitelné odborné předměty**	**Min. cours. 0**	**Min/Max** 0/999			**V**

List of courses of this pass:

Code	Name of the course	Completion	Credits
A0M33PAR	Practical Robotics	KZ	4
Course aim is to mediate practical skills in robot control in a complex task (containing robot architecture design, sensor data processing, navigation, map building, planning, and intelligent decision making) to students. Emphasis is placed on practical laboratories, where students solve a non-trivial task (treasure hunt) on a real mobile robot hardware. Time to implementation and experiments is dedicated in order to clear why basic algorithms don't always work and why to use more sophisticated methods. The course is a suitable complement to A3M33IRO.			
A0M37RLP	Air traffic control	Z,ZK	4
Air traffic control service and its function. Air traffic control procedures and utilization of the communication, navigation and radar systems. Requirements on radio equipment. The course applies knowledge from course Navigation. The knowledge is applicable in aerospace industry and air business.			
B1M13JAS1	Quality and Reliability	Z,ZK	6
Terminology and definitions from the area of quality and reliability and their control, philosophy of quality, systems of quality control in the world. Reliability as a part of quality. Basic definitions from the area of reliability, basic distributions used in reliability and their basic characteristics. Back-up using a warm and cold standby, types of warm and cold standbys. Reliability of components and systems, calculation of reliability using composition and decomposition. and using a method of a list. Basic statistical methods and tools joined with quality control, managerial tools for quality control. Techniques FMEA and QFFD, house of quality. Capability of a process. Taguchi loss function. Audits. Statistical inspection.			

B2M37RNVA	Radio Navigation	Z,ZK	6
The course introduces students to the terrestrial and satellite radio navigation and radar systems. Students get knowledge of the radio navigation systems, and of the structure of navigation and radar signals and methods of their processing. They become familiar with coordinate systems, fundamentals of celestial mechanics, and methods of position estimation. Students get knowledge of practical applications and the integration of navigation systems.			
B2M37SSPA	Statistical Signal Processing	Z,ZK	6
The course provides fundamentals in three main domains of the statistical signal processing: 1) estimation theory, 2) detection theory, 3) optimal and adaptive filtering. The statistical signal processing is a core theory with many applications ranging from digital communications, audio and video processing, radar and radio navigation, measurement and experiment evaluation, etc.			
B3M33ARO1	Autonomous Robotics	Z,ZK	6
The Autonomous robotics course will explain the principles needed to develop algorithms for intelligent mobile robots such as algorithms for: (1) Mapping and localization (SLAM) sensors calibration (lidar or camera). (2) Planning the path in the existing map or planning the exploration in a partially unknown map and performing the plan in the world. IMPORTANT: It is assumed that students of this course have a working knowledge of optimization (Gauss-Newton method, Levenberg Marquardt method, full Newton method), mathematical analysis (gradient, Jacobian, Hessian), linear algebra (least-squares method), probability theory (multivariate gaussian probability), statistics (maximum likelihood and maximum aposteriori estimate), python programming and machine learning algorithms. 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.			
B3M37KIN	Space Engineering	Z,ZK	6
The subject acquaints students with the basics of physics of the space environment and the technologies used in space systems, satellites, spacecrafts and launchers and methods used for the design and preparation of space missions. Subject matter includes a detailed description of the instrumentation of satellites and spacecrafts and its resistance to external influences of the space environment, and analysis of instruments and systems for spacecratfts and methods of their testing. It provides a basic overview of the trajectories of spacecrafts and their applications. The course also covers optoelectronics in space systems, sensors used, their modeling and description. It discusses the principles of underlying calculations, simulations and their processing.			
B3M37LRS	Aeronautical radio systems	Z,ZK	6
The course introduces students to the aeronautical radio engineering, aeronautical analogue, digital and satellite communication systems, aeronautical radio navigation including satellites navigation, primary secondary and passive radiolocation. The course gets students theoretical and practical knowledge of the operation of the aeronautical radio systems and their integration to the aircraft systems.			
B9M35OFD	Estimation, Filtering and Detection	Z,ZK	4
This course will cover description of the uncertainty of hidden variables (parameters and state of a dynamic system) using the probability language and methods for their estimation. Based on bayesian problem formulation principles of rational behavior under uncertainty will be analyzed and used to develop algorithms for parameter estimations (ARX models, Gaussian process regression), filtering (Kalman filter) and detection (likelihood ratio theory) . We will demonstrate numerically robust implementation of the algorithms applicable in real life problems for the areas of industrial process control, robotics and avionics.			
B9M35SRL	Flight Control Systems	Z,ZK	6
The course is devoted to classical and modern control design techniques for autopilots and flight control systems. Particular levels are discussed, starting with the dampers attitude angle stabilizers, to guidance and navigation systems. Next to the design itself, important aspects of aircraft modelling, both as a rigid body and considering flexibility of the structure, are discussed.			
B9M36BEP	Unmanned Vehicles	Z,ZK	4
Course is focused on area of unmanned systems. The focus will be primarily on unmanned aerial systems, but topics will cover unmanned surface and ground vehicles as well. Course will in details cover structural design, propulsion, sensors for navigation, stabilization and control and telemetric systems. Topics will cover modern methods for navigation, flight control, including trajectory following and target tracking. Besides this students will gain knowledge about trajectory planning and areas of application from the perspective of user payload. Legal issues related to unmanned systems operation will be discussed as well.			
B9M38AML	Aerodynamics and Mechanics of Flight	Z,ZK	6
The course provides overview of key findings from aircraft aerodynamics and flight mechanics. In the first part, students are familiar with models and equations for the flow of an incompressible fluid. In the second part there are derived equations describing force and rotating effects of flow on the surface of the airfoils and wings. The important relations for effects of compressibility are derived in the next part. These findings are applied on flow around the airfoils and wings at high subsonic and supersonic speeds in last part. In the subject there are discussed basic modes of flight mechanics and basic design methods of air propellers.			
B9M38EML	Experimental Methods in Aeronautics	KZ	4
Introduction to the basic methods of measuring non-electrical quantities, procedures for conducting engineering experiments, evaluation and processing of data. Introduction to basic methods of aircraft specifics testing. Processing of individual labs and practical demonstrations of experimental techniques and procedures.			
B9M38INA	Integrated Avionics	Z,ZK	6
The course Integrated Modular Avionics (IMA) focuses on a modern concept of the approach to the development and design of aircraft electronics (avionics), where the transition from distributed HW systems to SW blocks. They use high-speed connections to exchange data in applications related to paid air transport. The existing regulatory basis and airspace sharing define the requirements for the accuracy, reliability, and functionality of electronic systems even in the event of a failure. In the course, students will learn details about the requirements for so-called safety-critical multi-sensor systems, methods of data processing from predetermined systems, fault detection methods, selection of primary computer and control system in parallel architectures, bus technology, and methods of testing/certification of aircraft instruments.			
B9M38LKS	Aircraft Structures and Materials	Z,ZK	5
The course is an introduction lecture for structure branch aerospace technologyavionics and air trafics. The course acquaints with fundamental types of aircraft structures, forces acting on the aircraft structures and aircraft materials. It further acquaints with functions of aircraft control surfaces. Philosophy of the safety, reliability, strength certification, and airworthiness as well as the aviation regulations is given.			
B9M38POL	Aircraft Propulsion	Z,ZK	5
This course gives basic knowledge of the aircraft propulsion theory, thermal cycles of aircraft powerplants and basics of aero- and thermodynamics of aircraft powerplants components. The influence of design parameters on propulsion system efficiency, specific fuel consumption and thrust is analyzed for the given flight velocity. Design layouts of the aerospace propulsion units are introduced and function of their components is described. The focus is given on the comparison of various systems and the choose of the appropriate one. Enviromental aspects are mentioned together with the common and alternative fuels and energy sources.			
B9M38PRM	Project Management and Marketing	Z,ZK	2
Currently it is in enterprises carried out much of the work in the form of one-off projects. These projects are often a crucial part of the strategic management of the business. The aim of the project might be, for example, the rapid introduction of new products into production and its subsequent application in the market and helps to project management, and marketing.			
B9M38PSL	Aircraft Avionics	Z,ZK	6
The subject is focused into a field of aircraft avionics including principles, sensors, measurement and evaluation systems and signal/data processing methods. The subject goes into details of studied systems, i.e. engine and aircraft monitoring systems, power systems, pressure-based systems, low-frequency navigation means, and flight recorders. The subject introduces currently used technology and methodology on aircraft and thus serves to understand fundamentals of avionics. Inertial navigation systems are discussed in more details as well as their aiding systems and sensors. The course focuses on both small and large aircraft as well as on UAV suited avionics.			
B9M38TYP	Team Project	KZ	6

B9M38VBM	Videometry and Contactless Measurement	Z,ZK	4
This course focuses on CCD and CMOS video sensors, and optoelectronic sensors in general and their use in contactless videometric measurement systems. Further optical radiation, its features, behavior and its use for acquiring object parameters, optical projection system, design of measurement cameras and processing of their signal will be presented. Students will design, realize and debug an independent project - 'Optoelectronic reflective sensor', during labs.			
BDIP30	Diploma Thesis	Z	30
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.			
BE9M04AKP	Academic Writing	KZ	2
ACADEMIC WRITING COURSE (BE9M04AKP) Objective(s): The overall aim of this course is not to increase the student's level of English, but to improve the student's skills and abilities of writing academically (in English). This course is not simply an opportunity for students who have registered to have someone (the instructor) simply proofread and correct their texts - the ultimate goal of the course will be that the student is able to write (better) in English at an academic level. If a student's level of English is not up to the expected level of this course (B2 Upper-Intermediate), it is the student's responsibility to take action to improve it (outside of this course). It is hoped that by working and writing in English on a regular basis throughout this course that participants will, naturally, improve their level of English in one way or another.			
BE9M04PRE	Presentation Skills	KZ	2
The overall aim of this course is to develop communication and language skills in order to plan and deliver an effective presentation. Students will be taken systematically through the key stages of giving presentations, from planning and introducing to concluding. Students are guided, using interactive methods, to communicate their thoughts and ideas in a logical and structured order - and in as brief or succinct a way as possible. Emphasis is placed on independent, critical thinking and the correct formulation of presenting ideas; throughout this course students will practice skills that will enable them to become better speakers and presenters.			
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 http://bilakniha.cvut.cz/en/FF.html
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