

Faculty of Aviation – I st degree studies general information
Field of study: <i>Aviation and Aerospace</i>
Type of qualification: BSc Eng.
Mode of study: full-time, part-time
Duration: 3,5 year
Specialization: aircraft pilotage, unmanned aerial vehicles (UAVs)
Educational profile: <ul style="list-style-type: none"> • aircraft pilotage - civil and military studies • unmanned aerial vehicles - civil and military studies • avionics - civil studies • aerospace engineering - civil studies
Language of instruction: Polish, English – only for the Erasmus+ incoming students.
Characteristics of qualification: The aim of the study is to provide knowledge in the field of general and technical studies as well as the latest and most important contents related to the safe use and handling of the aircraft. Besides, the graduate will gain the skills of safe exploitation of appliances and equipment, adequate to the specialization. The graduate is prepared to work independently, has the ability to work in a team, discuss the results of research and observation and formulate reviews. Graduates of the first-cycle studies in the field of Aviation and Aerospace are prepared to perform engineering tasks in the modern aviation industries and in companies operating aircraft. They also have the ability to transfer modern aviation technology to other industries, and especially to those which perform aviation and aerospace tasks.
Faculty of Aviation – II nd degree studies general information
Field of study: <i>Aviation and Aerospace</i>
Type of qualification: MSc Eng.
Mode of study: full-time, part-time
Duration: 1,5 years
Specialization: aircraft exploitation
Educational profile: <ul style="list-style-type: none"> • aircraft exploitation - civilian and military studies.
Language of instruction: Polish, English – only for the Erasmus+ incoming students.
Characteristics of qualification: A graduate of the second-cycle studies in Aviation and Aerospace has the ability to safely operate equipment and aircraft. The graduate is prepared to work independently moreover, has the ability to work in a team, discuss the results of research and observation and formulate reviews. The graduate will receive a master's degree in engineering.

COURSE CATALOGUE OFFER

Academic year: 2020/2021

Faculty of Aviation

Field of study: Aviation and Aerospace

ISCED - F code: 0716

Language of instruction: English



Index	Name of the course	Number of hours	ECTS	Number of hours acc. to the form of classes			
				lectures	exercises	laboratories	project
Core Module							
1.	<i>Fluid Dynamics</i>	45	3	30	15		
2.	<i>Aircraft and spacecraft engines</i>	30	3	15	15		
3.	<i>Artificial intelligence in aviation</i>	45	3	15	30		
Specialized Module							
1.	<i>English for aviation</i>	60	4		60		
2.	<i>Programming and modelling of avionics</i>	30	2	15	15		
3.	<i>Knowledge about aircraft</i>	45	3	30	15		
4.	<i>Avionics</i>	45	3	30	15		
5.	<i>Aeronautical telecommunication</i>	45	3	15	30		
Total	ECTS		24				

Description of the modules:**Core Module****1. Fluid dynamics****Educational content:**

Description of state and motion of fluids. Elements of hydrostatics – equation of equilibrium, pressure of a liquid on the walls of the container. Continuity equation. Euler equation. Euler's equation in integral form: Bernoulli's equation, Cauchy-Lagrange equation. Elements of kinematics. Rotary movement, circulation, Rankine's model of a vortex. Strain rate tensor and strain tensor. Navier-Stokes equation – examples of analytical solutions. Similarity of flows. Elements of hydraulics. Laminar and turbulent motion, turbulence coefficient. Potential motion. Boundary layer, Prandtl equation, Karman's momentum integral equation. Drag coefficient of a thin, flat body (plate) and a blunt one (cylinder), flow separation.

Effects of education - abilities and competences:

Conversance with basic properties of fluids, understanding of basic phenomena in fluid mechanics. Interpretation of basic equations of fluid mechanics. Ability to solve basic problems in fluid mechanics, finding relationship between examples of analytical solutions with practice.

2. Aircraft and space engines**Educational content:**

Classification, areas of use, thermodynamic cycles, energy balance. Principle of work and construction of structural component systems of piston, turbine and jet engines. Internal and external characteristics of aircraft engines. Power systems, oil lubrication systems and cooling systems. Exploitation of aircraft engines.

Effects of education – abilities and competences:

Ability to classify power systems of aircraft, to characterize used construction solutions of main power systems in aircraft. Ability to interpret selected characteristics of power systems and their practical applications, characterize power systems and steer turbine engine working range.

3. Artificial intelligence in aviation**Educational content:**

Characteristics of AI. Process of originating of neuron systems. Neuron connection. Teaching of systems. Characteristics of genetic algorithms. Characteristics of fuzzy logic. Basic definitions. Blurring – fuzzification. Creating of rules base. Conclusion. Sensitizing – defuzzification. Characteristics of expert systems. Requirements of fuzzy expert systems. Use of expert systems in aviation. Identification of air objects using neuron systems. Identification of visible air objects. Identification of air objects using radar signals. Examples and characteristics of programs and systems using AI.

Effects of education - abilities and competences:

Knowledge of basic definitions referring to AI. Knowledge of basic characteristics of neuron systems, fuzzy logic and genetic algorithms. Knowledge of basic definitions and ideas referring to fuzzy expert systems. Competence in defining requirements for projects of fuzzy expert systems. Competence in interpretation of influence of input parameters on correctness and stability of work of the whole project. Knowledge of examples of AI application in aviation (among others: in crew-less aircraft, air combat mediums, air board systems and object identification). Competence in designing fuzzy expert system (creating of data base, blurring, conclusion and sensitizing).

Specialized Module

1. English for aviation

Educational content:

The construction of the aircraft. The airport and its services. Crew and passengers. Navigation. Radio and navigation tools. Meteorology. Aviation procedures. Flight safety. Electronic combat. Board radar. Weapons.

Effects of education - abilities and competences:

The ability to use the English language during operational work as an air traffic controller, to use English at work and to understand procedures in English.

2. Programming and modelling of avionics

Educational content:

Acquisition of knowledge and practical skills for programming the selected class of microcontrollers. Within the course the principles of programming will be shown: ports, memory, interrupts, counters, displays and microcontrollers transmission systems.

Effects of education - Abilities and competences:

Basics of Bascom. The structure of the source file. Selected functional blocks of microcontrollers. Registers. Configuring ports. Handling of interruptions. Counters. Compilation. Programmers. Description of the selected set of runtime. Implementation of simple boot programs in Bascom: shift registers, controlling 7-segment display, alphanumeric LCD display control, examples of clocks, keyboard support, controlling servos. The use of the bootloader to load the program into the microcontroller via the selected interface.

3. Knowledge about aircraft

Educational content:

Basic questions related with knowledge about aircraft. Aerodynamic bases and flight mechanics. General characteristic and capabilities of employment of aircraft and helicopters. Characteristic, classification, general structure and principle of operation of the aircraft engine. Modern avionics and armament aircraft systems. Factors effecting aircraft performance.

Effects of education - abilities and competences:

Ability to utilize the basic principle of the flight theory and aircrafts performance in the interception operations and influence of construction solutions of respective fuselage and engine subassembly on flight conditions and operational limitations. Ability to utilize of avionics and armament systems in the interception process.

4. Avionics

Educational content:

Characteristic and classification of the on-board equipment. Electro energy system. On-board installations. Installation of air pressure receivers. Aerometric instruments. Gyroscope theory, classification of gyroscopes. Aerial compasses and directional systems, terrestrial magnetic field. Architecture of the avionics systems. Pilotage – navigation systems, aerodynamic data unit, inertial navigation systems. Information illustrating systems. Flight leading system. Automated steering

systems. Alerting equipment. Registering equipment. Instruments of engine and installation control. On-board communication devices and systems.

Effects of education - Abilities and competences:

Knowledge of employment, structures and principles of operations of basic parameters of technical devices and systems. Ability to read in and interpreting indication of the on-board instruments. Adhering to principles of use on-board devices and systems in states of normal work, emergency and dangerous ones.

5. Aeronautical telecommunication

Educational content:

Basic issues related with communication and informatics systems. Final and commutation devices. Technical characteristic of digital and analog aeronautical radio stations. Principles and methods of organizational communication. Regulations of conducting radio communications. Safety and protection of communications. Operational documents and secret commanding documents. Using the technical communication means.

Effects of education - abilities and competences:

Ability of utilization technical and tactical capabilities of communication means and systems. Knowledge of regulations in range of the work of technical means of communication; practical using telecommunication and informatics means adhering operational and secret commanding documents.