COURSE DESCRIPTION CARD - SYLLABUS

Course name
Aircraft systems [S1Lot2-SLiPL>SP]

Course

Field of study
Aviation

Year/Semester
3/6

Area of study (specialization)
Aircraft Engines and Airframes

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

• Knowledge: Basics of onboard equipment operation and system usage. • Skills: Ability to apply the scientific method to problem-solving. • Social Competencies: Awareness of one's knowledge limitations and ability to work in a team.

Course objective

Understanding the purpose, structure, and operational principles of onboard systems and equipment. Ability to read and interpret indications from onboard instruments.

Course-related learning outcomes

Knowledge:
Structured theoretical knowledge of key technical aspects and specialized topics related to air transport, including engineering techniques and tools.
Basic understanding of research methods, conducting scientific studies, and principles of academic writing.
Knowledge of aviation safety and management, including human factors, pilot reliability assessment, and the impact of human limitations on flight operations.

Proficiency in self-learning using modern tools such as online lectures, databases, e-books, and digital learning programs.

Skills:
Ability to gather, analyze, and critically evaluate information from various sources (literature, databases in Polish and English).
Proficiency in using information and communication technologies applicable to aviation projects.
Ability to plan and conduct experiments, including measurements and computer simulations, and correctly interpret results.
Capability to apply analytical, simulation, and experimental methods in solving civil aviation-related problems.
Competence in probability theory and statistical analysis, with the ability to interpret and apply statistical methods in aviation engineering.
Ability to write a short scientific paper, select appropriate research methods, and analyze results.
Ability to collaborate and work in a team, taking on various roles and prioritizing tasks effectively.
Capability to plan and pursue lifelong learning, including opportunities for advanced studies and professional development.
Social Competencies:
Awareness of the social role of an aviation engineer, including the responsibility to communicate technical advancements and engineering developments to the public.
Ability to identify and resolve ethical dilemmas in aviation and astronautics.

Social competences:
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Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Oral exam
Written exam
Programme content:
• PART-66 (Theory - 22.5 hours, Practical - 11.25 hours)
• Module 7A - Maintenance Practices
• Module 11B - Aerodynamics, Structures, and Piston Aircraft Systems
• Module 17A - Propeller Systems
Course Topics:
Pilot and navigation equipment
Electrical power, hydraulic, and pneumatic systems
Diagnostics, communication, and positioning systems
Specialist systems: human safety and aircraft safety
PART-66 (Theory - 22.5 hours, Practical - 11.25 hours)
Module 7A - Maintenance Practices
7.7 Electrical Wiring Interconnection Systems (EWIS):
Techniques and insulation continuity testing
Crimping techniques: manual and hydraulic
Testing crimped connections
Inserting and removing connector plugs
Coaxial cables: safety measures for testing and installation
Wire marking, inspection criteria, and damage tolerance
Electrical installation protection techniques
7.9 Tubing and Pipes:
Bending and flaring aircraft pipes
Pipe inspection and testing
Installation and securing of pipes
Module 11B - Aerodynamics, Structures, and Piston Aircraft Systems
11.4 Cabin Pressurization and Air Conditioning (ATA 21)
11.5 Avionics and Instrumentation Systems (ATA 31)
Flight instruments: altimeter, airspeed indicator, vertical speed indicator
Gyroscopic instruments: artificial horizon, heading indicator, turn coordinator
Angle of attack indicators and stall warning systems

Glass cockpit displays
Other aircraft indicators
11.6 Electrical Power (ATA 24)
Battery installation and operation
DC power generation and regulation
Power distribution and circuit protection
Converters and transformers
11.7 Aircraft Equipment (ATA 25)
Emergency equipment requirements
Cabin layout and safety equipment
Cargo handling systems
11.8 Fire Protection (ATA 26)
Fire and smoke detection systems
Fire suppression systems
11.9 Flight Controls (ATA 27)
Primary flight controls: ailerons, elevator, rudder
Flaps, trim tabs, and gust locks
11.10 Fuel Systems (ATA 28)
Fuel tank design and management
Fuel delivery and cross-feed systems
Fuel quantity indicators and safety features
11.11 Hydraulic Power (ATA 29)
Hydraulic fluids and pressure generation
System maintenance and troubleshooting
11.12 Ice and Rain Protection (ATA 30)
Ice detection and de-icing systems
Windshield heating and wipers
11.13 Landing Gear (ATA 32)
Landing gear structure and operation
Emergency extension systems
Brakes, anti-skid, and auto-braking systems
11.14 Aircraft Lighting (ATA 33)
External and internal lighting systems
11.15 Oxygen Systems (ATA 35)
Cockpit and cabin oxygen supply
Storage and distribution systems
11.17 Water/Waste Systems (ATA 38)
Water supply and waste disposal systems
Module 17A - Propeller Systems
17.1 Propeller Basics
Blade pitch, aerodynamic forces, and vibration considerations
17.2 Propeller Construction
Materials and manufacturing techniques
17.3 Propeller Pitch Control
Mechanical and electronic control systems
17.4 Propeller Synchronization
Phase synchronization techniques

Programme content

none

Course topics

none

Teaching methods

Lecture: Structured presentation of course material.
Laboratory: Hands-on experiments and practical applications.
Exercises: Practical application of knowledge, including examples presented on the board and problem-

solving tasks assigned by the instructor.

Bibliography

Basic:
Bilski J., Polak Z., Rypulak A., Avionics, Instruments, and Onboard Systems, WSOSP, Dęblin, 2001.
Stola M., Aircraft Equipment, Warsaw University of Technology, 1978.
Spitzer C.R., The Avionics Handbook, 2001.
Titterton D.H., Strapdown Inertial Navigation Technology, 1997

Additional:
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Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00