



## 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

mgr inż. Wiktor Hoffmann

wiktor.hoffmann@put.poznan.pl

### 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 |