



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aircraft and engines maintenance

### Course

Field of study

Aviation and Astronautics

Area of study (specialization)

Aircraft engines and airframes

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

### Prerequisites

1 Knowledge: Basic mathematical information in the field of statistics and probability in calculating the reliability parameters and measures and indicators of the airframe and aircraft engine engineering

2 Skills: Student is able to adopt and plan an appropriate model of the operating process and create computer support tools for the operation of the airframe and aircraft engine using a spreadsheet or relational database

3 Competence: Student is aware of the level of his knowledge and skills and understands the need for further training - raising professional and personal competences



### Course objective

-learn students the principles of engines and aircraft servicing on the basis of service processes and operating models;

-understand the basic issues regarding reliability, readiness, operational vulnerability, durability, lifetime and properties and operational properties of airframe and aircraft engines;

-acquire the methods of testing the operational reliability of airframes and aircraft engines, adopt an appropriate model of the operation process and suggest the appropriate extension or modification of service processes depending on the needs;

- plan and supervise the operation process of the selected aircraft structure taking into account relevant quality standards

to ensure a high level of flight safety;

### Course-related learning outcomes

#### Knowledge

1. has detailed knowledge related to selected issues in the field of construction of manned and unmanned aircraft, including on-board equipment and their main components

2. has detailed knowledge related to selected issues in the field of construction of aircraft propulsion systems and design of their components

3. has detailed knowledge related to selected issues in the field of ground handling of aircraft and propulsion systems, taking into account logistics aspects

4. has basic knowledge about the life cycle of devices, facilities and technical systems, as well as how to describe them technically

#### Skills

1. Is able to think and act in a creative and entrepreneurial way

2. Is aware of the validity of the proposed operating rules and understands the effects of engineering activities, including its impact on flight safety

#### Social competences

1. Is able to think and act in a creative and entrepreneurial way

2. Is aware of the validity of the proposed operating rules and understands the effects of engineering activities, including its impact on flight safety

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- Written test



## Programme content

- Basic concepts of operation of airframes and aircraft engines.
- Reliability theory, characteristics and reliability models.
- Characteristics of selected models of operation of airframe structures and aircraft engines.
- Forecasting reliability in the aircraft operation process.
- Basic models of failures and damage.
- Readiness, suitability, durability and lifetime of the technical facility with regard to aircraft constructions.
- Operational vulnerability as a property of airframes and aircraft engines.
- Computer operating support systems.

### PART-66

#### MODULE 7A. MAINTENANCE ACTIVITIES

##### 7.17 Handling and storage of aircraft

Taxiing and towing aircraft and related security measures; Lifting, wedging, securing of aircraft and related measures safety; Aircraft storage methods; Procedures for filling / emptying fuel tanks; Deicing and deicing procedures; Electrical, hydraulic and pneumatic earthing supplies; Impact of environmental conditions on the operation and functioning of the aircraft. [2]

##### 7.19 Extraordinary events

- a) Lightning strike examination and HIRF penetration. [2]
- b) Examination after extraordinary events such as difficult landing and flight through turbulence. [2]

##### 7.20 Maintenance procedures

Maintenance planning; Modification procedures; Warehouse procedures; Certification / approval procedures; Connection to the operation of the aircraft; Maintenance check / quality control / quality guarantee; Additional maintenance procedures; Inspection of limited durability components. [2]

#### MODULE 10. REGULATIONS CONCERNING AVIATION

##### 10.6 Continuing airworthiness

Detailed understanding of Part-21 regulations on continuing airworthiness.

Detailed understanding of Part-M. [2]

10.7 Relevant national and international requirements: (if not replaced by EU requirements)



a) Maintenance programs, inspection and testing of maintenance; Airworthiness directives; Service bulletins, manufacturer service information; Changes and repairs; Technical service documentation: technical service manual, repair manual construction, illustrated spare parts catalog, etc. Only for licenses A to B2: Master list of minimum equipment, list of minimum equipment, list shipping deviations; [2]

b) Continuing airworthiness; Minimum equipment requirements - test flights Only for B1 and B2 licenses: ETOPS, maintenance and shipping requirements; Operation in any weather, operation of category 2/3. [1]

#### MODULE 17A. PROPELLER

##### 17.5 Icing guard for propeller

Equipment for de-icing by liquid and electrically. [2]

##### 17.6 Propeller maintenance

Static and dynamic balancing; Demarcation of the shovel; Assessment of blade damage, erosion, corrosion, impact of damage, splitting of layers; Propeller treatment / repair systems; Propeller engine operation. [3]

##### 17.7 Storage and maintenance of the propeller

Maintenance and lack of propeller maintenance. [2]

#### Teaching methods

Lectures / Discussion

#### Bibliography

Basic

1. Jerzy Lewitowicz, Kamila Kustroń: Podstawy eksploatacji statków powietrznych, Tom 1 i 2
2. Zbigniew Zagdański, Stany awaryjne statków powietrznych
3. Jerzy Lewitowicz, Leszek Lorycha, Jerzy Manerowski, Problemy badań i eksploatacji techniki lotniczej, Tom 6 Wydawnictwo Instytutu Technicznego Wojsk Lotniczych , Listopad 2006
4. Szczepanik R., Tomaszek H., Zarys metody oceny niezawodności i trwałości urządzeń lotniczych z uwzględnieniem stanów granicznych, Problemy Eksploatacji 2005
5. Tomaszek H., Żurek J., Jaształ M., Prognozowanie uszkodzeń zagrażających bezpieczeństwu lotów statków powietrznych, Wydawnictwo Naukowe Instytutu Technologii Eksploatacji, Warszawa 2008

Additional

Supplementary literature:



1. Paweł Lindstendt, Praktyczna diagnostyka maszyn i jej teoretyczne podstawy
2. Dzierżanowski p., (i inni), Napędy lotnicze, Turbinowe silniki śmigłowe i śmigłowcowe, Wydawnictwo Komunikacji i Łączności, 1985
3. Dzierżanowski p., (i inni), Napędy lotnicze, Turbinowe silniki odrzutowe, Wydawnictwo Komunikacji i Łączności, 1983
4. Dzierżanowski p., (i inni), Napędy lotnicze, Zespoły wirnikowe silników turbinowych, Wydawnictwo Komunikacji i Łączności, 1982
5. Józef Zieleziński, Budowa płatowców, Wydawnictwo Komunikacji i Łączności, Warszawa 1974
6. Kocańda S., Szala J., Podstawy obliczeń zmęczeniowych, Wydawnictwo Naukowe PWN, 1997

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,6
Student's own work (literature studies, preparation for tutorials, preparation for tests) <sup>1</sup>	10	0,4

<sup>1</sup> delete or add other activities as appropriate