



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aircraft ground and inflight test organization

Course

Field of study

Aerospace Engineering

Area of study (specialization)

Onboard systems and aircraft propulsion

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

compulsory

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Dr Eng. Wojciech Prokopowicz

email: wojtek379@wp.pl

phone +48 616652212

Faculty of Environmental Engineering and Energy

ul. Piotrowo 3; 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Has basic knowledge necessary to understand profile subjects and specialistic knowledge about the aircraft construction, construction methods, manufacturing, operation of aviation technology, management of safety systems, impact on the economy, society and the environment in the field of aviation for selected specialties: Aviation Engineering

Has basic knowledge related to selected issues in the field of manned and unmanned aircraft construction, in the field of on-board equipment, aircraft propulsion units, control systems, communication and registration systems, life support systems, and automation of individual systems.



Has ordered, theoretically founded basic knowledge in the field of: on-board systems, aviation propulsion, on-board and ground systems supporting the operation of aircraft, systems for analyzing and decoding flight parameters.

Course objective

The aim of the course is to provide students with specialistic knowledge and the necessary skills in the field of ground and flight aviation tests, preparation of aviation equipment for the verification of on-board systems and aircraft propulsion used in civil and military aviation on manned and unmanned aircraft.

Course-related learning outcomes

Knowledge

Has detailed knowledge about the construction of manned and unmanned aerial vehicles, including technology and types of materials used in the construction of basic airframe aggregates and systems. Has knowledge related to the design of aircraft engines and can calculate the life cycle of a technical object based on measures and durability indicators. Has knowledge of the analysis and decryption of aircraft flight parameters in terms of performing checks on aviation technology equipment both on the ground and in flight. He has knowledge of the ground handling of aircraft and propulsion systems, and knows and can characterize the basic models of maintenance for a given type of airframe and engine structure. Has basic knowledge of the airframe and engine life cycle, including basic reliability structures.

Skills

Student might communicate using various techniques in the professional and other environments using the formal notation of construction, technical drawing, concepts and definitions of the field of study. Has the ability to self-educate with the use of modern didactic tools, such as remote lectures, internet sites and databases, teaching programs, e-books. He can obtain information from literature, the Internet, databases and other sources. Student can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions. Can draw a diagram and a complex machine element in accordance with the rules of technical drawing, can create a system diagram, select elements and perform basic calculations of the electrical and electronic system of machines or aviation devices. He knows and understands the characteristics of the basic parameters of the airframe and aircraft engine and is able to apply these skills to the analysis and decryption of parameters obtained from the aircraft as a technical object during tests on the ground and in flight.

Social competences

Student can think and act creatively and enterprisingly. Is aware of the importance of the proposed rules of operation and understands the effects of engineering activities, including its impact on flight safety. Is able to properly define the priorities in the operation of the airframe and aircraft engine with regard to ensuring an appropriate level of flight safety while maintaining the required economic implications.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified by two 45-minute tests carried out during the 15th and 30th lecture. Each test consists of 5 (open) questions, with different scores. Passing threshold: 70%



of points. As part of the exercises, the knowledge is verified by a 45-minute final colloquium carried out during 15 classes. The test consists of 5 questions (open), with different scores. Passing threshold: 70% of points. Passing issues on the basis of which the questions are developed do not go beyond the content presented during the lectures.

Programme content

- Basic issues and concepts related to the implementation of ground and in flight tests of aircraft.
- Basic concepts of airframe and aircraft engine operation.
- Analysis and decryption of airframe and engines flight parameters.
- Reliability theory, characteristics and reliability models.
- Characteristics of selected operation models of airframe structures and aircraft engines.
- Reliability forecasting in the process of aircraft operation.
- Basic models of failure and damage.
- Readiness, suitability, durability and service life of the technical objects (aircraft, engines) in relation to its structures.
- Serviceability of airframes and aircraft engines.
- Computer systems supporting the operation and analysis of aircraft or engines characteristics.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.

Exercises: presentation illustrated with examples given on the board and performing the tasks given by the teacher, examples with the use of the system FDS 9.0 for analysis and decryption of parameters recorded during flight and ground tests.

Bibliography

Basic

Mirosław Nowakowski: "Badania w locie statków powietrznych", Wydawnictwo Instytutu Technicznego Wojsk Lotniczych, 2019

Jerzy Jędrzejewski: "Próby w locie samolotów lekkich", Wydawnictwa Naukowe Instytutu Lotnictwa, Warszawa 2001

Zbigniew Zagdański: „Stany awaryjne statków powietrznych”, Wydawnictwo Instytutu Technicznego Wojsk Lotniczych, 1995



Jerzy Lewitowicz, Leszek Lorycha, Jerzy Manerowski: „Problemy badań i eksploatacji techniki lotniczej”. Tom 1-6 Wydawnictwo Instytutu Technicznego Wojsk Lotniczych , Listopad 2006

Szczepanik R., Tomaszek H.: „Zarys metody oceny niezawodności i trwałości urządzeń lotniczych z uwzględnieniem stanów granicznych”. „Problemy Eksploatacji” 2005

Tomaszek H., Żurek J., Jaształ M.: „Prognozowanie uszkodzeń zagrażających bezpieczeństwu lotów statków powietrznych”. Wydawnictwo Naukowe Instytutu Technologii Eksploatacji, Warszawa 2008.

Technical documentation of flight tests of selected aircraft

Additional

Ward Donald i inni, "Introductions to Flight Test Engineering: 1 3rd Edition", Kendall Hunt Publishing 2006

Paweł Lindstendt: „Praktyczna diagnostyka maszyn i jej teoretyczne podstawy”, Wydaw. Naukowe Askon, 2002

Dzierżanowski p., (i inni): „Napędy lotnicze – Turbinowe silniki śmigłowe i śmigłowcowe”, Wydawnictwo Komunikacji i Łączności, 1985

Dzierżanowski p., (i inni): „Napędy lotnicze – Turbinowe silniki odrzutowe”, Wydawnictwo Komunikacji i Łączności, 1983

Dzierżanowski p., (i inni): „Napędy lotnicze – Zespoły wirnikowe silników turbinowych”, Wydawnictwo Komunikacji i Łączności, 1982

Józef Zieleziński: „Budowa płatowców”, Wydawnictwo Komunikacji i Łączności, Warszawa 1974

Kocańda S., Szala J.: „Podstawy obliczeń zmęczeniowych”, Wydawnictwo Naukowe PWN, 1997

Breakdown of average student's workload

	Hours	ECTS
Total workload	74	3,0
Classes requiring direct contact with the teacher	49	2,0
Student's own work (literature studies, preparation for classes, preparation for tests) ¹	25	1,0

¹ delete or add other activities as appropriate