



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Non-destructive inspections of aircraft components

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

elective

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Energy

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Responsible for the course/lecturer:

Prerequisites

Has basic knowledge necessary to understand profile subjects and specialist knowledge about the 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 construction, materials used in the construction of airframes and on-board systems as well as aircraft propulsion units.



Has basic knowledge of measurement methods, characteristics of measuring instruments and their classification according to purpose, principles of operation and features, knows sensors and measuring transducers, registration

He has an orderly, theoretically founded basic knowledge in the field of: materials science, chemistry and technical physics.

Course objective

The aim of the course is to provide students with specialist knowledge and the necessary skills in the field of non-destructive inspections of aviation technology equipment, elements of on-board systems and aircraft propulsion used in civil and military aviation on manned and unmanned aircraft in accordance with the adopted standards.

Course-related learning outcomes

Knowledge

Has detailed knowledge of the construction of manned and unmanned aerial vehicles, including technology and types of materials used in the construction of basic airframe elements and systems. Has knowledge related to the design of aircraft engines and is able to calculate the life cycle of a technical object on the basis of measures and durability indicators. Has basic knowledge of the strength of materials, including the basics of the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other simple structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures. Has basic knowledge in the field of technical diagnostics and methods and methods of solving problems of their technical condition assessment and forecasting, knows: conditions for diagnosing technical objects, the essence of technical diagnostics in aviation engineering, tasks and goals of technical diagnostics. Has a basic knowledge of the basic processes occurring in the life cycle of technical devices, facilities and systems, as well as their technical description in the field of aerospace engineering.

Skills

Student can communicate using various techniques in the professional and other environments by apply the formal notation of construction, technical drawing, concepts and definitions of the field of study studied. Can use the language sufficiently to understand technical texts in the field of aviation (knowledge of technical terminology). Is able to obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it. Can use basic technical standards for safety.

Social competences

Student is aware of the importance of maintaining the principles of professional ethics. Is able to properly define priorities for the implementation of a task set by himself or others, based on the available knowledge. Can inspire and organize the learning process of other people

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. Passing issues on the basis of which the questions are developed do not go beyond the content presented during the lectures. The skills acquired during the laboratory classes are verified on the basis of a test admitting to laboratory classes, consisting of 5-7 tasks with different scores depending on the degree of their difficulty and on the basis of a prepared report on the laboratory task. Passing threshold: 50% of points.

Programme content

- Basic issues related to the operation of aircraft and aircraft engines
- Basic operating parameters
- Aircraft technical and on-board documentation according to ATA standards
- National regulations governing aircraft maintenance and non-destructive testing
- Physical and chemical basics of applied non-destructive testing methods
- Basic methods of diagnostics of structural elements used in aviation technology
- Tribological research
- Examples of apparatus used in non-destructive testing
- Software supporting the non-destructive testing process
- Safety rules during non-destructive testing of aviation technology.

Teaching methods

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

Laboratories: presentation illustrated with examples given on the blackboard and carrying out the tasks given by the teacher.

Bibliography

Basic

Andrzeja Żyłuk i Mariusz Zieja, "Problemy badań i eksploatacji techniki lotniczej", Tom 11, Wydawnictwo ITWL 1993

Praca zbiorowa, Lotnicze silniki turbinowe. Konstrukcja - eksploatacja - diagnostyka, Wydawnictwa Naukowe Instytutu Lotnictwa 2012

Anna Lewińska-Romicka, Badania nieniszczące. Podstawy defektoskopii, WNT Wydawnictwa Naukowo-Techniczne 2006



Zdzisław Pawłowski, Badania nieniszczące poradnik, Stowarzyszenie Inżynierów i Techników Mechaników Polskich 1984

Additional

Praca zbiorowa, Lotnicze silniki turbinowe. Konstrukcja-eksploatacja-diagnostyka, Wydawnictwa Naukowe Instytutu Lotnictwa 2012

Marek Dębski, Daniel Dębski, Wybrane zagadnienia wytrzymałości zmęczeniowej konstrukcji lotniczych, Wydawnictwa Naukowe Instytutu Lotnictwa 2014

Dębski, M. Dębski, K. Gołoś, J. Kaźmierski, Fatigue analysis tools of aerostructures, Wydawnictwa Naukowe Instytutu Lotnictwa 2018

Breakdown of average student's workload

	Hours	ECTS
Total workload	68	3,0
Classes requiring direct contact with the teacher	53	2,5
Student's own work (literature studies, preparation for classes, preparation for tests) ¹	15	0,5

¹ delete or add other activities as appropriate