



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aircraft engine tests and diagnostics

Course

Field of study

Aviation

Area of study (specialization)

Aircraft engines and airframes

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Grzegorz Szymański prof. PP

Responsible for the course/lecturer:

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Prerequisites

Basic knowledge of mechanics, metrology, material strength and machine construction. He can apply the scientific method in solving problems, carrying out experiments and inference. He knows the limits of his own knowledge and skills; can formulate questions precisely, understand the need for further education

Course objective

The aim of the course is to learn theoretical and practical issues related to research and diagnostics of aircraft engines, including: the scope of engine tests and methods of diagnosis, diagnostic modeling and forecasting future states of aircraft engines.

Course-related learning outcomes

Knowledge



1. has knowledge of the method of presenting test results in the form of tables and graphs, performing the analysis of measurement uncertainties
2. has extended knowledge in the field of material strength, including the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures, and has basic knowledge of the main departments of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body
3. has basic knowledge of metal, non-metal and composite materials used in machine construction, in particular about their structure, properties, methods of production, heat and thermo-chemical treatment and the influence of plastic processing on their strength, as well as fuels, lubricants, technical gases, refrigerants e.t.c.

Skills

1. is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret them and make a critical evaluation, draw conclusions and exhaustively justify the opinions they formulate
2. is able to properly plan and perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions from them
3. is able to properly select materials for simple aviation structures, and can indicate the differences between the fuels used in aviation
4. is able to design means of transport with appropriate external requirements (e.g. regarding environmental protection)

Social competences

1. understands that in technology, knowledge and skills very quickly become obsolete
2. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life
3. correctly identifies and resolves dilemmas related to the profession of an aerospace engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as part of the lecture is verified by a 45-minute test carried out on the 7th lecture. Colloquium consists of questions (test and open), variously scored. Passing threshold: 50% of points.

Skills acquired as part of the laboratory classes are verified on the basis of the final test, consisting of tasks scored differently depending on their level of difficulty. Passing threshold: 50% of points.

Programme content



Basic stages of engine testing. The role and scope of bench tests and during flight. Braking of aircraft engines and their capabilities. Technical measures in aircraft engine tests. Methods of bench tests and during flight of aircraft engines. Determination of operating parameters and characteristics of aircraft engines. Registration and processing of results from engine tests

PART - 66 (THEORY - 11.25 hours, PRACTICE - 11.25 hours)

MODULE 6. MATERIALS AND EQUIPMENT

6.4 Corrosion

a) Chemical basics;

Creation by electroplating process, microbiological, by pressure; [2]

MODULE 7A. MAINTENANCE ACTIVITIES

7.18 Disassembly, Inspection, Repair and Assembly Techniques

a) Damage types and visual inspection techniques;

Corrosion removal, evaluation and re-corrosion protection. [3]

b) General repair methods, structure repair manual;

Aging, fatigue and corrosion control programs. [2]

c) Techniques of non-destructive testing together with penetrant, radiographic and current methods vortex, ultrasonic and borescope. [2]

Teaching methods

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

2. Laboratory exercises: multimedia presentation illustrated with examples given on a blackboard and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1. Bukowski J., Łucjanek W., Napęd śmigłowy. Teoria i konstrukcja, Wyd. MON, Warszawa 1986r

2. Mysłowski J., Doładowanie silników, Wyd. Komunikacji i Łączności, Warszawa 2006r

3. R.B. Randall: Vibration based condition monitoring, Wiley, 2011.

4. Niziński S. Michalski R.: Diagnostyka obiektów technicznych. Monograficzna seria wydawnicza Biblioteka Problemów Eksploatacji, Warszawa - Sulejówek - Olsztyn - Radom, 2002.

5. J. Marciniak: Diagnostyka techniczna kolejowych pojazdów szynowych. WKiŁ, Warszawa 1982.



6. B. Żółtowski: Podstawy diagnostyki maszyn. Wydawnictwo. Uczelniane Akademii Techniczno-Rolniczej w Bydgoszczy, Bydgoszcz 1996.

7. C. Cempel, F. Tomaszewski: Diagnostyka Maszyn. Zasady ogólne, przykłady zastosowań. M.C.N.E.M.T, Radom 1992.

Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,2
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) ¹	20	0,8

¹ delete or add other activities as appropriate