



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aviation Research [S2LiK1>BwL]

Course

Field of study

Aerospace Engineering

Year/Semester

1/2

Area of study (specialization)

Civil Aviation

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

15

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

He has the knowledge necessary to understand the profile subjects and specialist knowledge about the construction, methods of construction, manufacturing, operation, air traffic management, safety systems, the impact on the economy, society and the environment in the field of aviation and astronautics for selected specialties. Has a basic knowledge of numerical methods, numerical dynamics of gases, using specialized software or self-developed tools. 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 Can obtain information from literature, the Internet, databases and other sources. He can integrate interpret the obtained information and draw conclusions from it, and create and justify opinions. He got it the need for lifelong learning; can inspire and organize the learning process of other people. He is ready to critically evaluate his knowledge and received content, recognizing the importance of knowledge in solving cognitive and practical problems and consulting experts in the case difficulties with solving the problem on their own.

Course objective

The aim of this course is to familiarize students with research related to air transport and aircraft operation. It will also provide them with the skills to develop research methodology and conduct practical testing of selected aircraft components, engines, and consumables.

Course-related learning outcomes

Knowledge:

Knowledge:

1. Has extended knowledge necessary to understand the profile subjects and specialist knowledge about the construction, methods of construction, production, operation, air traffic management, safety systems, impact on the economy, society and the environment in the field of aviation and cosmonautics for selected specialties: Civil Aviation, UAV.
2. has an orderly, theoretically founded general knowledge covering key issues in the field of the impact of aviation on the natural environment, emission of toxic compounds from aircraft propulsion, acoustic emission of flying objects

Skills:

Skills:

1. is able to communicate using various techniques in the professional environment and other environments using the formal notation of construction, technical drawing, concepts and definitions of the scope of the study field .
2. has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.
3. can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions
4. is able to apply basic technical standards concerning unification and safety and recycling

Social competences:

Social competences:

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people.
2. Is ready to critically evaluate the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems, and consult experts in case of difficulties in solving the problem on its own.
3. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE: Written exam covering the content covered during lectures

TUTORIALS: Written test covering the tasks and content covered during tutorials

LAB: Average grade based on all reports submitted after the laboratory sessions

Programme content

LECTURE:

1. Introductory lecture
2. Introduction to aviation research
3. Introduction to aircraft engine research
4. Topics of aviation research
5. Research methodology

EXERCISES:

Development of research methodology for selected processes

LABORATORY:

Practical testing of selected aircraft components, aircraft engines, and consumables

Course topics

- 1: Measurement of engine blade and component applications using non-destructive testing methods
- 2: Airframe layer measurement using non-destructive testing methods (vibroacoustic and ultrasonic)
- 3: Landing gear measurement using non-destructive testing (magnetic)
- 4: Electronic airframe measurement using non-destructive testing (radiographic)
- 5: Powerplant degradation measurement using non-destructive testing methods (spectrographic)
- 6: Fuel content measurement in oil

- 7: Water content measurement in hydraulic oil
- 8: Aircraft balance test
- 9: Measurement and assessment of the potential for mechanical failure of the primary landing gear
- 1: Measurement of the rotational speed of a turbofan engine rotor
- 2: Measurement of pressures in the working passage of a turbine engine
- 3: Measurement of temperature in individual engine cross-sections
- 4: Measurement of turbine engine vibrations during operation
- 5: Measurement of engine oil pressure
- 6: Measurement of engine thrust on a test stand
- 7: Measurement of fuel flow in the engine fuel system
- 8: Measurement and assessment of damage to fan and high-pressure compressor blades
- 9: Measurement of damage to the stationary and moving ring blades of the high-pressure and low-pressure turbines
- 10: Measurement of compressor and turbine blade tip clearances

Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character The exercise method (subject exercises, practice exercises) - in the form of auditorium exercises (application of the acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition)

Laboratory method

Laboratory exercises carried out as part of an educational trip to military units of the General Command of the Armed Forces

Bibliography

Basic:

Podstawowa

1. EASA ATPL Training, Operational Procedures, Jeppesen Boeing Company GmbH, Germany 2016
2. Zagdański Z., Stany awaryjne statków powietrznych, wyd. ITWL, Warszawa 1995
3. Szczepański C., Symulatory lotu, Wyd. Politechniki Warszawskiej, 1990
4. Zagdański Z.: Stany awaryjne statków powietrznych, Wyd. ITWL, Warszawa, 1995
5. Lewitowicz J., Kustroń K., Podstawy eksploatacji statków powietrznych, Własności i właściwości eksploatacyjne statku powietrznego, Wyd. ITWL, Warszawa, 2003
6. Lewitowicz J. (red.) Podstawy eksploatacji statków powietrznych, Badania eksploatacyjne statków powietrznych, Wyd. ITWL, Warszawa,
7. Lewitowicz J., Kustroń K., Podstawy eksploatacji statków powietrznych, Własności i właściwości eksploatacyjne statku powietrznego, Wyd. ITWL, Warszawa, 2003

Additional:

1. Biuletyn eksploatacyjny NR/P/S/4944/E/2007 Ankes nr 4 "System diagnostyki tribologicznej statków powietrznych lotnictwa Sił Zbrojnych RP zgodnego ze standardami NATO i programem Joint Oil Analysis Program (JOAP) - Warszawa, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50