COURSE DESCRIPTION CARD - SYLLABUS

Course name

Airframes construcion

Course

Field of study

Aviation

Year/Semester

3/5

Area of study (specialization)

Aircraft engines and airframes

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Transport Engineering

ul. Piotrowo 3; 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

1 Knowledge: Basic knowledge in the field of mechanics, airframe construction, metrology, strength of materials, non-destructive testing.

2 Skills: He can apply the scientific method in solving problems, carrying out experiments and gain conclusions

3 Competence: He knows the limits of his knowledge and skills; can precisely formulate questions, understands the need for further education

Course objective

- Familiarize students with the problems of aircraft operation (elements of the airframe structure).

Understanding the currently used operation and diagnosis systems increasing the safety of aircraft operation. Acquainting with basic aerial structures and methods of testing their strength. Familiarizing students with the principles of strength calculations for aircraft structures. To acquaint students with currently used systems supporting the design of aircraft structures.

Course-related learning outcomes

Knowledge

1. student ma wiedzę z zakresu bezpieczeństwa i zarządzania w lotnictwie. Student zna pojęcie czynnika ludzkiego oraz metody oceny niezawodności człowieka, ma szczegółową wiedzę związaną z wybranymi zagadnieniami z zakresu możliwości i ograniczeń człowieka podczas obsługi samolotu w locie, jego wpływu na zdrowie i zdolność do wykonywania operacji lotniczych, a także możliwości poprawy kondycji fizycznej

2. has the ability to self-study with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books

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 use information and communication techniques, applicable at various stages of the implementation of aviation projects

3. can see legal aspects in the process of formulating and solving tasks in air transport, in particular, use the aspects of European and national aviation law regulations

4. can assess - at least in a basic scope - various aspects of the risk associated with a logistics undertaking in air transport

5. is able to organize, cooperate and work in a group, assuming various roles in it, and is able to properly define priorities for the implementation of a task set by himself or others

6. is able to plan and implement the process of own permanent learning and knows the possibilities of further education (2nd and 3rd degree studies, postgraduate studies, courses and exams conducted by universities, companies and professional organizations)

Social competences

1. is able to think and act in an entrepreneurial way, incl. finding commercial applications for the created system, bearing in mind not only the business benefits, but also the social benefits of the activity

2. is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession

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:
- Written test

Programme content

- General information on the types of aircraft structures. Materials used for the production of airframe components. Concepts related to the probability and reliability of aircraft structures. The probability of working in the state of fitness. Technical operation of aircraft. Aircraft maintenancein practice. The influence of various factors on aircraft airframe wear. Non-destructive testing of aircraft structures. Problems of assessing the technical condition of the aircraft's reliability and operational durability. Technical services for servicing and repairing airframe structures. Operational flight safety factors. Safety of aircraft against the background of aviation law and regulatory requirements.

PART - 66 (THEORY - 33 hours)

MODULE 7A. MAINTENANCE ACTIVITIES

7.8 Riveting

Rivet connections, rivet spacing and pitch; Tools used for riveting and plunge riveting; Study of riveted joints. [2]

7.14.2 Composites and non-metals

Making binders; Environmental conditions; Test methods. [2]

MODULE 11B. PISTON AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

11.2 Airframe Structures - General Concepts

b) Construction methods: stressed skin hull, formers, stringers, bulkheads, frames, doublers, struts, ties, beams, floor structure, reinforcement, stripping methods, protection anti-rust, wing, empennage and engine devices; Construction assembly techniques: riveting, twisting, bonding; Surface protection methods such as chromating, anodizing, painting; surface cleaning;

Teaching methods

Lectures

Bibliography

Basic

1. K. Kaw, Mechanics of Composite Materials, second edition, Taylor & Francis Group, LL, 2006;

2. M. Chun-Yung Niu, Airframe structural design. Practical Design Information and Data on Aircraft Structures, Conmilit Prcss Ltd., 1988;

3. T. H. G. Megson, Aircraft Structures for engineering students (fourth edition), Elsevier Ltd., 2007;

4. E. ÜNAY, Load analysis of an aircraft using simplified aerodynamic and structural models, February 2015;

5. W. Błażewicz, Budowa samolotów – obciążenia, Wydawnictwo Politechniki Warszawskiej, Warszawa 1979;

6. M. Skowron, Budowa samolotów – obciążenia. Zbiór zadań, Wydawnictwo Politechniki Warszawskiej, Warszawa 1979;

7. C. Galiński, Wybrane zagadnienia projektowania samolotów, Biblioteka Instytutu Lotnictwa, Warszawa 2016;

8. M. N. Szulżenko, A.S. Mostowoj, Konstrukcja samolotów, Wydawnictwa komunikacji i łączności, Warszawa 1980;

9. Danilecki S., Projektowanie samolotów, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000;

10. Błaszczyk J., Konstrukcja samolotów, cz.I., Obciążenia zewnętrzne, WAT, Warszawa 1984;

11. Olejnik A., Budowa statków powietrznych, WAT 1984;

12. Cichosz E., Konstrukcja i praca płatowca, WAT, Warszawa 1986;

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14. Cheda W, Malski M., Płatowce (wydanie drugie poszerzone), WKiŁ, Warszawa 1981;

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17. B. Jancalewicz Podstawy konstrukcji lotniczych z kompozytów polimerowych, Wydawnictwo Politechniki Warszawskiej, Warszawa 2000;

18. J. P. Filding, Aircraft design, Cambridge University Press 1999.

Additional

1. A. Milikiewicz, Praktyczna aerodynamika i mechanika lotu samolotu odrzutowego w tym wysokomanewrowego, Wydawnictwo ITWL, Warszawa 2011;

2. M. Dębski, D. Dębski, Wybrane zagadnienia wytrzymałości zmęczeniowej konstrukcji lotniczych, Wydawnictwa Naukowe Instytutu Lotnictwa, Warszawa 2014;

3. A. Abłamowicz, W. Nowakowski, Podstawy aerodynamiki i mechaniki lotu, Wydawnictwa komunikacji i łączności, Warszawa 1980;

4. M. Bijak-Żochowski, Mechanika materiałów i konstrukcji, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006;

5. R.P.L. Nijssen, Composite materials an introduction, Inholland University of Applied Sciences, 2015;

6. P. Elsztein, A. Mańkowski, J. Świdźiński, B. Arct, 100 słów o lotnictwie, Wydawnictwo MON, Warszawa 1958;

7. T. Sołtyk, Amatorskie konstruowanie samolotów, Wydawnictwa Naukowe Instytutu Lotnictwa, Warszawa 2012;

8. R. Aleksandrowicz, J. Rościszewski, Mechanika lotu – zbiór zadań z rozwązaniami, PWN, Warszawa 1955.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	25	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	50	2,0

[1] delete or add other activities as appropriate