



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Airframes construction

Course

Field of study

Year/Semester

Aviation

2/4

Area of study (specialization)

Profile of study

Aircraft engines and airframes

general academic

Level of study

Course offered in

First-cycle studies

polish

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

15

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

Dr eng. Wojciech Prokopowicz

email: wojtek379@wp.pl

phone +48 606 638 410

Faculty of Transport Engineering

ul. Piotrowo 3; 60-965 Poznań

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. 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

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

Social competences

1. understands that in technology, knowledge and skills very quickly become obsolete
2. 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
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 maintenance in 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.



860/5000

PART - 66 (THEORY - 33 hours)

MODULE 7A. MAINTENANCE ACTIVITIES

7.8 Riveting

Riveted joints, rivet spacing and pitch;

Tools used for riveting and dimpling;

Examination of riveted joints. [2]

7.14.2 Composites and non-metals

Making binders;

Environmental conditions;

Research methods. [2]

MODULE 11B. PISTON AIRPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

11.2 Airframe structures - general concepts

b) Construction methods: working hull, frames, stringers, partitions, frames, doublers, struts, ligaments, beams, floor structure, reinforcement, stripping methods, protection anti-corrosion, wing, tail and engine equipment;

Structure assembly techniques: riveting, screwing, 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. Błaszczak 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;
13. Rozporządzenie Ministra Infrastruktury z dnia 15 lipca 2003 w sprawie klasyfikacji statków powietrznych Dz.U. 2003 nr 139 poz. 1333;
14. Cheda W, Malski M., Płatowce (wydanie drugie poszerzone), WKiŁ, Warszawa 1981;
15. Cymerkiewicz R. , Budowa samolotów, WKiŁ, Warszawa 1981;
16. J. Lamparski Konstrukcje powłokowe w lotnictwie, Sekcja Mechaniki i Konstrukcji KILiW PAN, Kraków 1974;
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. Elsztain, A. Mańkowski, J. Świdziński, 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 rozwiązaniami, PWN, Warszawa 1955.

Breakdown of average student's workload

| | Hours | ECTS |
|--|-------|------|
| Total workload | 100 | 4,0 |
| Classes requiring direct contact with the teacher | 75 | 3,0 |
| Student's own work (literature studies, preparation for tutorials, preparation for tests) ¹ | 15 | 1,0 |

¹ delete or add other activities as appropriate