Aircraft Structures

Classification	Module ID	Kind of Module	Number of Credits (ECTS)
		Elective	5

Location	Language	Duration of Module	Frequency of Module	Max. Number of Participants
Online	English	One Semester	Summer Semester	60

Module Convenor	Professor / Lecturer
Assoc. Prof. Dr. Kateryna Barandych	Assoc. Prof. Dr. Kateryna Barandych Industry practitioners (Progresstech-Ukraine)

Prerequisites*

Knowledge of engineering graphics, materials science and physics.
*** Note: Please also note the prerequisites according to the examination regulations in the respective valid SPO version.**

Usability	Teaching Methods	Workload
The module is offered by the Department of Computer-Integrated Technologies of Device Production, Igor Sikorsky Kyiv Polytechnic Institute, as an elective module for the Digital Technology and Management Bachelor's degree programme. The usability in other courses of study must be checked in each individual case.	Lecture; seminars with student presentations; independent study	Contact time: 60 h Self-study: 60 h Exam preparation: 30 h Total effort: 150 h

Learning Outcomes
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After successful completion of the module, students will have acquired the following professional, methodological and personal skills and competencies:
Professional Skills:

- Students can classify aircraft according to international and national regulatory documents, aerodynamic configuration, range, mass, speed and engine arrangement.
- Students can explain the basic laws of aerodynamics, the nature of lift and drag and the influence of aircraft design features on aerodynamic processes.
- Students are able to describe the structure and load-bearing elements of the wing, high-lift devices, tail unit, fuselage, engines and landing gear and the loads acting on them.
- Students can characterise passenger cabin layouts and select fasteners and joint types for aircraft structures.

Methodological Skills:

- Students are able to apply systems analysis methods to the design and analysis of elements of aircraft structures.
- Students can search for, process and analyse technical information from various sources, including international aviation handbooks.

Personal Skills (Social Competence and Self-competence):

- Students are able to prepare and deliver a technical presentation on an assigned topic and discuss it in a seminar.

Course Content

Current state of aircraft manufacturing and classification of aircraft; basic concepts of aerodynamics: International Standard Atmosphere, lift and drag, angle of attack, aerofoil geometry and mean aerodynamic chord; wing geometry, structural elements, fuel tank arrangement and high-lift devices; wing loads, load factor, flight envelope (V-n diagram) and aeroelastic phenomena such as divergence, control reversal, flutter and buffeting; tail unit and primary control surfaces, aircraft stability, controllability, trim and centre of gravity; fuselage design, structural elements and loads; interior layout of passenger aircraft and seat strength requirements; classification of aircraft engines and landing gear layouts; fasteners, riveted and bolted joints, corrosion protection and automation of fastener installation in aircraft production.

Literature

1. Megson T. H. G. Aircraft Structures for Engineering Students. Elsevier, 2021.
2. Raymer D. P. Aircraft Design: A Conceptual Approach. 7th ed. Reston, VA: AIAA Education Series, 2024.
3. Gudmundsson S. General Aviation Aircraft Design: Applied Methods and Procedures. Butterworth-Heinemann, 2021.
4. Federal Aviation Administration. Aviation Maintenance Technician Handbook: General, FAA-H-8083-30A. 2021.
5. Balabuiev P. V., Bohuslaiev V. O., Donets O. D. et al. Concept for Creating Modern Regional Passenger Jet Aircraft: monograph. Kharkiv: KhAI, 2020. 254 p. (in Ukrainian)
6. Lukianov P. V. (comp.) Aerodynamics of Flight Vehicles: textbook. Kyiv: Igor Sikorsky KPI, 2024. 188 p. (in Ukrainian)

Internationality (content-related)

The module follows international aircraft classification documents and FAA handbooks, uses international design literature and is co-taught by practitioners of an engineering company working for the global aircraft industry.

Method of Assessment (if applicable, notes on multiple choice as form of examination - APO §9a)

Form of Examination*1)	Type/Scope incl. Weighting*2)	Learning Objectives/Competencies to be Assessed
Portfolio examination	Seminar presentations (7 assignments): 56 % Module test: 44 % Optional oral credit test for students wishing to improve their grade	All of the above-mentioned competencies are assessed by way of the aforementioned examination forms.

*1) Please refer to the applicable overview of the forms of examination at the OTH Amberg-Weiden
*2) Please provide additional information on the weighting (in % share) and, if applicable, explain the bonus system.