COURSE DESCRIPTION CARD - SYLLABUS

Course name
Design of aircraft

Course

Field of study
Aerospace Engineering

Year/Semester
III/6

Area of study (specialization)
Aircraft engines and airframes

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
english

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
30

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
Dr inż Jedrzej Mosiężny

Jedrzej.mosiezny@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

Has basic knowledge on construction of aircraft, flight dynamics and aerodynamics.Has the capability of performing basic of performing basic algebraic and differential computations

Course objective

The goal of the study is to project knowledge and skills in area of aircraft design

Course-related learning outcomes

Knowledge

1. Has extensive knowledge on selected areas of flight mechanics in context of airframe loads

2. Has extended knowledge required to comprehend tasks in area of designing aircraft and endurance of airframes

3. Has extended knowledge in aera of rigid body mechanics and material strength in context of aircraft design [

Skills

1. Is capable of arranging and executing the process of designing and aircraft

2. Is capable of acquiring information from literature, internet and other sources. Is capable of integrating gathered knowledge and drawing conclusions.

3. Is capable of creating a schematic representation and executing basic calculations for design of an aircraft

Social competences

1. Is capable of setting up priorities for execution of a task, based on acquired knowledge

2. Understands the necessity of critical assessment of acquired knowledge and the necessity of perpetual learning

3. Understands the importance and non-technical aspects of engineering work and it's effect on environment and responsibility for own decisions

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: 90 minute exam in the exam session. Exam consists of 10 closed, single choice tasks (estimated time per task - 2 minutes) and 10 short opne calculation tasks (estimated time per task - 5 minutes) relevant to tasks presented on the lecture. Correct answer for closed tasks is worth 1 point. Open tasks are given 0-2 points with 0.5 point grading. Fully accomplished task cosists of a schematic (if needed), equations, calculations and unit calculations. Tasks are independent, answer from previous task is not required to following task. Passing the test requires 50% of points.

Project: Passing the project is based on minimum 5, maximum 7 project assignments relevant to the lectures. A project task is based on a elaborate calculations completed with specialistic software or self written scripts. Estimated time for completing a task - 13 days. Tasks shall be submitted via univerisites e-mail before given deadline. Tasks are graded from 0 - 10 points. Grading criteria are dependent on the task and comminicated during assignment. Task submitted after a deadline and/or by and to a non-univerisity e-mail are graded with 0 points. Tasks completed with use of references without pointing the reference sources (plagiarism, copycat works) are graded with 0 points. Criteria for passing a single assignment: obtaining 50% of points. Criteria for passing the class: obtaining 50% of total available point from all assignments and passing minimum of 70% of assignments.

Programme content

1. Overview of aircraft design process, statistical approach for aircraft design
2. Aerodynamic loads on flight surfaces
3. Aerodynamic loads on control surfaces
4. Aerodynamic loads on fuselage

5. Computation of shear, bending, twist loads based on aerodynamical and mass loading

6. Computation of loads in load bearing points

7. Introduction to aeroelastics

PART - 66 (THEORY - 45 hours)

MODULE 11B. PISTON AIRPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

11.3 Airframe structures - airplanes

11.3.1 Hull (ATA 52/53/56)

Sealing structures and increasing tension;

Wing, Airplane Tail Bracket and Landing Gear Mount;

Seat assembly;

Emergency doors and exits: construction and operation;

Fixing windows and windbreak. [2]

11.3.2 Wings (ATA 57)

Building;

Storage of fuel;

Landing gear, pillar, control surface, and lift / drag devices. [2]

11.3.3 Ballasts (ATA 55)

Building;

Attachment of the control surface. [2]

11.3.4 Flight control surfaces (ATA 55/57)

Construction and fastening;

Balancing - mass and aerodynamics. [2]

11.3.5 Gondolas / Supports (ATA 54)

Gondolas / Brackets:

- Construction;

- Firewalls;

- Engine suspension. [2]

Teaching methods

Blackboard based lecture, project classes in computer laboratory with practical examples of calculations presented on lecture

Bibliography

Basic

1. Thomas C. Corke – Design of Aircraft

2. Lloyd R. Jenkinson, James F. Marchman III – Aircraft Design Projects

3. T. H. G. Megson – Aircraft Structures for Engineering Students

4. Jan Roksam – Airplane Design

Additional

Any adequate literature on topic

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	75	3,0
Practical Activities [1]	25	1,0

[1] delete or add other activities as appropriate