



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Principles of Flight

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### Course

Field of study

Aviation and astronautics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

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### Number of hours

Lecture

15

Tutorials

15

Laboratory classes

Projects/seminars

Other (e.g. online)

### Number of credit points

2

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### Lecturers

Responsible for the course/lecturer:

Adam Wójcik

Responsible for the course/lecturer:

Wydział Inżynierii Środowiska i Energetyki

email: awpka@wp.pl

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### Prerequisites

The student starting this subject should have basic knowledge of aircraft control. He should also have the ability to apply the scientific method in solving problems and be ready to cooperate within a team.

### Course objective

To acquaint the student with the operation of airplane control systems.



### Course-related learning outcomes

#### Knowledge

1. has detailed knowledge related to selected issues in the field of navigation and piloting techniques, and the use of flight simulators
2. has detailed knowledge related to selected issues in the field of flight rules, its preparation, as well as related operational procedures

#### Skills

1. can obtain information from literature, the Internet, databases and other sources. Is able to integrate the information obtained, interpret and draw conclusions from them as well as create and justify opinions
2. knows how to use verbal communication with one additional foreign language at the everyday language level, can in this language describe the issues of the field of study being studied, is able to prepare technical descriptive and drawing documentation of an engineering, transport and / or logistics task

#### Social competences

1. rozumie potrzebę uczenia się przez całe życie; potrafi inspirować i organizować proces uczenia się innych osób
2. potrafi współdziałać i pracować w grupie, przyjmując w niej różne role
3. rozumie potrzebę krytycznej oceny posiadanej wiedzy i ciągłego kształcenia się
3. potrafi odpowiednio określić priorytety służące realizacji określonego przez siebie lub innych zadania

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

- assessment of knowledge and skills demonstrated on the written test - 1.5 hour

#### Exercises:

- knowledge acquired during the exercises is verified by two 45-minute colloquia carried out during 3 and 7 classes

### Programme content

#### Lecture:



Subsonic aerodynamics: basic, laws and definitions. Basics of airflow. Aerodynamic forces on aerofoils. Shape of an aerofoil section. Wing shape. The lift coefficient (CL) - angle of attack ( $\alpha$ ) graph. General use of coefficients. Three-dimensional airflow around an aeroplane.

Exercises:

Two-dimensional airflow around an aerofoil: streamline pattern, stagnation point, pressure distribution, centre of pressure (CP) and aerodynamic centre (AC), drag and wake, the lift coefficient (CL) - angle of attack ( $\alpha$ ) graph. Streamline pattern. Stagnation point. Pressure distribution.

### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Exercises: examples given on the board and performance of tasks given by the teacher - practical exercises.

### Bibliography

Basic

1. "Principles of Flight" (JAR Ref 080). JAA ATPL Training. Germany 2004
2. „Podstawy Aerodynamiki i Mechaniki Lotu". Abłamowicz A.. Nowakowski W., Wydawnictwo Komunikacji i Łączności, Warszawa 1980
3. „Praktyczna aerodynamika i mechanika lotu samolotu odrzutowego, w tym wysokomanewrowego", Milkiewicz A.. Wydawnictwo ITWL, Warszawa 2009
4. „Podstawy eksploatacji statków powietrznych", Lewitowicz J., Wydawnictwo Instytutu Technicznego Wojsk Lotniczych, Warszawa 2001

Additional

### Breakdown of average student's workload

	Hours	ECTS
Total workload	49	2,0
Classes requiring direct contact with the teacher	36	1,4
Student's own work (literature studies, preparation for exercises, preparation for colloquium, preparation for passing) <sup>1</sup>	13	0,6

<sup>1</sup> delete or add other activities as appropriate