



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Flight mechanics I

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Aircraft engines and airframes

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

PhD inż. Łukasz Brodzik

Responsible for the course/lecturer:

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tel.: 61 665 2213

Faculty of Environmental Engineering and  
Energy

Piotrowo 3 st., 60-965 Poznań

### Prerequisites

Student should have knowledge of mathematics, physics and aerodynamics presented in the studies. He should be able to obtain information from the indicated sources of literature, the Internet and other sources, use formulas, tables and technical calculations. He should be able to understand the need to expand their competencies and has the willingness to cooperate in a team.

### Course objective

Teaching basic rights and relationships in the field of flight mechanics of aircrafts, as well as familiarizing with the basic equilibrium equations of airframes in different flight states.



### Course-related learning outcomes

#### Knowledge

1. has knowledge in mathematics, including algebra, analysis, theory of differential equations, analytical geometry necessary to understand and describe the basic issues related to flight mechanics
2. has detailed knowledge related to selected issues in the field of flight mechanics of aircrafts, in particular related to the description of determined flight conditions
3. has ordered, theoretically founded general knowledge covering key issues in the field of fluid mechanics, in particular aerodynamics, necessary to determine the forces acting on an airplane

#### Skills

1. has the ability to self-study using modern teaching tools, such as websites and databases of aircraft performance information, as well as e-books
2. can explain and describe in a general way selected flight states of the aircraft
3. can use patterns associated with the description of aircraft movement

#### Social competences

1. is aware of the importance of maintaining the principles of professional ethics in analyzing and presenting issues of flight mechanics
2. is able to properly set priorities for the implementation of a specific task based on the available knowledge of the mechanics of aircraft flight [
3. understands the need for a critical assessment of knowledge of flight mechanics and its exploration in more detailed aspects affecting the state of flight

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam from the lecture

Written exam from tutorials

### Programme content

Classification of flying objects and air propulsion, propeller operation in constant and variable conditions, needed and disposable power, characteristic speeds, horizontal and ascending flights, straight and curvilinear flights, range and duration of flight, aircraft ceiling, aircraft takeoff and landing, aircraft flight restrictions aerodynamics and endurance, similarity criteria, selected hazardous situations in flight

PART - 66 (THEORY - 15 hours)

MODULE 8. BASICS OF AERODYNAMICS

8.3 Theory of Flight



Relationship between lift, weight, thrust and drag;

Gliding flight;

Steady state flights, performance;

Rotation theory; [2]

### Teaching methods

1. Lecture: multimedia presentation
2. Tutorials: completing the tasks given by the teacher

### Bibliography

Basic

1. Krzyżanowski A., Mechanika lotu, WAT, Warszawa 2009
2. Fiszdon W., Mechanika lotu cz. 1 i 2, PWN, Warszawa 1961
3. Hull D.G., Fundamentals of Airplane Flight Mechanics, Springer, 2007

Additional

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### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	42	1,7
Student's own work (literature studies, preparation for tutorials, preparation for tests <sup>1</sup> )	33	1,3

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