



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aerodynamics

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

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

30

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

PhD Remigiusz Jasiński

Responsible for the course/lecturer:

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### Prerequisites

Knowledge of mathematics and physics in the field presented during the studies

Ability to apply scientific methods in solving problems, carrying out experiments and inferring

Knowing the limits of one's own knowledge and skills; can precisely formulate questions, understand the need for further education

### Course objective

Learn the basic laws and dependencies in the field of aerodynamics and dynamics of aircraft movement and the ability to physically interpret phenomena. Familiarize yourself with the basic equations describing the aerodynamic parameters in the flow of solids and the equations describing the dynamics of aircraft motion.



### Course-related learning outcomes

#### Knowledge

1. Has extended knowledge necessary to understand profile subjects and specialist knowledge of the construction, construction and manufacturing methods, of aircraft - [K2A\_W04]
2. Has knowledge of mathematics, including algebra, analysis, theory of differential equations, probability, analytical geometry - [K2A\_W09]
3. Has ordered, theoretically founded general knowledge covering key issues in the field of body flow - K2A\_W10]

#### Skills

1. Can use the following languages: native and international to a degree enabling the understanding of technical texts and writing technical descriptions of machines in the field of aviation and aerospace using dictionaries (knowledge of technical terminology) - [K2A\_U01]
2. Can use formulas and tables, technical and economic calculations using a spreadsheet, specialized software - [K2A\_U05]

#### Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people - [K2A\_K01]
2. Is ready to critically evaluate his knowledge and received content, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties with solving the problem on his own - [K2A\_K02]
3. Is aware of the social role of a technical university graduate, and especially understands the need to formulate and transmit to the society, in particular through the mass media, information and opinions on technological achievements and other aspects of engineering activities; makes efforts to provide such information and opinions in a commonly understandable manner - [K2A\_K0]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE: Assessment of knowledge and skills on the written or oral test based on the explanation of selected issues

EXERCISES: Assessment of knowledge and skills on the written test on the basis of solved tasks

### Programme content

#### LECTURE

- Fundamentals of aerodynamics, basic equations of fluid mechanics, flows of real fluids, the influence of gas compressibility, flow ranges, aerodynamic characteristics, aerodynamic interference.



- Fundamentals of the dynamics of aircraft movement, steady and transient movements, balance static and dynamic stability of the aircraft, controllability of the aircraft.

- Flight duration and range issues

**EXERCISES:**

The exercises provide an example of solving the task on the blackboard along with analyzing the next stages. The way students solve the problem on the blackboard is reviewed by the tutor.

**Teaching methods**

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character

The exercise method (subject exercises, practice exercises) - in the form of auditorium exercises (application of acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition)

**Bibliography**

Basic

1. Arżanikow N.S., Malcew W.N, Aerodynamika, PWN, 1959
2. A.Krzyżanowski. Mechanika Lotu, skrypt WAT, 1984 r
3. Prosnak W.J., Równania klasycznej Mechaniki płynów, PWN, 2006

Additional

1. Anderson J.D. Jr., Fundamentals of Aerodynamics, McGraw-Hill, 1991

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for tutorials, preparation for exam) <sup>1</sup>	25	1,0

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