



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Meteorology in unmanned aerial vehicles flights [S1Lot2-BSP>MwLBSP]

### Course

Field of study

Aviation

Year/Semester

4/7

Area of study (specialization)

Unmanned Aerial Vehicles

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

30

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

Maria Nowaczyk

### Lecturers

### Prerequisites

A student beginning this course should have basic knowledge of phenomena occurring in the environment, physical processes shaping the weather, interpretation of weather forecasts presented in various forms. They should also have the ability to apply the scientific method in solving problems and be ready to cooperate within a team.

### Course objective

to familiarize the student with the processes and phenomena that determine the weather, weather systems and phenomena that are dangerous for flight and disrupt the operation of navigation and communication devices

### Course-related learning outcomes

Knowledge:

1. has detailed knowledge related to selected issues in the field of the most important phenomena occurring in the Earth's atmosphere, the possibility of their prediction, recognition, research, as well as limiting the negative impact of human activity on the surrounding environment
2. has detailed knowledge related to selected issues in the field of navigation, flight mechanics and piloting techniques, the use of simulators, flight rules, its preparation, and related operating procedures

Skills:

1. can see legal aspects in the process of formulating and solving tasks in air transport, in particular, use the aspects of European and national aviation law regulations
2. can assess - at least in a basic scope - various aspects of the risk associated with a logistics undertaking in air transport

Skills:

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Social competences:

1. understands that in technology, knowledge and skills very quickly become obsolete
2. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life
3. is able to think and act in an entrepreneurial way, incl. finding commercial applications for the created system, bearing in mind not only the business benefits, but also the social benefits of the activity

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated in the written test - 1.5 hours.

Exercises:

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

### Programme content

Lecture:

Atmosphere, troposphere, stratosphere, temperature, evolution and inversion types, atmospheric pressure, air density, International Standard Atmosphere (ISA). Wind, definition and measurement of wind. Thermodynamics. Clouds and fog. Air masses and fronts. Atmospheric pressure systems: high, non-frontal lows. Flight hazards: icing, turbulence, thunderstorms. Meteorological information.

Exercises:

Composition, spread, vertical division of the atmosphere. Surface temperature, insolation, surface effects, daily variations, cloudiness effect, wind effect. Pressure changes depending on altitude, isohypsy. Interdependence of pressure, temperature and density. Height measurement. Basic causes of wind, pressure gradient, Coriolis force, gradient wind. Cloud types and cloud classification. Movement of fronts and pressure systems, duration

### Course topics

1. Introduction to Meteorology in UAV Flights
2. Atmospheric Factors Affecting UAV Flights
3. Meteorological Forecasts for UAV Flights
4. Flight Altitude and Its Impact on Meteorological Conditions
5. Cloud Cover and Visibility in the Context of UAVs
6. Meteorological Conditions at Different Times of the Day and Year
7. Atmospheric Phenomena and Their Impact on UAV Flights
8. Meteorology in UAV Flights in Mountainous and Hard-to-Reach Areas
9. Using Technology to Analyze Meteorological Conditions for UAVs
10. Basic Meteorological Safety Principles for UAV Flights
11. UAV Flight Simulations in Different Meteorological Conditions
12. Basics of Aviation Law Regarding Meteorology
13. Preparation for UAV Flights in Extreme Meteorological Conditions
14. Analysis of Real Meteorological Incidents in UAV Flights

### Teaching methods

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

exercises.

## Bibliography

Basic:

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Additional:

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## Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	28	1,00