



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Meteorology 2

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3-4; 3/5-6

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

60

Tutorials

30

Laboratory classes

Projects/seminars

Other (e.g. online)

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

Piotr Szewczak

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Responsible for the course/lecturer:

dr hab. inż. Agnieszka Wróblewska, prof.PP

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### Prerequisites

The student starting this subject should have basic knowledge of environmental phenomena, physical processes shaping the weather, interpretation of weather forecasts presented in various forms. He



should also have the ability to apply the scientific method in solving problems and be ready to cooperate within a team.

### Course objective

Familiarizing the student with the processes and phenomena determining the weather, weather systems and phenomena dangerous to flight and disruptive to the operation of navigation and communication devices.

### Course-related learning outcomes

#### Knowledge

1. has basic knowledge of measurement methods, characteristics of measuring instruments and their classification according to purpose, principles of operation and features, knows sensors and measuring transducers, registration of results, measurement systems, measurement errors - the influence of external factors, statistical analysis of measurement results, organization principles active and passive experiment.
2. 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 activities on the surrounding environment.
3. has expanded knowledge of technical vocabulary, in particular specialized terminology used in the departments of science and technology related to aviation engineering.

#### Skills

1. knows how to use a language to a degree enabling understanding of technical texts in the field of aviation (knowledge of technical terminology).
2. has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.
3. can obtain information from literature, the Internet, databases and other sources. Is able to integrate obtained information, interpret and draw conclusions from them.
3. is able to conduct a research experiment using measuring apparatus, computer simulations, is able to make measurements, such as measurements of temperature, velocity and flow rate, pressure and operating forces, as well as interpret results and draw conclusions.

#### Social competences

1. is aware of the importance of maintaining the principles of professional ethics.
2. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for the decisions taken.
3. understand the need for critical assessment of knowledge and continuous education.



### 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:

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

### Programme content

Lecture:

semester 3:

The Atmosphere: Composition, extent, vertical division. Atmospheric pressure. Air density. International Standard Atmosphere (ISA). Altimetry. Wind. Thermodynamics.

semester 4:

Cloud formation and description. Cloud types and cloud classification. Influence of inversions on cloud development. Define 'fog', 'mist' and 'haze' with reference to the WMO standards of visibility range. Radiation fog.

semester 5:

Precipitation. Types of precipitation. Process of development of precipitation. Air Masses and Fronts. Modifications of air masses. Describe the boundaries between air masses (fronts). Description, classification and source regions of air masses. Pressure systems. Anticyclones, types, general properties, cold and warm anticyclones, ridges and subsidence. Non-frontal depressions. Tropical revolving storms.

Exercises:

semester 4:

Climatology. Climatic zones. General circulation in the troposphere and lower stratosphere. Tropical climatology. Cause and development of tropical showers and thunderstorms: humidity, temperature, tropopause. Seasonal variations of weather and wind, typical synoptic situations. Monsoon, sandstorms, cold-air outbreaks. Typical weather situations in the mid-latitudes.

semester 6:

Flight hazards. Icing. Turbulence. Wind shear. Thunderstorms. Tornadoes. Inversions. Hazards in mountainous areas. Meteorological information. Weather charts. Meteorological warnings. Meteorological services.



## 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. Domicz J., Szutowski L. Podręcznik pilota samolotowego, Technika Poznań 2001 Dunlop S.,
2. Pogoda - przewodnik ilustrowany, Świat Książki Warszawa 2003 Międzynarodowy atlas chmur, WMO 1956
3. Ostrowski M., Meteorologia dla lotnictwa sportowego, Aeroklub Polski Warszawa 2004
4. Petterssen S., Zarys meteorologii PWN Warszawa 1964
5. Roth G., Pogoda i klimat, Świat Książki Warszawa 2000
6. Schmidt M., Meteorologia WKiŁ Warszawa 1975
7. Schmidt M., Meteorologia dla każdego WKiŁ Warszawa 1972
8. Szewczak P., Meteorologia dla pilota samolotowego (PPL, CPL, ATPL, IR), Avia-test Poznań 2007
9. Słownik meteorologiczny pod red. Niedźwiedz T. PTGeofizyczne IMGW Warszawa 2003
10. Słownik pojęć geograficznych WEGŚ pod red. Kostrzewski A. Poznań 2001
11. Szczeciński Cz., Meteorologia na usługach lotnictwa WK Warszawa 1952
12. Światowa Organizacja Meteorologiczna, Podstawy meteorologii opr. B.J.Retallack IMGW 1991
13. Tamulewicz J., Pogoda i klimat Ziemi, WEGŚ tom V Poznań 1997
14. Tamulewicz J., Wody i klimat Ziemi, Pogoda i klimat Poznań 2001
15. Woś A. Meteorologia dla geografów PWN Warszawa 1996
16. Zwieriew A.S. Meteorologia synoptyczna, WKiŁ Warszawa 1965

### Additional



### Breakdown of average student's workload

|  | Hours | ECTS |
|--|-------|------|
| Total workload   | 150   | 6,0  |
| Classes requiring direct contact with the teacher  | 110   | 4,4  |
| Student's own work (literature studies, preparation for exercises, preparation for colloquium, preparation for passing lecture / exercises) <sup>1</sup> | 40    | 1,6  |

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