# MODULE INFORMATION SHEET

| **Name of Module Unit** | **Meteorology** |
|---|---|
| Name in polish language | Meteorologia |
| Module type | compulsory ~~/ elective~~ |
| Form of studying | full-time day courses |
| Level of study | undergraduate course (B.Sc. level) |
| Type of study ( for extra-mural courses) | - |
| Programme | Environmental Engineering |
| Speciality | Environmental Engineering |
| Responsible department | Department of Environmental Protection and Management |
| Responsible person | Dr inż. Małgorzata Zdunek |

| Semester | Lectures(E) | Tutorials | Laboratory | Computer Exercises | Projects | ECTS |
|---|---|---|---|---|---|---|
| 4 | 30 (Exam) | - | - | - | 15 | 5 |

**Objectives (summary)**

Meteorology is an introductory course on major physical and dynamical processes determining properties of the atmosphere in different spatial and temporal scales. Although focus is on weather processes, the examples of the application of meteorology in environmental protection are also included.
At the end of this course, students should:

- explain the structure of the earth atmosphere and the variability of meteorological parameters
- understand weather phenomena
- understand forces of motion in the atmosphere
- explain the impact of meteorological situation on air quality
- know how to estimate solar and wind energy resources
- access and interpret the real-time meteorological information and the weather forecast

**Prerequisites**

Physics I, II
Fluid mechanics

**Rules of integrated grade setting**

60% of lectures grade, 40% of project grade

**Recommended readings**

Molders N., Kramm G., 2014: Lectures in Meteorology. Springer.

Ahrens D.C., 2008: Essentials of meteorology. Brooks-Cole.

Petty G.W., 2008: A First Course in Atmospheric Thermodynamics. Sundog Publishing, Madison, WI.

Holton J. R., 2008: An introduction to dynamic meteorology. Elsevier.

Lynch A., Cassano J., 2006: Applied Atmospheric Dynamics. John Wiley & Sons, England

Ackerman S., Knox J. 2003: Meteorology - Understanding the Atmosphere. Prentice-Hall, Englewood Cliffs, NJ, USA.

Lutgens F. K., E. J. Tarbuck. 1986: The atmosphere: an introduction to meteorology. (wyd.3) Prentice-Hall, Englewood Cliffs, NJ, USA.

## Contents of lectures (syllabus)

| | Topics | Time (hrs.) | Scope (S / Ex) |
|---|---|---|---|
| 1 | Introduction. | 2 | S |
| 2 | Motion in the atmosphere (forces, Coriolis effect, equation of motion, geostrophic wind, waves in the atmosphere, global circulation, local winds)<br>Solar and Earth radiation. Radiative transfer. Energy budget | 6 | S |
| 3 | Basic of synoptic meteorology (air masses, cyclogenesis, fronts) | 2 | S |
| 4 | Origin, composition and the structure of the atmosphere. Hydrostatic equation. Standard atmosphere. | 2 | S |
| 5 | Solar and Earth radiation. Radiative transfer. Energy budget | 2 | S |
| 6 | Satellite measurements. | 2 | S |
| 7 | Atmospheric stability. | 1 | S |
| 8 | Thermodynamics of moist air. Condensation, clouds and precipitation. | 5 | S |
| 9 | Planetary boundary layer – structure and diurnal evolution. | 2 | S |
| 10 | Planetary boundary layer – turbulence and mixing. | 2 | S |
| 11 | Numerical weather forecast. Verification of forecast. | 4 | Ex |
| | **Total** | **30** | **hours** |

S – topics listed in the legal study programme standards from 12.07.2007
Ex – extended topics

**Lecturers**

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|---|
| Dr inż. Małgorzata Zdunek |

**Assessment method**

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|---|
| exam |

## Contents of guided projects

| | Topics | Time (hrs.) | Scope (S / Ex) |
|---|---|---|---|
| 1 | Analysis of meteorological situation based on synoptic reports, weather maps, and satellite and radar imagery. | 7 | S |
| 2 | Interpretation of NWP information. | 4 | Ex |
| 3 | Atmospheric stability – the interpretation of Stuve diagram and upper air soundings | 4 | Ex |
| | **Total** | **15** | **hours** |

S – topics listed in the legal study programme standards from 12.07.2007
Ex – extended topics

**Persons responsible for guided projects**

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| Dr inż. Małgorzata Zdunek |

**Assessment method for guided projects**

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| Project grade based on sum of credits obtained per each sub-project (90%) and attendance (10%) |