



Course title: Physical and astronomical basis of atmospheric science

Form of teaching: lecture – 52 hrs., 5p. ECTS; practices – 52 hrs., 10 p. ECTS, **total – 104 hrs., 15p. ECTS**

Course completion requirements : lecture – finale exam; practices – projects evaluation, evaluation of activity

Language of instruction: English

1. Short description, objectives:

The aim of the proposed course is repetition and systematization of the basic physics with special emphasis on atmospheric physics and elements of geophysics. During the course following goals will be achieved : understanding of physical processes in atmosphere, description of phenomena on the base of physical laws, forecast of environmental changes on the base of physical laws, measurement of physical variables and estimation of measurement error, understanding of physical equations. During practices students are trained in physics doing simple experiments and preparing reports.

2. Prerequisites:

1. reading and writing in English,
2. basic knowledge on physics and mathematics on the level of secondary school,
3. skills for simple laboratory experiments in physics.

3. Learnin outcomes

- W01 – understands basic phenomena and processes in all Earth spheres, especially in the atmosphere. Knows basic terms and concepts in this field (14K-1A_W01),
- W02 – possess a physical knowledge necessary for understanding of atmospheric and environmental processes (14K-1A_W03),
- W03 – knows key problems of atmospheric physics, concepts and terms used in their analysis (14K-1A_W04),
- W04 – knows fundamentals of mathematical description of complex physical phenomena, especially phenomena in Earth atmosphere (14K-1A_W05, 14K-1A_W11)
- W05 – knows the principles of planning and conducting laboratory experiments in physics (14K-1A_W09)
- W06 – knows the basic rules of safety and hygiene in work and ergonomics (14K-1A_W10)
- U01 – knows how to make basic measurements and observations of physics (14K-1A_U01)
- U02 – get skills to perform simple laboratory experiments in physical (14K-1A_U02)
- U03 - get skills of statistical analysis of measurements and their presentation as a final report (14K-1A_U03)
- U04 - learns independently under supervisionm(14K-1A_U08)
- K01 – is able to work in a team, both as a leader of the organizing group work and team member to carry out certain tasks (14K-1A_K01)
- K02 – feels responsible for safety in work of self and others (14K-1A_K04)
- K03 – is aware of the rapid development of physics, understands the need for continuous updating of expertise (14K-1A_K02)



4. Course description:

- 1) Fundamentals of mechanics and their application in atmospheric science;
- 2) Basic thermodynamics and its application in atmospheric science;
- 3) Fluid dynamics;
- 4) Physical description of turbulence;
- 5) Electricity and magnetism, electromagnetic waves;
- 6) Fundamentals of optics.

5. Course evaluation

Finale exam (W01-W06) – 60% total score, (Exam can be taken by individuals who have passed practices)
 projects evaluation (U01-U05) – 30% total score,
 evaluation of activity (K01-K02) – 10% total score.

6. Teaching methods

Teaching methods: lecture, multimedia presentations, discussion, work with the source material (book, article), methods of practical exercises, auditorium, laboratory

7. Recommended reading list

- [1]. Andrews, D.G., 2010, An Introduction to Atmospheric Physics. Cambridge.
- [2]. Halliday, D., Resnick, R., Walker, J., 2010, Fundamentals of Physics, John Wiley & Sons, Inc.
- [3]. Serway R.A., Jewett, J.W., 2004, Physics for Scientists and Engineers, Thomson Brooks/Cole.
- [4]. Chapman, R.E, 2002, Physics for Geologists, Routledge
- [5]. Vallis, G.K., 2006, Atmospheric and Oceanic Fluid Dynamics. Cambridge.