



Course title: Methods and measuring instruments

Form of teaching: lecture – 13 hrs., 1p. ECTS; practices – 13 hrs., 3 p. ECTS, **total – 26 hrs., 4p. ECTS**

Course completion requirements : lecture – final test; practices – final test, projects evaluation, evaluation of activity

Language of instruction: English

1. Short description, objectives:

The aim of the course is to acquaint students with the problems of meteorological measurements, measurement methods, classical and modern instruments used in meteorology.

2. Prerequisites:

1. reading and writing in English,
2. preparing of multimedia presentations,
3. basic knowledge on meteorology and climatology,
4. basic knowledge on physics, mathematics and statistics.

3. Learnin outcomes

W01 - understands basic concepts and terms on meteorological measurements methodology (14K-1A_W01, 14K-1A_W04, 14K-1A_W09)

W02 - understands basic processes possess in the atmosphere (14K-1A_W01, 14K-1A_W02, 14K-1A_W04)

W03 - describes the principles of traditional and modern meteorological instruments (14K-1A_W03, 14K-1A_W07, 14K-1A_W09)

W04 - clarifies the configuration of automatic weather stations and meteorological networks, depending on the scope of the measurements (14K-1A_W07, 14K-1A_W09, 14K-1A_W10)

W05 - understands the need for continuous, advanced and detailed meteorological measurements observations from the point of view of their use in social and economic life (14K-1A_W06, 14K-1A_W08, 14K-1A_W11, 14K-1A_W12)

U01 - understand the literature in the field of meteorology, climatology, meteorological measurements and basic physics (14K-1A_U06)

U02 - get skills of conducting basic observations of meteorological phenomena and processes, and basic meteorological measurements (14K-1A_U01, 14K-1A_U02)

U03 - get skills of evaluation of the expected quality of meteorological data based on the advantages and disadvantages of measuring instruments (14K-1A_U06, 14K-1A_U08)

U04 - indicates the methodological limitations and difficulties in interpreting the results of measurements obtained using classical instruments and remote sensing (14K-1A_U06, 14K-1A_U08)

U05 - get skills of acquire and expand the knowledge and skills with use of specialist literature and web sources. Understands the need for self-education (14K-1A_U03, 14K-1A_U06, 14K-1A_U07)

K01 - understands the need for continuous education for all life (14K-1A_K01)

K02 - understands the need for self-improvement through personal and professional life (14K-1A_K01, 14K-1A_K02)

K03 - understands the need for continuous updating of knowledge (14K-1A_K02)

K04 - get skills of critically respond to the opinions and the hypotheses posed by others. Able to present own opinion with reasonable arguments (14K-1A_K03)



K05 - correctly identifies and resolves dilemmas related to the functioning of the human in environment (14K-1A_K03)

4. Course description:

- 1) historical development of measurement methods and networks
- 2) traditional and modern measurement methods in meteorology (in situ measurements)
- 3) traditional and modern measurement sensors (remote sensing)
- 4) meteorological automatic station – components, exploitation, WMO requirements
- 5) meteorological dataloggers – basic of operation, basics of programming
- 6) remote sensing

5. Course evaluation

Finale exam (W01-W05) – 60% total score, (Exam can be taken by individuals who have passed practices)
The finale test for practices (W01-W05) – 20% total score,
evaluation of activity (K01-K05) – 20% total score.

6. Teaching methods

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

7. Recommended reading list

- Bader M.J., Forbes J.R., Lilley R.B.E., Waters A.J., 1995, Images in weather forecasting. Cambridge University Press.
- Fortuniak K, 2010, Radiacyjne i turbulencyjne składniki bilansu cieplnego terenów zurbanizowanych na przykładzie Łodzi, Wyd. UŁ, Łódź, 232 s.
- Moszkowicz S., Tuszyńska I., 2003, Meteorologia radarowa. Wyd. IMGW.
- Różdżyński K., 2004, Podstawy telemetrycznego miernictwa meteorologicznego. Wyd. IMGW.
- Oke T.R., 1995, Boundary Layer Climates, Methuen, London, 372 s.
- Renomowane czasopisma naukowe z zakresu klimatologii (np. International Journal of Climatology, Boundary Layer Meteorology, Theoretical and Applied Climatology, Atmospheric Environment)