Course title: Hydrology and oceanography

Form of teaching: lecture – 26 hrs., 2p. ECTS; exercises – 26 hrs., 5 p. ECTS, total – 52 godz., 7p. ECTS
Course completion requirements : lecture – finale exam; exercises – final test, control tests, assessment of experiments and projects execution.
Language of instruction: English

1. Short description, objectives:

The aim of the course is acquainting students with hydrological phenomena, processes and objects. Teaching of the fundamental, scientific and analytical methods applied in hydrology and oceanography. Explaining of the regularities of the Earth hydrosphere existing, especially in the hydrological cycle and water budget. Explaining of the water and its circulation importance to environment as well as economy.

2. Prerequisites:

1. Reading, writing and speaking in English.
2. Basic knowledge of physical geography.

3. Learning outcomes (LO):

1. Student understands fundamental phenomena and processes occurring in hydrosphere and related spheres. Student knows basic concepts and terms in this scope (14K-1A_W01).
2. Student possesses mathematical and statistical basics of the knowledge using to description and interpretation of the hydrological phenomena, objects and processes (14K-1A_W02, 14K-1A_W03, 14K-1A_W05).
3. Student possesses knowledge about technics and measuring devices used in sciences related to monitoring of hydrosphere. Student understands problem of quality and quantity data influence to research results (14K-1A_U01).
4. Student possesses the knowledge about relationships between natural and technical sciences, connected with hydrology and oceanography (14K-1A_W04, 14K-1A_W06).
5. Student is able to operate in basic scope the measuring apparatus used in hydrological investigations (14K-1A_W09, 14K-1A_U01).
6. Student knows how to use digital and traditional cartographical sources as well as data bases during working out hydrological studies results (14K-1A_U04).
7. Student is able to select and apply statistical and computer procedures to description and analysis of hydrological data in temporal and spatial scope (14K-1A_U03).
8. Student is able to learn, expand his knowledge and develop skills by himself, using contemporary literature as well as modern technology. Student realizes the needs of self-improvement (14K-1A_U08).
9. Student understands the need of constant specialist knowledge updating (14K-1A_K01, 14K-1A_K02).
10. Student is able to have a critical approach to opinions and thesis advanced by others as well as to have a discussion on the base of rational arguments. Student possesses his own views based on his knowledge and skills (14K-1A_K03).

4. Course description:

1. Origin of water on Earth and its properties
2. Water circulation and hydrological balance of Earth – the hydrological circle links
3. Water in atmosphere – evaporation, evapotranspiration, precipitation, interception
4. Ground waters – unsaturated and saturated zone, infiltration, filtration, groundwater systematics, springs
5. River waters – river network, river systems, fundamentals of hydrometry, phases and forms of discharge, river regime, hydrological extremes (floods and droughts)
6. Lakes – resources, distribution, water budget, trophic and thermal properties
7. Wetlands
8. World ocean division
9. Thermo-saline differentiation of sea water
10. Sea water motion: wavy motion, tides, currents
11. Water circulation in the World ocean
12. Methodology of hydrological observations and measurements. Basic equipment in measurement techniques of: rivers, lakes, swamps, springs, ground waters, precipitation, evaporation.
13. Methods of assessment of quantitative and qualitative dynamics of basic hydrological processes (water resources balancing, introduction to hydrological modelling, fundamentals of applied hydrology).

5. Course evaluation:

Final written exam (LO 1-6) – 60% of total score, (exam can be taken by individuals who have passed exercises)

Credit for exercises (LO 5-10) – 40% of total score:
- final test
- control tests
- assessment of experiments and projects execution

6. Teaching methods:

- Information lecture
- Problem lecture
- Seminar lecture
- Classical problem method
- Situational method
- Method of subject exercises
- Project method
- Case study method
- Experiment method
- Exhibiting method of demonstration

7. Recommended reading list:

1. Shaw E. M., 1994, Hydrology in Practice, Chapman & Hall
2. Boiten W., 2003, Hydrometry, Swets & Zeitlinger B.V., Lisse, The Netherlands
2. Ojha C.S.P., Berndtsson R., Bhunya P., 2008, Engineering Hydrology, Oxford University Press
3. Dingman L. S., 2002, Physical Hydrology, Prentice Hall
4. Ward A.D., Trimble S.W., 2004, Environmental Hydrology, Lewis Publishers
5. Steward R.H., 2008, Introduction To Physical Oceanography, Texas A & M University