

HYDROLOGY AND HYDROGEOLOGY

(Specialization Environmental engineering, 2nd Year of study, 1st Semester)

Credits (ECTS): 3

Course category: mandatory

Course holder: Assist. Prof. Georgiana-Diana GABUR, PhD

Objectives of the discipline:

The general objective of the subject is to train the technical thinking of future specialists in the field of hydrology, hydrogeology and water resources management, in order to support activities and decisions related to the efficient management of water resources, both in special situations (floods, droughts) and in normal situations, by decision-makers in the field. Familiarize with the physical, chemical and geological processes related to the presence of water in the natural terrestrial environment.

Specific objectives:

- To understand the main hydrological and hydrogeological processes, processes and phenomena associated with the water circuit at all scales.
- To develop skills in analyzing and interpreting hydrological and hydrogeological data and information in order to formulate concrete arguments and approaches.
- Demonstration of an own, reasoned and responsible attitude towards the problems encountered in the hydrological and hydrogeological monitoring process.
- Deepening the methods, techniques and research procedures used in hydrology and hydrogeology.
- Solving hydrological and hydrogeological problems in the context of environmental protection.
- Explaining the mechanisms of anthropogenic and natural processes and effects that cause and influence environmental pollution.

Contents (syllabus)

Course (chapters/subchapters)
1. Hydrology. Introductory concepts. Definition and social importance of hydrology. Brief history of the development of hydrology. Genesis of water. Molecular structure of water. Water resources and reserves. Water cycle and water balance in nature. Properties of water in its natural state (physical, chemical, biological and bacteriological).
2. River hydrology (potamology). Hydrographic network and river system. River valleys. Hydrography. Water circulation in nature; Global hydrologic cycle; Water balance in nature; Hydrography of rivers; Hydrography of lakes; Hydrography of groundwater; Hydrography of levels and flows; Solid runoff; Flooding of reservoirs.
3. Hydrometry. Collection of hydrological data; Need for measurements; Hydrometric network, surface water hydrometric network, lake hydrometric network, groundwater hydrometric network; Flow-level relationship; Wave hydrometry in rivers and lakes; Groundwater hydrometry; Groundwater levels and velocities hydrometry.
4. Elements of Atmospheric Physics. Atmosphere. Composition of air; physico-chemical characteristics; Standard atmosphere; Radiant energy; Solar energy; Air temperature; Heating and cooling processes of atmospheric air; Measurement of air temperature; Atmospheric pressure; Variation of atmospheric pressure with height. Barometric height formula; Atmospheric precipitation; Precipitation measurement; Precipitation processing; Wind; Integrated National Integrated Meteorological System (I.N.I.N.M.S.)

- Urban Hydrology. Introduction to urban hydrology; Water supply system; Water drainage system in urban areas; Flood risk in urban areas and its management; Determination of design rainfall and rainfall runoff; Alternative techniques to sewerage; Water quality in urban areas; Water supply and sewerage infrastructure in Romania.

Practical activity

1. The river basin. Hydrographic network. Organization of the hydrometric network in Romania. How levels are represented. Representation of liquid flows.
2. Determination and calculation of liquid flow on unmonitored watercourses - practical application
3. Water sampling from surface sources - practical application
4. Analysis of samples from surface water sources using multiparameter and turbidimeter. Statistical analysis of physico-chemical parameters characteristic for the Black Sea
5. Flow-level relationship; limnometric key extrapolation. Hydrometry of velocities and flows in rivers. Hydrometry of solid flows in rivers.
6. Mean precipitation by basin. Heavy rainfall; intensity-frequency curves; surface runoff assessment. Drawing intensity-duration-frequency curves. Measuring levels and flows in urban areas
7. Colloquium

Bibliography

- Crăciun I., Giurma I., Giurma-Handley C-R., Boboc V., 2011 - *Evaluating the Climatic Changes in the Hydrological Flow Regime of the Moldavian Areas*, Environmental Engineering and Management Journal, 10/12, 1983-1986.
- Diaconu P., 1998 - *Aplicatii de hidrometrie*, Ed. HGA Bucuresti.
- Drobot R., 2000 - *Lecții de hidrologie și hidrogeologie*, Editura Didactică și Pedagogică, București.
- Giurma I., 2004 - *Hidrologie specială*, Ed. Politehniun, Iași.
- Giurma I., Crăciun I., Giurma C-R., 2006 - *Hidrologie*, Ed. Politehniun, Iași.
- Serban, P., Stănescu, Al. V., Roman, P., 1989 - *Hidrologie dinamică*, Editura Tehnică, București
- Socovschi, V., Buta, I., 1994 - *Hidrometrie – măsurători și calcule hidrologice*, UBB, Cluj Napoca.
- Stefanache D., Giurma-Handley R-C., 2004 - *Monitorizarea parametrilor hidrologici și meteorologici*, Ed. "Gh.Asachi", Iasi.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Final exam	Written examination	60%
Evaluation of the activity during the semester	Written and oral assessments during the semester	40%

Contact

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