

**56S1-HYDRO**

**HYDROLOGY**

**ECTS: 3.5**

**HOURS PER SEMESTER/WEEK:** LECTURES: 15/1; CLASSES: 30/2

**FIELD OF THE STUDY:** Environmental protection

**Level of study:** First-cycle (Engineer's degree) program

**Course status:** obligatory \*

**Year of the study:** I

**COURSE CONTENTS**

**LECTURES:** Occurrence and circulation of water in nature. Water balance. Characteristics of water resources in the world, Europe and Poland. Available and renewable water resources. Causes, effects and methods of preventing water deficits. Classification and characteristics of natural water bodies. Origin, typology and environmental conditions of water resources formation. Groundwater, its types and characteristics. Methods of groundwater resources assessment. River systems - stream networks, water levels, discharges, flow measures, low water, high water and floods. Overgrowth of river channels. Ice phenomena. Hydrological forecasting. Urban hydrology. Natural and artificial lakes - formation, types, supply, thermals, and state variations. Effects of water reservoirs on the environment. Wetlands. Seas and oceans - origin, chemistry and dynamics of water. Glaciers - distribution, characteristics and role in the water cycle.

**CLASSES:** Field measurements - hydrometry. Methods of measuring and calculating water flow. Distribution of water velocity in the riverbed. Analysis of the topography of the hydrographic catchment area and water cycle conditions in the catchment area. Designation and typology of watersheds. Polish Hydrographic Division. Classification and density of the river network, channel mileage, measures of tortuosity and development. Hydrological survey (use of GIS tools). Analysis of hydrological data: water levels and flows. High and low flows. Indicators of water runoff from the catchment area. Water balance of the river basin. Lake bowl morphometry. Bathymetric and capacitive curve.

**EDUCATIONAL PURPOSE:** Familiarizing students with hydrological processes, factors governing the water cycle in the catchment area and determining the basic hydrological characteristics.

**LEARNING OUTCOMES**

**Knowledge.** Is able to define the basic hydrological concepts. Understands and is able to describe the water cycle in nature, knows the conditions for the formation of water resources, interprets the elements of the water balance Explains the general conditions of water flow in natural channels and describes the conditions for the formation of hydrological extreme phenomena Knows the basic methodologies of hydrometric measurements and principles of operation measuring devices.

**Skills.** Is able to use cartographic materials to describe the characteristics of the catchment area. Is able to classify the river network, recognizes and analyzes hydrological phenomena, is able to select the measurement method for the prevailing hydrological conditions and independently perform a hydrometric measurement. Is able to interpret the results of hydrological measurements and observations. Is able to assess the water resources of the catchment area.

**Social competences.** Expresses opinions on the impact of extreme phenomena on the environment, is aware of their risk.

**TEACHING FORMS AND METHODS**

**Lectures.** Informative lecture with a multimedia presentation.

**Classes.** Auditorium exercises, field exercises.

**FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES**

**Lectures.** Written test - Assessment of knowledge of the topics presented in the lectures. 60% of correct answers entitle to pass the course.

**Classes.** Written test summarizing the theoretical and practical knowledge gained during the classes. Report - Correctly defined outflow conditions from the hydrographic catchment of the selected river. Correctness of the hydrological survey.

**BASIC LITERATURE**

1) Allison Sergeant. Hydrology and Earth Systems. Syrawood Publishing House, 2018 ISBN-13: 978-1682865217. 2) Wilfried Brutsaert. Hydrology: An Introduction. Cambridge University Press, 2023, 11ed. 3) Tim Davie. Fundamentals of Hydrology. Routledge 2019, 11ed.. 4) William LeRoy Evans II. Lake Hydrology An Introduction to Lake Mass Balance. <https://doi.org/10.1353/book.83862>, Johns Hopkins University Press., 2021. 5) Pociask-Karteczka J., Zlewnia. Właściwości i procesy. Wyd. II, Wyd. Wyd. UJ, 2006. 6) Ozga-Zielińska M., Brzeziński J., Hydrologia stosowana. Wyd. Wyd. PWN Warszawa, 1994.

**ADDITIONAL LITERATURE**

International textbooks on hydrology available on-line.

**THE TEACHER/TEACHERS CONDUCTING THE CLASSES:**

prof. dr hab. inż. Katarzyna GLIŃSKA-LEWCZUK [kaga@uwm.edu.pl](mailto:kaga@uwm.edu.pl)

Department of Water Management and Climatology

Plac Łódzki 2, 10-721 Olsztyn, POLAND