



SZKOŁA GŁÓWNA
GOSPODARSTWA
WIEJSKIEGO

Hydrology and Water Management

Educational subject description sheet

Basic information

Field of study Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes)		Didactic cycle 2024/25	
Speciality -		Subject code PWMPWM2S_D.B100000P.06311.24	
Organizational unit Course Offer for exchange students		Lecture languages english	
Study level second cycle studies, including uniform master studies (MA programmes)		Mandatory Elective subjects	
Study form full-time studies		Block Basic subjects	
Education profile General academic		Disciplines	
Coordinator	Leszek Hejduk		
Teacher	Leszek Hejduk, Agnieszka Hejduk, Agnieszka Bańkowska-Sobczak, Adam Krajewski		
Period Winter semester	Examination Exam	Number of ECTS points 5	
	Activities and hours Lecture: 30 Laboratory exercises: 30		

Goals

Code	Goal
C1	The transfer of knowledge regarding water circulation processes in nature, including: Earth's water resources and their types, the hydrological cycle, the methodology for assessing water circulation parameters in a river basin, the water balance of a river basin, the thermics and dynamics of inland waters, sources and movement of solid materials, the quality of surface waters, the impact of anthropopression on water circulation in the basin, as well as hydrological processes in seas and oceans

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	The student knows and understands the issues related to sustainable development and the impact of human activities on the environment, including the effects of engineering structures.		Written exam
W2	The student knows and understands hydrological phenomena and processes, as well as the principles of their modeling, and knows the principles of conducting hydrometric measurements and preparing hydrological studies for planning purposes.		Written exam
Skills - Student can:			
U1	The student can prepare hydrological documentation for planning purposes and can determine and analyze the basic characteristics of water flow.		Written exam, Project
U2	The student is able to use various methods of hydrological analysis applied in environmental protection and engineering and critically evaluate the results obtained using these methods.		Written exam, Project
Social competences - Student is ready to:			
K1	The student is ready to describe the results of their work, formulate conclusions, and provide opinions on environmental protection issues.		Written exam
K2	The student is ready to consider non-technical aspects and consequences of engineering activities, including their impact on the environment, in light of the principles of rational resource use.		Written exam

Study content

No.	Course content	Subject's learning outcomes	Activities
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1.	<p>Subject and scope of hydrology. The importance of hydrology in engineering and environmental protection. Hydrological service. International organizations. Basic elements of the water balance. Water level measurements. Characteristic water levels. Hydrological curves related to water levels. Water velocity measurements. Determination of flow rates. Flow curve (rating curve). Hydrological curves related to water flows. Characteristic flows. Runoff measures. Calculation of probable maximum flows – statistical methods. Design flows (for sizing water and transportation structures; Q_m and Q_k). Floods, their characteristics. Hydrological forecasts. Hydrographic characteristics of the catchment. Boundaries and areas of the catchment. Parameters characterizing the catchment. Outflow hydrographs from the catchment (catchment response to rainfall depending on land use). Riverbed sediment. Suspended sediment transport measurements. Bedload transport measurements. Indicators of catchment denudation. Thermics and water quality. Chemistry of inland waters, sources of water pollution. Water balance and its components. Balance equation. Atmospheric precipitation. Land evaporation. Retention. Hydrological modeling. Rainfall-runoff models for flood estimation in small catchments; effective rainfall, unit hydrograph, quantity and quality runoff models. Use of models to assess the impact of human activities on flood flows. Impact of anthropopression (land use changes in the catchment, urbanization, hydraulic structure development) on runoff characteristics. Selection of the method for determining characteristic flows depending on the available hydrological information. Statistical methods, flow transposition methods, empirical methods (based on SQ). Low flows, environmental flows. Water management balance.</p> <p>Hydrological characteristics of lakes and artificial reservoirs. Selected processes in seas and oceans. Status, use, and threats to Poland's water resources. Hydrological documentation in water projects. Water law permits, authorization for preparing hydrological documentation.</p>	W1, W2, U1, U2, K1, K2	Lecture
2.	<p>Determination of selected runoff characteristics from a controlled catchment (based on measurement data). Determination of characteristic flows in the absence of observational data. Application of a mathematical model to determine floods (including design flows) in small catchments. Water management balance</p>	U1, U2, K2	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture
Laboratory exercises	Problem solving

Activities	Examination method	Percentage
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Activities	Examination method	Percentage
Lecture	Written exam	60%
Laboratory exercises	Project	40%

Activities	Credit conditions
Lecture	passing exam
Laboratory exercises	project preparation

Literature

Obligatory

1. Byczkowski A., 1999. Hydrologia, t. 1 i 2, Wydawnictwo SGGW.

Optional

1. Banasik K., Górski D., Ignar S., 2000. Modelowanie wezbrań opadowych i jakość odpływu z małych nieobserwowanych zlewni rolniczych. Wyd. SGGW.
2. Ciepeliowski A. (red.), 1995. Metodyka zagospodarowania zasobów wodnych w małych zlewniach rzecznych. Wyd. SGGW, Warszawa.

Calculation of ECTS points

Activity form	Activity hours*
Lecture	30
Laboratory exercises	30
Preparation for exercises	20
Preparing the project	20
Preparation for the exam	30
Self-study on the content covered in class	20
Student workload	Hours 150
Number of ECTS points	ECTS 5

* hour means 45 minutes