

SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Water Resources Management and Modeling Educational subject description sheet

Basic information

Field of study Course Offer for exchange st studies, including uniform ma programmes) Speciality - Organizational unit Course Offer for exchange st Study level second cycle studies, includie (MA programmes) Study form full-time studies Education profile General academic	udents - second cycle aster studies (MA udents ng uniform master studies	Didactic cycle 2024/25 Subject code PWMPWM2S_D.B100000K.03756.24 Lecture languages english Mandatory Elective subjects Block Major subjects Disciplines Environmental engineering, mining and en	ergy
Coordinator	Dorota Mirosław-Świątek		
Teacher	Dorota Mirosław-Świątek		
Period Winter semester	Examination Pass with grade Activities and hours Lecture: 10 Project exercises: 20		Number of ECTS points 2

Goals

Code	Goal
C1	The aim of the course is to introduce students to the basics of water resources modelling based on a river flow model.

Entry requirements

Hydrology, MathematicsI, Physics, Fluid mechanics. Student student knows the basics of hydrology and open channel hydraulics. Ability to use computer technologies

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	the essence of open channel flow modelling		Report, Presentation, Test (written or computer based)
Skills - Student can:			
U1	how to calculate of basic flow elements		Report, Presentation, Test (written or computer based)
U2	how to analyze and interpret the results of the simulations and draw critical conclusions based on them		Report, Presentation, Test (written or computer based)
Social competences - Student is ready to:			
К1	participate in the thematic discussion and argue his views		Presentation

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Lectures: Introduction to modeling (quantity and quality) of water resources. Description of water flow in open channels - the steady uniform flow in open channels with uniform and variable cross-section roughness and occurrence of plants in compound cross-sections; Description of the unsteady flow in open channel; Numerical solutions of Saint Venant equations based on explicit and implicit differential schemes; HEC-RAS calculation software; Unsteady water flow modelling with HEC-RAS; Determination of boundary conditions, identification of model parameters; Model calibration and validation.	W1, U1, U2	Lecture
2.	Exercises: Hydraulic properties of a river cross-section; Flood routing in a river using the HEC-RAS model. Calculations of water profiles for the subcritical flows. Identification of model parameters.	W1, U1, U2, K1	Project exercises

Course advanced

Activities	Methods of conducting classes	
Lecture	Lecture	
Project exercises	Presentation, Problem solving	
Activities	Examination method	Percentage
Lecture	Test (written or computer based)	50%

Leeture	rest (written of compater based)	5070
Project exercises	Report	25%
Project exercises	Presentation	25%

Activities	Credit conditions	
Lecture	Correct answers 50% of the test	
Project exercises	Positive evaluation of the project and presentation.	

Literature

Obligatory

- 1. SZYMKIEWICZ R., 2010: Numerical Modeling in Open Channel Hydraulics. Springer.
- 2. . WHITE F.: Fluid mechanics. McGraw-Hill, Nowy Jork, 2011
- 3. Cunge (2003) Cunge JA. Of data and models. Journal of Hydroinformatics. 2003;5(2):75–98. doi: 10.2166/hydro.2003.0007.

Optional

1. Brunner (2016) Brunner GW. HEC-RAS river analysis system 2D modeling user's manual. Davis: US Army Corps of Engineers—Hydrologic Engineering Center; 2016a.

Calculation of ECTS points

Activity form	Activity hours*	
Lecture	10	
Project exercises	20	
Preparing a report	10	
Preparation for the test	10	
Preparation of a multimedia presentation	10	
Student workload	Hours 60	
Number of ECTS points	ECTS 2	

* hour means 45 minutes