SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Water Resources Management and Modeling

Educational subject description sheet

Basic information

Field of study
Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes)

Speciality
-

Organizational unit
Course Offer for exchange students

Study level
second cycle studies, including uniform master studies (MA programmes)

Study form
full-time studies

Education profile
General academic

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 energy

Coordinator	Dorota Mirosław-Świątek
Teacher	Dorota Mirosław-Świątek

Period	**Examination**	**Number of ECTS points**
Winter semester	Pass with grade **Activities and hours** Lecture: 10 Project exercises: 20	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:			
K1	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%
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