



SZKOŁA GŁÓWNA  
GOSPODARSTWA  
WIEJSKIEGO

## Water Resources Management and Modeling

### Educational subject description sheet

#### Basic information

<p><b>Field of study</b> Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes)</p> <p><b>Speciality</b> -</p> <p><b>Organizational unit</b> Course Offer for exchange students</p> <p><b>Study level</b> second cycle studies, including uniform master studies (MA programmes)</p> <p><b>Study form</b> full-time studies</p> <p><b>Education profile</b> General academic</p>	<p><b>Didactic cycle</b> 2024/25</p> <p><b>Subject code</b> PWMPWM2S_D.B100000.03756.24</p> <p><b>Lecture languages</b> english</p> <p><b>Mandatory</b> Elective subjects</p> <p><b>Block</b> Major subjects</p> <p><b>Disciplines</b> Environmental engineering, mining and energy</p>	
<b>Coordinator</b>	Dorota Mirosław-Świątek	
<b>Teacher</b>	Dorota Mirosław-Świątek	
<b>Period</b> Winter semester	<b>Examination</b> Pass with grade	<b>Number of ECTS points</b> 2
	<b>Activities and hours</b> Lecture: 10 Project exercises: 20	

#### 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, Mathematics, 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
<b>Knowledge - Student knows and understands:</b>			
W1	the essence of open channel flow modelling		Report, Presentation, Test (written or computer based)
<b>Skills - Student can:</b>			
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)
<b>Social competences - Student is ready to:</b>			
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

<b>Activities</b>	<b>Methods of conducting classes</b>
Project exercises	Presentation, Problem solving

<b>Activities</b>	<b>Examination method</b>	<b>Percentage</b>
Lecture	Test (written or computer based)	50%
Project exercises	Report	25%
Project exercises	Presentation	25%

<b>Activities</b>	<b>Credit conditions</b>
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

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

\* hour means 45 minutes