

Course name: Hydraulics and Hydrology II

ECTS	6.0
Course status	facultative
Course final assessment /evaluation of outcomes	exam / test
Prerequisite	basics of: hydrology, open channel hydraulics

Main field of study: Engineering and Water Management

Educational profile	General academic
Code of studies and education level	master of thesis
Semester of studies	summer
Language of instruction	English

Course offered by:

Name of faculty offering the course	Environment Engineering and Land Surveying
Name of department offering the course	Hydraulic Engineering and Geotechnics / Sanitary Engineering and Water Management
Course coordinator	Leszek Książek Ph.D., Maciej Wyrębek Ph.D., Agnieszka Woś Ph.D., Andrzej Wałęga Ph.D., Agnieszka Cupak Ph.D.

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
HAH_K1	<i>methods of calculating the water surface level in river channels in steady and unsteady flow, super- and sub-critical flow, determining the channel capacity and determining the impact of hydrotechnical constructions. Understands the small and large circulation of water in a nature, with the hydrological cycle constituent characteristics, genesis, quantitative assessment and effects of extreme hydrological phenomena and methods of specifying characteristic flows in controlled and uncontrolled catchments.</i>	IGW2_W05 IGW2_W07	T
SKILLS – student is able to:			
HAH_S1	<i>calculate parameters of the channel and the capacity of the watercourse section in various conditions of bed maintenance. Is able to perform calculations of maximum flows with a defined probability of exceedance in a controlled catchment and a small uncontrolled catchment.</i>	IGW2_U01	T
SOCIAL COMPETENCIES – student is ready to:			
HAH_C1	<i>make informed decisions in the field of engineering and water management and proper assessment of the impact of human activities on the environment.</i>	IWG2_K02	T

Teaching contents

Lectures:	15 hours
Topics	<i>Steady and unsteady water flow in open channels. Laminar and turbulent flow in open channels. Flow resistance. Calculation of the capacity of natural channels. Weir. The discharge-depth relation. Interpretation of the results of numerical calculations of water flow.</i> <i>Cycle of water circulation in the basin (precipitation, interception, evaporation, infiltration and surface and ground drainage). Types of hydrological regimes of watercourses. Characteristics of extreme phenomena. Determination of characteristic flows in controlled and uncontrolled catchments. Hydrological models of the catchment.</i>
Accomplished learning outcomes	HAH_K1; HAH_C1
Means of verification, rules and criteria of assessment	<i>Single-choice test, positive assessment should be given at least 50% of correct answers to given questions: <50% – insufficient (2.0); 50–60% – sufficient (3.0); 61–70% – satisfactory plus (3,5); 71–80% – good (4.0); 81–90% – good plus (4,5); 91–100% – very good (5.0). The share of the lecture grade in the final grade is 50%.</i>
Classes:	30 hours
Topics	<i>Calculation of the parameters of the channel and the capacity of the watercourse section in various conditions of bed maintenance – the method of subsequent approximations. Determining the discharge-depth curve.</i> <i>Calculation of maximum flows with a defined probability of exceedance in a controlled catchment and a small uncontrolled catchment.</i>
Accomplished learning outcomes	HAH_S1
Means of verification, rules and criteria of assessment	<i>Passing reports on exercises - a grade from exercises is an arithmetic average of formative grades. The share of the grade for the project exercises in the final grade of the subject is 50%.</i>

References:

Basic	<ol style="list-style-type: none">1. Subramanya K. 2009. <i>Flow in open channels</i>.2. Gordon N. et al. 2004. <i>Stream hydrology. An introduction for ecologists</i>.3. Byczkowski A. 1996. <i>Hydrologia. T. 1 i 2. Wyd. SGGW, Warszawa</i>.
Supplementary	<ol style="list-style-type: none">1. Ozga-Zielińska M., Brzeziński J. 1997. <i>Hydrologia stosowana. PWN, Warszawa</i>.

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	0.0 ECTS **
Area of academic study: T – technical sciences	6.0 ECTS**

Structure of student activity

Contact hours	57	hrs.	2.3 ECTS**
Including: lectures	15	hrs.	
classes and seminars	30	hrs.	
consultations	10	hrs.	
participation in research	0	hrs.	
obligatory traineeships	0	hrs.	
participation in examination	2	hrs.	

e-learning	0	hrs.	0.0	ECTS**
student own work	93	hrs.	3.7	ECTS**

*Areas of academic study in the fields of: A – the arts; H – humanities; M – medical, sport and health sciences; N – natural sciences; P – biological sciences; R – agricultural, forestry and veterinary sciences; S – social studies; T – engineering and technology

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25–30 hours of classes