

**Course name: Elements of Flood Protection**

ECTS	6.0
Course status	facultative
Course final assessment /evaluation of outcomes	graded credit
Prerequisite	basics of 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	winter or summer
Language of instruction	English

**Course offered by:**

Name of faculty offering the course	<i>Environment Engineering and Land Surveying</i>
Name of department offering the course	<i>Hydraulic Engineering and Geotechnics</i>
Course coordinator	<i>Andrzej Strużyński, Ph.D., Maciej Wyrębek, Ph.D.</i>

**Learning outcomes:**

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
<b>KNOWLEDGE – student knows and understands:</b>			
<i>EFP_K1</i>	<i>processes determining the water cycle in nature and techniques for modeling and forecasting hydrological extreme phenomena; methods for conducting a flood risk study and determining flood risk zones using specialized IT techniques; ways of managing flood zones.</i>	<i>IGW2_W05 IGW2_W06 IGW2_W07</i>	<i>T</i>
<b>SKILLS – student is able to:</b>			
<i>EFP_S1</i>	<i>describe and model water circulation processes in the environment; acquire and use the necessary data and information to perform a flood risk study and water management planning; develop a way of managing areas of immediate flood risk.</i>	<i>IGW2_U06 IGW2_U07 IGW2_U08</i>	<i>T</i>
<b>SOCIAL COMPETENCIES – student is ready to:</b>			
<i>EFP_C1</i>	<i>making engineering and water management decisions, and taking into account the environmental impacts of human activities and associated risks; bear responsibility for decisions taken in the designation of floodplains.</i>	<i>IGW2_K02 IGW2_K03</i>	<i>T</i>

**Teaching contents**

Lectures:	15 hours
Topics	<ol style="list-style-type: none"> <li>1. An introduction to Water and Flood Directives (WFD and FD).</li> <li>2. Genesis of flood events.</li> <li>3. Flood range.</li> <li>4. Methods of modeling floods.</li> </ol>

	5. Main factors of flood risk. 6. Flood protection methods. 7. Flood risk design.	
Accomplished learning outcomes		EFP_K1; EFP_C1
Means of verification, rules and criteria of assessment		Written exam. 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%.
Classes:		30 hours
Topics	1. Creating of the sampling survey within the flooded regions. 2. Drawing of the flood risk zones. 3. Creating of the flood defense scenarios on maps.	
Accomplished learning outcomes		EFP_S1
Means of verification, rules and criteria of assessment		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%.

#### References:

Basic	1. Strużyński A., Bartnik W. 2008. Flood protection in high valued river ecosystem – Middle Delta system of the Nida River. EJPAU, manuscript. 2. Florek J., Strużyński A., Mucha J. 2007. Hydrodynamic effects of flood wave travel along Targaniczanka Stream, Acta Scientiarum Polonorum, Formatio circumiectus, 6 (4), 39–50. 3. Mokwa M., Tymków P., Wężyk P. 2009. Identification of flow resistance coefficients in floodplain forests using terrestrial laser scanning. Studia Geotechnica et Mechanica, Vol. XXXI, No. 1.
Supplementary	1. CEN 2004. Water Quality – Guidance standard for assessing the hydromorphological features of rivers. EN-14614. European Comitee for Standarization, Brussels. 2. Flood Directive. Dyrektywa 2007/60/WE Parlamentu Europejskiego i Rady z dn. 23 października 2007 r. w sprawie oceny ryzyka powodziowego i zarządzania nim. 3. Identification and Destignation of Heavily Modified and Artificial Water Bodies, Common Implementantion Strategy for the WFD 2000/60/EC.

#### 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