

**Course title: HYDRAULIC STRUCTURES**

<b>Course Basic Information</b>	
<b>Academic Unit:</b>	Faculty of Civil Engineering
<b>Course title:</b>	Hydraulic Structures
<b>Level:</b>	Master
<b>Course Status:</b>	M
<b>Year of Study:</b>	II-year, III semester
<b>Number of Classes per Week:</b>	2+2
<b>ECTS Credits:</b>	6
<b>Time /Location:</b>	
<b>Teacher:</b>	Prof. Dr. Laura Kusari
<b>Contact Details:</b>	Email: <a href="mailto:laura.kusari@uni-pr.edu">laura.kusari@uni-pr.edu</a>
<b>Course Description:</b>	Hydraulic structures introduce students to the fundamentals of hydraulics needed to impart a sound foundation in the planning and hydraulic design concepts of the river engineering structures, dams and appurtenant structures.
<b>Course Goals:</b>	Hydraulic structures aim to provide knowledge of the basic principles of hydraulics as well as the planning and engineering design concepts of river engineering structures and dams.
<b>Expected Learning Outcomes:</b>	Upon successful completion of this course, student should be able to: <ul style="list-style-type: none"><li>• Understand the principles of hydraulics, open channel flow and flow in closed conduits,</li><li>• Understand river morphology and river engineering works,</li><li>• Design and sketch a real river section and river alignment changes,</li><li>• Differentiate between the various types of dams,</li><li>• Select, sketch and construct a hydraulic structure for river regulation and manage the same.</li> <li>• Pre-design simple dams and channels</li><li>• Design and operate sustainable solutions for IWRM while addressing technical, social, environmental, and institutional constraints.</li></ul>

<b>Student Workload (should be in compliance with student's Learnign Outcomes)</b>			
<b>Activity</b>	<b>Hours</b>	<b>Day/ Week</b>	<b>Total</b>
<i>Lectures</i>	2	15	35
<i>Theory/ Lab Work/Exercises</i>	2	15	30
<i>Practical Work</i>	0	0	0
<i>Consultations with the teacher</i>	1	10	10
<i>Field Work</i>	4	1	4
<i>Test, seminar paper</i>	2	3	6
<i>Homework</i>	2	5	10
<i>Self-study (library or home)</i>	2	5	10
<i>Preparation for final exam</i>	5	6	30
<i>Assessment time (test, quiz, final exam)</i>	2	4	8
<i>Projects, presentations, etc.</i>	2	4	8
<b>Total</b>			151
<b>Teaching Methods:</b>	Frontal lecture, individual assignments, in class presentations, discussions, individual seminar work.		
<b>Assessment Methods:</b>	First midterm evaluation 30%, Second evaluation 40% Seminars, assignments 30%		
<b>Primary Literature:</b>	Kusari, L., (2025), Lecture notes		
<b>Additional Literature:</b>	Sturm, T., (2009), Open Channel Hydraulics, McGraw-Hill Education; Lindell, J., Moore, W.P., Kong, H.W., (2018). Handbook of Hydraulics, McGraw-Hill Education. Przedwojski, B. et al., (1997), River training Techniques. Fundamentals, Design and Applications. Published by A. A. Balkema, Netherlands.		
<b>Designed teaching plan</b>			
<b>Week</b>	<b>Title of the Lecture</b>		
<i>Week 1:</i>	Basic principles of Hydraulics. Fundamentals of Hydrostatics.		
<i>Week 2:</i>	Flow in open channels		
<i>Week 3:</i>	Flow in close conduits.		

<b>Week 4:</b>	Basic concepts in Hydraulic Structures. River characteristics, river use, river impacts.
<b>Week 5:</b>	Hydrologic regime of rivers. Types of flow in the rivers channel. River hydraulics, steady and non steady flow.
<b>Week 6:</b>	Catchment and River morphology. River channel characteristics. River engineering and environment.
<b>Week 7:</b>	Planning and design of river regulation structures. Design criteria. Monitoring and their Maintenance.
<b>Week 8:</b>	Introduction to dams and appurtenant structures. Types of dams. Site investigations for dam construction. Selection of dam site, selection of type of dam.
<b>Week 9:</b>	Forces acting on dam. Combination of forces for design. Design parameters.
<b>Week 10:</b>	Embankment dams. Classification. Earth and rock fill dams. Their design criteria and constructive details.
<b>Week 11:</b>	Dam section selection to suit available materials and foundation.
<b>Week 12:</b>	Causes of failure of earth and rockfill dams. Slope protection. Seepage.
<b>Week 13:</b>	Dam Stability analyses. Safety measures.
<b>Week 14:</b>	Gravity dams. Forces acting on gravity dam. Profiles of a dam. Galleries in a gravity dam.
<b>Week 15:</b>	Dam appurtenant structures. Dam outlet works.

#### **ACADEMIC POLICIES AND CODE OF CONDUCT**

We start and finish class on time.

Tools used during class must be cleaned and stored away at the end of class.

Mobile/smart phones, and other electronic devices (e.g. iPods) must be turned off (or on vibrate) and hidden from view during class time.

Laptop and tablet computers are allowed for quiet use only; other activities such as checking personal e-mail or browsing the Internet are prohibited.

**Note | If a student has more than 3 class assignments evaluated below 50% he/she loses the right on taking the final exam. Evaluation is done from 0-100 %.**