

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Hydraulics and Hydrology</b>		Code <b>1010115111010130065</b>
Field of study <b>Civil Engineering Extramural Second-cycle</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Structural Engineering</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>20</b> Classes: <b>10</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>major</b>		(university-wide, from another field) <b>from field</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Marcin Skotnicki email: marcin.skotnicki@put.poznan.pl tel. 61 665 24 69 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Knowledge of the mathematics, physics and fluid mechanics
2	<b>Skills</b>	Student should be capable to apply knowledge to solve practical problems
3	<b>Social competencies</b>	Student should be aware of results of taken decisions
<b>Assumptions and objectives of the course:</b> Presentation of rules of fluid flows in different conditions		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student knows rules of pressure calculations and laws describing the pressure distribution in fluid - [K_W02]		
2. Student knows rules of calculations of pipelines systems with pump stations - [K_W04, K_W8]		
3. Student knows nonuniform and unsteady flow equations and its application - [K_W08]		
<b>Skills:</b>		
1. Student can compute the forces in fluid - [K_U01]		
2. Student can compute pump parameters - [K_U13]		
3. Student can evaluate water level profiles for different flow conditions - [K_U07, K_U13]		
<b>Social competencies:</b>		
1. Student is aware of the necessity of critical review of calculation results - [K_K02]		
2. Student is aware of the necessity of risk evaluation in drainage and hydraulic structures designing - [K_K02, K_K04]		
<b>Assessment methods of study outcomes</b>		
Lectures - written test (15 -20 questions, duration up to 30 min)		
Exercises - written test (3-4 problems, duration up to 60 min) and activity		

<b>Course description</b>		
Conservation of momentum, nonuniform flows, unsteady flow equations (de Saint-Venant equations), outflow through orifices and nozzles, overflows, complex pipeline systems, pump parameters evaluation, water hammer phenomena; presentation of computer applications EPANET (calculation of flow in complex hydraulic systems) and SWMM (unsteady open-channel flows)		
<b>Basic bibliography:</b>		
1. Mitosek M.: Mechanika płynów w inżynierii środowiska, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1997		
2. Orzechowski Z., Prywer J., Zarzycki R.: Mechanika płynów w inżynierii środowiska, Wydawnictwa Naukowo-Techniczne, Warszawa 1997		
3. Pociask-Karteczka J.: Zlewnia. Właściwości i procesy, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2006		
<b>Additional bibliography:</b>		
1. Ciesielski J.: Zbiór zadań z mechaniki płynów dla kierunku Inżynieria Środowiska (cz. 1), Wydawnictwo Politechniki Poznańskiej, 1986		
2. Nielacny M.: Uderzenia hydrauliczne w systemach wodociągowych, Wydawnictwo Politechniki Poznańskiej, 2005		
3. Sawicki J.: Przepływy ze swobodną powierzchnią, Wydawnictwo Naukowe PWN, 1998		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in lectures	20	
2. Participation in excersises	10	
3. Work at home	25	
4. Preparation for test and the presence on the test	20	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	35	1
Practical activities	42	2