STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Hydraulics and Hydrology**		Code **1010115111010130065**
Field of study **Civil Engineering Extramural Second-cycle**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
Elective path/specialty **Structural Engineering**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **20** Classes: **10** Laboratory: **-** Project/seminars: **-**		No. of credits **3**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **3 100%** **3 100%**

Responsible for subject / lecturer:

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

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of the mathematics, physics and fluid mechanics
2	**Skills**	Student should be capable to apply knowledge to solve practical problems
3	**Social competencies**	Student should be aware of results of taken decisions

Assumptions and objectives of the course:

Presentation of rules of fluid flows in different conditions

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Student knows rules of pressure calculatuions 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]

Skills:

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]

Social competencies:

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]

Assessment methods of study outcomes

Lectures - written test (15 -20 questions, duration up to 30 min)
Exercises - written test (3-4 problems, duration up to 60 min) and activity

Course description

Conservation of momentum, nonuniform flows, unsteady flow equations (de Saint-Venant equations), outflow trough 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).

Basic bibliography:

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

Additional bibliography:

1. Ciesielski J.: Zbiór zadań z mechaniki płynów dla kierunku Inżynieria Środowiska (cz. 1), Wydawnictwo Politechniki Poznańskiej, 1986
2. Niełacny M.: Uderzenia hydrauliczne w systemach wodociągowych, Wydawnictwo Politechniki Poznańskiej, 2005
3. Sawicki J.: Przepływy ze swobodną powierzchnią, Wydawnictwo Naukowe PWN, 1998

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	20
2. Participation in excersises	10
3. Work at home	30
4. Preparation for test and the presence on the test	15

Student's workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	30	1
Practical activities	0	0