

Faculty of Civil and Environmental Engineering						
Study programme:	<b>Civil Engineering</b>		Degree level: full-time programme:		<b>Bachelor's degree</b>	
Specialization			Diploma path:			
Module name:	<b>Hydraulics and hydrology</b>					
Module type:	<b>obligatory</b>	Semester:	<b>2</b>	ECTS	<b>3</b>	Module ID: <b>ENB02429</b>
No. of hrs in semester:	L - 15	C - 0	LC- 0	P- 15	SW- 0	S- 0
Prerequisites:	<i>Complete with prerequisites or "-"</i>		Mathematics, Physics			
Aims and objectives:	<i>Description of the assumed knowledge, skills and social competence the student should have acquired after the completion of the module:</i>		Knowledge and understanding of the static and dynamic fluid effects on structures or components. Understanding the basic issues of hydrology and water management. Learning design pressurized pipes and open troughs.			
Forms of teaching activities:	<i>lecture and project</i>		Assessment:		<i>Evaluation must be relevant to the intended learning outcomes</i>	
			lecture – written test; project – partial verification of the projects, 3 projects completion and discussion, three written tests			
Module content:	Physical and mechanical properties of liquids. Elements of hydrostatics. Fluid pressure on the simple, bent and curved walls . Basic concepts of liquid hydrodynamics. Bernoulli equation for ideal and real fluids flow. Steady flow in open channels. Securing and sealing troughs. Geound water flow. Bridges' and culverts' light. Watercourse and catchment. Catchment water balance. Fundamentals of hydrometry and hydrography. Water management. Protection against flooding.					
Teaching methods:	<i>lecture</i>		<i>design - individual projects</i>			
Learning outcome	<i>Specify min. 4, max. 8 learning outcomes in the following order: knowledge – skills – competence. Each learning outcome must be verifiable</i>				<i>Reference to the programme learning outcomes</i>	
LO1	Student identifies the impact of the liquid on the buildings or their parts.				K_B1_W11, K_B1_U03	
LO2	Student describes the basic laws of motion of the liquid in the pipes in closed and open channels.				K_B1_W14, K_B1_U10, K_B1_U16	
LO3	Student recognizes the basic issues of hydrology and water management.				K_B1_W04, K_B1_U04	
LO4	Student calculates the fluid pressure on the simple and refracted walls.				K_B1_U03, K_B1_U04	
LO5	Student constructs lines of pressure and energy to the movement of the liquid in the confined pipe.				K_B1_W11	
LO6	Student designs drainage for small buildings.				K_B1_W11	
LO7	Student designs trapezoidal ditch for given discharge.				K_B1_W11	
LO8	Student uses source databases available in the library and on the Internet.				K_B1_U23	

No. of learning outcome	Methods of assessing the learning outcome	Type of teaching activities (if more than one) during which the outcome is assessed	
LO1	Written colloquium qualifying the lecture, the defense of the calculation results.	L	P
LO2	Written colloquium qualifying the lecture, the defense of the project.	L	P
LO3	Written colloquium qualifying the lecture.	L	P
LO4	Defending the graphic part and the descriptive part of the first project.		P
LO5	Defending the graphic part and the descriptive part of the first project.		P
LO6	Defending the graphic part and the descriptive part of the second project.		P
LO7	Defending the graphic part and the descriptive part of the third project.		P
LO8	Discussion on the descriptive parts of the first, the second and the third projects.		P
Student workload (in hours)	lecture attendance	15x1h	15
	participation in classes, laboratory classes, etc.	15x1h	15
	preparation for classes, laboratory classes, projects, seminars, etc.		20
	working on projects, reports, etc.	-	-
	participation in student-teacher sessions related to the classes/seminar/project	1x5h	5
	implementation of project tasks	10x2h	20
	preparation for and participation in exams/tests		15
			TOTAL:
Quantitative indicators	Student workload – activities that require direct teacher participation: 15h+15h+5h=35	35	ECTS 1,5
	Student workload – practical activities: 15h+5h+20h+20h	60	2
Basic references:	1. <i>Bedinet P.B., Huber W.C.: Hydrology and floodplain analysis. Addison-Wesley Publishing Company, USA, 1988.</i> 2. <i>Featherstone R.E., Nalluri C.: Civil Engineering Hydraulics. Wiley-Blackwell, 2007.</i> 3. <i>Mott R.L.: Applied Fluid Mechanics. Pearson Education Limited, 2016.</i> 4. <i>Sokołowski J., Żbikowski A.: Odwodnienia budowlane i osiedlowe. Wyd. SGGW, Warszawa, 1993.</i>		
Supplementary references:	1. <i>Knight D.W., Mc Gahey C., Lamb R., Samuels P.G.: Practical Channel Hydraulics. Taylor &amp; Francis Group, 2010.</i> 2. <i>Kubrak J.: Hydraulika techniczna. Wyd. SGGW, Warszawa, 1998.</i>		
Unit:	Division of Geotechnics		
Date of issuing the programme:	22.12.2016	Author of the programme:	Katarzyna Dołyżk-Szypcio, PhD, Eng.

L - lecture C - classes

LC - laboratory classes P-project

SW - specialization workshop

S - seminar