

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Water management with elements of hydrology		Code 1010134281010135182
Field of study Environmental Engineering Extramural First-	Profile of study (general academic, practical) (brak)	Year /Semester 4 / 8
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 20 Classes: 10 Laboratory: - Project/seminars: 10		No. of credits 5
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		ECTS distribution (number and %) 5 100%
Responsible for subject / lecturer: dr inż. Tomasz Kaźmierski email: tomasz.kazmierski@put.poznan.pl tel. 616652079 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		Responsible for subject / lecturer: Prof. dr hab. Inż. M. Sowiński email: marek.sowinski@put.poznan.pl tel. 61 665 2469 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge acquired within courses delivered earlier during First-cycle studies: Fluid Mechanics, Water Supply, Wastewater Disposal, Technologies of Wastewater, Environmental Biology and Chemistry,
2	Skills	Make advantage of informatics techniques, Acquaintance of basic terminology in area of environmental engineering. Self-education ability.
3	Social competencies	Awareness of the need to constantly update and supplement knowledge and skills.
Assumptions and objectives of the course: Presentation of the basics of hydrology and knowledge concerning water management, especially administration structure, water balance and water needs in Poland.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Basic concepts of hydrology, methods of hydrologic measurements, organization of measurements in Poland (obtained at the lecture) - [K_W04]		
2. Basic concepts, goals and tasks of water management, administration structure in water management (obtained at the lecture) - [K_W08, K_W09]		
3. Basis of evaluation of water needs and resources in a catchment, region and country (obtained on exercise) - [K_W09]		
4. Goals and tasks of flood protection and water deficit mitigation (obtained at the lecture) - [K_W09]		
5. Goals and basis of water management balance (obtained on exercise) - [K_W09]		
6. Basic economic instruments used in water management (obtained at the lecture) - [K_W08]		
7. Ecological aspects of sustainable development (obtained at the lecture) - [K_W09]		
8. Basic methods, techniques and materials used in solving simple engineering tasks in the field of environmental engineering at the hydrology and water protection (obtained on the design classes) - [K_W07]		
9. Basic knowledge of meteorology and ecology useful for formulating and solving simple problems environmental engineering (obtained on the design classes) - [K_W02]		
Skills:		

<p>1. Acquisition of hydrologic data and its interpretation (obtained on the project) - [K_U11,] 2. Interpretation of regulations published by water management authorities (obtained on the project) - [K_U12,] 3. Cooperation with water management bodies in flood protection and water deficit mitigation (obtained on the project) - [K_U12,] 4. Is able to prepare and present oral presentation on specific issues in the field of hydrology and conservation and contamination of water (obtained on the project) - [K_U04]</p>
<p>Social competencies:</p> <p>1. The student sees the need for systematic increasing his skills and competences (obtained on exercise) - [K_K01] 2. The student understands the need for teamwork in solving theoretical and practical problems (obtained on the project) - [K_K03, K_K04] 3. Student has consciousness of engineering activity effect on environment (obtained on the project) - [K_K02]</p>

Assessment methods of study outcomes
<p>Lectures: Written acquaintance with open questions (effect W1, W2, W4, W6, W7)</p> <p>Project Preparation of the project (40%) and defense project - work written and / or oral defense (60%) (effect W8, W9, U1-U4, K2, K3). Continuous assessment in the classroom - rewarding activity.</p> <p>Exercises A written test problem solving skills discussed in the exercises. (effect W3, W5, U5, K1)</p>

Course description
<p>Circulation of water in nature. Hydrological cycle. Water balance. Hydrological systems. Stages of water. Discharges measurement in rivers. Characteristic stages and discharges. Rating curve ? basis of evaluation and applications. Probable flows ? interpretation. Basic concepts, goals and tasks of water management. Administration structure in water management. Conditions of water use in large catchments. Water use permissions. Water law. Water resources. Disposal resources. Classification of water resources. Resources of water from rainfalls. Climatic deficit at precipitation. Spatial distribution of rainfalls and their regional deficit in Poland. Surface water resources. Moving water resources, methods of computations, criteria of quality evaluation, classification of moving water resources. Stagnation water resources, natural and artificial retention of resources. Functions and tasks of retention reservoirs. Artificial retention as a way to disposal resources augmentation. Evaluation of surface water resources in Poland. Water access indicators in Poland and other countries in Europe. Spatial and time distribution of runoff as a measure of surface moving water resources differentiation. Ground water ? disposal and exploitation resources. Quality evaluation criteria, classification of ground water resources. Main reservoirs of ground water in Poland. Water needs. Classification of needs as a basis for dividing of water resources. Structure of water consumption according to sources of resources and sectors of management in Poland and other countries in Europe and World. Energy from water. Water-management balance of resources and needs. Flood protection. Mitigation of water deficit consequences. Areas vulnerable to floods and water deficit. Economical instruments in water management ? taxes and penalties. Ecological aspect of sustainable development of water management systems.</p>

<p>Basic bibliography:</p> <p>1. Mikulski Z. Gospodarka wodna, Wyd. PWN Warszawa 1998 2. Ciepiewski A. Podstawy gospodarowania wodą, wyd. SGGW 1999</p>

<p>Additional bibliography:</p> <p>1. Słota H. Zarządzanie systemami gospodarowania wodą, IMGW Warszawa 1997 2. Goliszewski J. Ochrona wód powierzchniowych przed zanieczyszczeniem, Arkady 1968</p>
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Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures (contact hours)	20	
2. Participation in exercises (contact hours)	10	
3. Participation in project (contact and practical hours)	10	
4. Participation in consultations related to tutorials and practical exercises (contact hours)	11	
5. Preparation for the final test of tutorials (working alone)	35	
6. Preparation for the final test of the lectures (working alone)	35	
7. Presence at the final tests of tutorials (contact hours)	2	
8. Presence at the final tests of lectures (contact hours)	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	125	5
Contact hours	45	2
Practical activities	10	1