

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 4
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 %) 4 100% 4 100%
Responsible for subject / lecturer: dr inż. Wojciech Góra email: wojciech.gora@put.poznan.pl tel. 616652443 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		Responsible for subject / lecturer: mgr inż. Katarzyna Jaszczyszyn email: katarzyna.jaszczyszyn@put.poznan.pl tel. 616652443 Wydział Budownictwa i Inżynierii Środowiska ul. Piotrowo 5 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Fluid Mechanics at the level of 5 KRK, Water Supply and Wastewater Technology at the level of 5 KRK. Environmental Biology and Chemistry: water chemistry, the processes of pollutants biodegradation at the level of 6 KRK. Urban planning and development at the level of 5 KRK, Energy Economy at the level of 5 KRK, Basics of geodesy at the level of 5 KRK.
2	Skills	Application of knowledge of the above mentioned subjects. Acquiring knowledge from the literature, electronic resources and databases. The ability to self-education, the ability to conceptual thinking and reasoning at 5 KRK.
3	Social competencies	Group work. Awareness of the need to constantly update and supplement knowledge and skills.
Assumptions and objectives of the course: Acquisition of basic knowledge in the field of the sustainable and integrated water management, with a particular focus on the balancing of water resources and demand for water, classification and methods for improving the water quality and the basics of the strategy in water management. Acquiring the ability to solve the complex problems related to the subject in an interdisciplinary perspective, with taking into account the existing organizational and legal conditions.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		

<ol style="list-style-type: none"> 1. The student knows the basic concepts of hydrology, methods of hydrologic measurements, as well as the organization of measurements in Poland (obtained at the lecture) - [[K_W04]] 2. The student knows the basic concepts, goals and tasks of water management, as well as administration structure in water management (obtained at the lecture) - [[K_W08, K_W09]] 3. The student has the knowledge necessary to evaluation of water needs and water resources in a catchment, region and country (obtained during classes) - [[K_W09]] 4. The student knows the goals, tasks and methods of flood and drought protection and It has knowledge about methods of reducing the effects of water deficits (obtained at the lecture) - [[K_W09]] 5. The student knows the goals and basis of water management balance (obtained during classes) - [[K_W09]] 6. The student has the basic knowledge of the development trends in the field of water management in industry (including energy), in agriculture and in urban areas (obtained at the lecture and during classes) - [[K_W05, K_W08]] 7. The student knows and understands the ecological, legal and social aspects of sustainable development (obtained at the lecture) - [[K_W09]] 8. The student knows the basic methods, techniques and materials used in solving simple engineering tasks in the field of environmental engineering, hydrology and water protection (obtained during project and classes) - [[K_W07]] 9. The student has a basic knowledge of meteorology, ecology and process engineering useful for formulating and solving simple problems of water management (obtained during project classes) - [[K_W02]]
<p>Skills:</p> <ol style="list-style-type: none"> 1. The student is able to obtain hydrological data, data on water resources and data from the GIS databases and one is able to interpret and used them for solving simple engineering problems (obtained during project classes) - [[K_U01]] 2. The student is able to interpret and apply legal acts issued by the state administration and the organizational structures responsible for water management (obtained during project and classes) - [[K_U12,]] 3. The student is able to cooperate with the appropriate authorities of water management in the field of flood protection and mitigation of water deficit (obtained during project) - [[K_U10, K_U12,]] 4. The student is able to assess the suitability of water for public supply of drinking water and for industrial purposes, as well as one is able to make a critical analysis of the functioning of the solutions in the field of the environmental engineering, particularly in the water management systems (obtained during project and classes) - [[K_U12, K_U13, K_U11]] 5. The student is able to prepare and present oral presentation on specific issues in the field of hydrology and water protection as well as water contamination (obtained during project classes) - [[K_U04]]
<p>Social competencies:</p> <ol style="list-style-type: none"> 1. The student sees the need for systematic increasing his skills and competences (obtained during classes) - [[K_K01]] 2. The student understands the need for teamwork in solving theoretical and practical problems (obtained during project classes) - [[K_K03, K_K04]] 3. Student has consciousness of engineering activity effect on environment (obtained during classes and project) - [[K_K02]]

Assessment methods of study outcomes
<p>Lectures: Written exam, within the period fixed at the beginning of the semester (50% to pass the exam) (the effect of W4, W5, W8, W9, U13)</p> <p>Project Preparation of the project (60%) and project defense - written and / or oral defense (40%) (the effect of W2, W7, U1, U4, U10, K3, K4). Continuous assessment in the classroom - rewarding activity.</p> <p>Classes 60-minutes of the written final test - 50% to pass (the effect of W7, U11-13, K1, K2) Continuous assessment for each class</p>
Course description

Circulation of water in nature. Hydrological cycle. Water balance.
 Hydrological systems. Watercourses: stages of water and water discharges and probable flows.
 Basic concepts, goals and tasks of water management. Administration and water management.
 Conditions of water use in large catchments. Water use permissions. Water law. Water resources.
 Resources of water from rainfalls. Climatic deficit at precipitation. Spatial distribution of rainfalls and their regional deficit in Poland.
 Surface water resources. Flowing water resources, criteria of quality evaluation, classification.
 Still water resources, natural and artificial retention of resources. Functions and tasks of retention reservoirs.
 Water access indicators in Poland and other countries in Europe.
 Ground water resources - the disposal and exploitation resources. Quality evaluation criteria, classification of ground water resources. 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 all over the world. Hydropower. Water-management balance of resources and needs.
 Flood and drought protection. Mitigation of water deficit consequences. Areas vulnerable to floods and water deficit.
 Economical instruments in water management - taxes and penalties.
 Development trends in the field of water management in industry (including energy), agriculture, and urban areas. Criteria for evaluation of water management systems. Water and sewage management in the industry. Renewal of water. (BAT (Best Available Technologies) in the field of water management in large industrial plants.
 GIS tools and open databases related to water management.
 Ecological and social aspect of sustainable development of water management systems.
 Learning methods:
 Lectures: lectures with multimedia presentations and problem lectures.
 Classes: case study, exercise method based on the use of various sources of knowledge.
 Project: project method (practical project), case analysis.

Basic bibliography:

1. Mikulski Z. Gospodarka wodna, Wyd. PWN Warszawa 1998
2. Ciepielowski A. Podstawy gospodarowania wodą, wyd. SGGW 1999
3. Wąsowicz M. Podstawy ekonomiki gospodarki wodnej, Wydawnictwo OWPW, 2000
4. Więzik B. Hydrologia w inżynierii i gospodarce wodnej. T. 1, KİŚ PAN, 2010
5. Ustawa Prawo Wodne

Additional bibliography:

1. Goliszewski J. Ochrona wód powierzchniowych przed zanieczyszczeniem, Arkady 1958
2. Wojciechowska E., i in. Zrównoważone systemy gospodarowania wodą deszczową, WPG, 2015
3. Longley P.A., i in. : GIS. Teoria i praktyka, PWN, Warszawa, 2006
4. Gromiec M. Słownik terminów związanych z gospodarowaniem zasobami wodnymi, Politechnika Krakowska, 2006

Result of average student's workload

Activity	Time (working hours)	
1. Participation in lectures (contact hours)	20	
2. Participation in classes (contact hours)	10	
3. Participation in project (contact and practical hours)	10	
4. Preparation for the final test of tutorials (working alone, practical hours)	25	
5. Participation in consultations related to tutorials and classes (contact hours, practical hours)	1	
6. Presence at the final tests of classes (contact hours)	2	
7. Preparation for the exam (working alone)	30	
8. Presence at the exam (contact hours)	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	45	2
Practical activities	36	1