

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Basics of water and wastewater management		Code
Field of study	Profile of study (general academic, practical) general academic	Year /Semester 3/6
Elective path/specialty	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: I degree	Form of study (full-time, part-time) Full-time	
No. of hours Lecture: 2 Classes: - Laboratory: 3 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other)		(university-wide, from another field) University-wide
Education areas and fields of science and art Technical sciences		ECTS distribution (number and %)
Responsible for subject / lecturer: dr inż. Joanna Jeż-Walkowiak e-mail: joanna.jez-walkowiak@put.poznan.pl Faculty of Civil and Environmental Engineering ul. Berdychowo 4, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student should have a basic knowledge about mathematics, water chemistry, sanitary biology, fluid mechanics and materials.
2	Skills	Student should have laboratory practice and be able to learn. Student should be able to perform mathematical and chemical calculations in the scope of I degree study.
3	Social competencies	Awareness to constantly update and supplement knowledge and skills.
Assumptions and objectives of the course: The objective of the course is to broaden the basic knowledge and skills scopes of water and wastewater treatment technology.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
<ol style="list-style-type: none"> 1. Student has a basic knowledge of the water and sewage systems, design principles, and calculating network and water supply and sewerage facilities. K_W03, 2. Student knows the law regulations referred to water quality in distribution systems. K_W14, K_W15 3. Student knows the wastewater and sludge characteristic. K_W06, K_W09 4. Student has the basic knowledge of processes and utilities applied for water and wastewater treatment and disposal. K_W03, K_W05, K_W10, K_W12 5. Student has the basic knowledge referred to design and operation of objects at water treatment plant and wastewater treatment plant. K_W10, K_W12, K_W13 		
Skills:		
<ol style="list-style-type: none"> 1. Student has the basic skills for drinking water quality evaluation with respect to regulations. K_U01, K_U10, 2. Student has the basic skills for water requirement/demand and wastewater volume calculation. K_U01, 3. Student has the basic skills for water intake classification. K_U01, K_U16, 4. Student has the basic skills for wastewater treatment train recommendation with respect to wastewater composition. K_U15, K_U16, 5. Student has the basic skills for water treatment train recommendation with respect to raw water composition. K_U15, K_U16, 		
Social competencies:		
<ol style="list-style-type: none"> 1. Student understands the need for systematic deepening and broadening his/her competences - [K2_K01]. 2. Student understands the value of ethics in engineering professional activity. K_K02, K_K05 3. Student understands the need for teamwork, taking part in different activities - [K_K03] 		

Assessment methods of study outcomes	
<p>Written finale exam</p> <p>Laboratory exercises</p> <p style="padding-left: 20px;">Short entrance written test before each laboratory</p> <p style="padding-left: 20px;">Oral answer</p> <p style="padding-left: 20px;">Written report of each laboratory exercise</p> <p style="padding-left: 20px;">Activity evaluation during each laboratory</p>	
Course description	
<ol style="list-style-type: none"> 1. Water Supply Systems, mono and multi-zone systems, gravity and pressure systems, general characteristic. 2. Water demand. 3. Water network: line, hydraulic calculation, pressure lines, pipe placement in road, materials and utilities. 4. Water tanks, types and functions/purpose, volume, equipment and construction. 5. Pumping station and water tank (under pressure): types and purpose; selection of pump, pipes and water-air tanks; equipment, construction guidelines/engineering recommendations. 6. Sewage systems, gravity, pressure, general characteristic; Sewage net equipment. 7. Sewage line in road profile. Quality and quantity of sewage. Sewer and utilities calculation. Pumping stations. 8. Basic law regulations referred to drinking water quality. 9. Wastewater characteristic and composition. Quality parameters. Contaminants loads. PE – people equivalent. 10. Technological treatment trains. 11. Processes: removed contaminants, objects and devices. Effectiveness of processes Primary treatment (screening, grid removal, primary sedimentation). Chemical treatment. Integrated biological treatment (removal of carbon, nitrogen and phosphorus). 12. Sludge treatment and disposal, processes and objects. 13. Natural raw water. 14. Processes for suspended solids, colloids and dissolved contaminants removal from ground and surface water, mechanism and effects. Objects, operation, technological parameters. Technological trains. 15. Sludge treatment and disposal, processes and objects. 	
Basic bibliography:	
<ol style="list-style-type: none"> 1. Gabryszewski T., Wodociągi, Arkady, Warszawa 1983. 2. Mielcarzewicz E., Obliczanie systemów zaopatrzenia w wodę, Arkady, Warszawa 2000. 3. Wodociągi i kanalizacja. Poradnik. Praca Zbiorowa, Arkady, Warszawa 1971. 4. Błaszczak W. i in., Kanalizacja, Arkady, Warszawa 1974. 5. Sowiński: Projektowanie sieci i urządzeń kanalizacyjnych, Wyd. Politechniki Poznańskiej, Poznań 1986. 6. Praca zbiorowa pod redakcją Z. Dymaczewskiego, J.A. Oleszkiewicza, M.M. Sozańskiego: Poradnik eksploatatora oczyszczalni ścieków. Wyd. II, PZITS, Oddz. Poznań, LEM s.c. Kraków, Poznan1997. 7. Heidrich Z.: Urządzenia do oczyszczania ścieków - Projektowanie, przykłady obliczeń. Wyd. „Seidel-Przywecki” Sp. z o.o., Warszawa 2005. 8. Heidrich Z. i inni: Urządzenia do uzdatniania wody. Arkady, Warszawa 1987. 9. Praca zbiorowa, Wodociągi i Kanalizacja w Polsce, tradycja i współczesność, Polska Fundacja Odnowy Zasobów Wodnych, Poznań-Bydgoszcz, 2002 r. 	
Additional bibliography:	
<ol style="list-style-type: none"> 1. AWWA, Technical Editor F. W. Pontius, Water Quality and Treatment, Mc Coraw-Hill, Inc, New York, 1990 2. MWA, Water Treatment, Principles and Design, John Wiley and Sons, Inc., Hoboken, New Jersey, 2005. 	
Result of average student's workload	
Activity	Time (working hours)
1. Lecture participation	30
2. Lecture consulting	6
3. Laboratory consulting	10
4. Laboratory preparation	10
5. Laboratory exercises participation	45
6. Preparation for lecture final examination	20
7. Final exam attendance	2

Student's workload		
Source of workload	hours	ECTS
Total workload	123	3
Contact hours	93	
Practical activities	55	