

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Technology research in water treatment		Code 1010101251010137721
Field of study Environmental Engineering First-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: 15 Laboratory: - Project/seminars: -		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		ECTS distribution (number and %)
Responsible for subject / lecturer: dr hab. inż. Alina Pruss email: alina.pruss@put.poznan.pl tel. 61 665 34 97 Faculty of Civil and Environmental Engineering ul. Berdychowo 4, 60-965 Poznań		Responsible for subject / lecturer: dr hab. inż. Alina Pruss email: alina.pruss@put.poznan.pl tel. 665-3662 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student should have a basic knowledge mathematics, chemistry, fluid mechanics and general knowledge from environmental engineering.
2	Skills	Student should be able to perform mathematical calculations, physical, chemical, mechanics of the fluids. The student should be able to carry out the basic analysis of the physico-chemical and bacteriological water quality.
3	Social competencies	Awareness to constantly update and supplement knowledge and skills.
Assumptions and objectives of the course: The aim of the course is develop skills for planning and carry out technological research and interpretation of the results.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student has structured and theoretically founded knowledge of methods of water treatment. - [[[K2_W03, K2_W04, K2_W07]]]		
2. Student has an ordered knowledge of design methods of basic technological processes used in the raw water treatment technology - [K2_W03, K2_W04, K2_W07]		
Skills:		
1. Student is able to provide the treatment method and system devices as a function of the quality of water (obtained in lectures and classes) - [K_U03, K_U04, K_U09, K_U10]		
Social competencies:		
1. Student understands the need for teamwork in solving theoretical and practical problems - [K2_K03]		
2. Student understands the different roles in teamwork and the need for information and knowledge exchange in a group work - [K2_K03, K2_K04]		
3. Student understands the need for a systematic deepening and broadening his/her competences - [K2_K01]		
Assessment methods of study outcomes		

<p>Lectures</p> <p>A two-part written exam within the period stated at the beginning of the semester.</p> <p>Part 1. It aims to verify the knowledge and involves answering a few questions. In cases of doubt, extended exam is oral part.</p> <p>Part 2. Its purpose is to check the skills and relies on solving technological problems.</p> <p>Written exam - after 5 questions from each part. A total of 10 open questions. For each question the maximum number of points 10. Criteria of evaluation depending on the number of points obtained:</p> <p>Number of points - rating</p> <p>91 -100 very good (5.0)</p> <p>81 - 90 good plus (4,5)</p> <p>71 - 80 good (4.0)</p> <p>61 - 70 sufficient plus (3,5)</p> <p>50 - 60 satisfactory (3.0)</p> <p>Below 50 points - insufficient (2.0)</p> <p>At each lecture is required for the activity of the students.</p> <p>Classes</p> <p>45-minute written final test in the last week of the semester.</p> <p>Colloquium is to solve several technological problems.</p> <p>Continuous assessment for each class (rewarding activity).</p> <p>A total of 10 test questions. For each test question the maximum number of points 10. Criteria of evaluation depending on the number of points obtained:</p> <p>Number of points - rating</p> <p>91 -100 very good (5.0)</p> <p>81 - 90 good plus (4,5)</p> <p>71 - 80 good (4.0)</p> <p>61 - 70 sufficient plus (3,5)</p> <p>50 - 60 satisfactory (3.0)</p> <p>Below 50 points - insufficient (2.0)</p>	
<p>Course description</p>	
<p>Methodology selection of technological parameters of water treatment: iron removal and the removal of manganese from water (Removal of iron from the water by aeration and filtration, removing iron from water by aeration, alkalization and filtration, removing iron from water by aeration dosage of oxidants and filtration, removing manganese from water using strong oxidants.) Removal of water color (Removing color by aerating the water, Removing color by dosing oxidants, Removing colors by a coagulation of the contact in the filter bed, Removing color by a volume coagulation, removing the color by adsorption in active carbon bed).</p> <p>Learning methods:</p> <p>Lecture: Lecture using multimedia presentations, combined with discussion with the listeners.</p> <p>Classes: practice method using multimedia presentation.</p>	
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. M.M. Sozański, Peter M. Huck, Badania doświadczalne w rozwoju Technologii Uzdatniania Wody, Monografie Komitetu Inżynierii Środowiska PAN, vol. 42, Lublin 2007 2. Pruss A., Pruss P., Rola badań technologicznych wody w procesie inwestycyjnym, Instal, nr.7-8, 2016 3. Pruss A., Selection of the surface water treatment technology ? a full-scale technological investigation, Water Science and Technology, Rocznik: 2015 Tom: vol. 71 Numer: no. 4 4. Pruss A., Removal of organic matter from surface water during coagulation with sludge flotation and rapid filtration ? a full-scale technological investigation, Rocznik: 2015 Tom: vol. 71 Numer: no. 4 	
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. MWH, Water Treatment Principles and Design (Secondo Editio, Revised by J. C. Crittenden, R. R. Trussell, D. W. Hanol, K. J. Howe and G. Tchobanoglous), John Wiley & Sons, Inc., Hoboken, NY, 2005. 2. Pruss A., Pruss P. Eliminacja związków fosforu z wody - doświadczenia z badań technologicznych, rozdział w monografii naukowej Aktualne zagadnienia w uzdatnianiu i dystrybucji wody. Vol. 6, 2017 	
<p>Result of average student's workload</p>	
<p>Activity</p>	<p>Time (working hours)</p>

1. Participation in lectures (contact hours)	15	
2. Participation in classes (contact hours)	15	
3. Consultations (contact hours)	20	
4. Preparing for the exercises (individual work)	25	
5. Preparation for the final exam (individual work)	25	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	50	2
Practical activities	0	0