STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Technology research in water treatment		**1010101251010137721**

Field of study	Profile of study (general academic, practical)	Year /Semester
Environmental Engineering First-cycle Studies	**(brak)**	**3 / 5**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**elective**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **15**	Classes: **15**	Laboratory: **-**	Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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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

Lectures

A two-part written exam within the period stated at the beginning of the semester.

Part 1. It aims to verify the knowledge and involves answering a few questions. In cases of doubt, extended exam is oral part.

Part 2. Its purpose is to check the skills and relies on solving technological problems.

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:

Number of points - rating

91 -100 very good (5.0)

81 - 90 good plus (4,5)

71 - 80 good (4.0)

61 - 70 sufficient plus (3,5)

50 - 60 satisfactory (3.0)

Below 50 points - insufficient (2.0)

At each lecture is required for the activity of the students.

Classes

45-minute written final test in the last week of the semester.

Colloquium is to solve several technological problems.

Continuous assessment for each class (rewarding activity).

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:

Number of points - rating

91 -100 very good (5.0)

81 - 90 good plus (4,5)

71 - 80 good (4.0)

61 - 70 sufficient plus (3,5)

50 - 60 satisfactory (3.0)

Below 50 points - insufficient (2.0)

Course description

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, alkalinization 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).

Basic bibliography:

1. M.M. Sozański, Peter M. Huck, Badania doświadczalne w rozwoju Technologii Uzdatniania Wody, Monografie Komitetu Inżynierii Środowiska PAN, vol. 42, Lublin 2007

2. Apolinary L. Kowal, Maria Świderska - Bróż, Oczyszczanie wody, PWN, Warszawa 2009

Additional bibliography:

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.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures (contact hours)	15
2. Participation in classes (contact hours)	15
3. Consultations (contact hours)	5
4. Preparing for the exercises (working alone)	10
5. Preparation for the final exam (individual work)	30

Student's workload

Source of workload	hours	ECTS
Total workload	75	3

Contact hours	30	1
Practical activities	15	1