

Course title: <b>Water technology</b> Technologia wody		
Field of study: <b>Environmental engineering</b>		
Type of study: <b>full-time studies</b>	The level of education: <b>first-cycle studies</b>	Education profile: <b>general academic</b>
Type of subject: <b>optional</b>	Semester: <b>IV</b>	Course language: <b>English</b>
Course type: <b>lecture, laboratory</b>	Number of hours: <b>30L, 30Lab</b>	ECTS Credit points: <b>7</b>

## SYLLABUS

### COURSE CONTENT

<b>Form of classes - lectures</b>	<b>Hours</b>
Water contaminants. Water intakes. Law requirements for drinking water and water for industry.	3
Treatment of water at the source. Technological schemes of surface and underground water treatment.	2
Preliminary treatment of water. Sedimentation and flotation. Mathematical model of sedimentation. Sedimentation tanks. Technological research of sedimentation	3
Coagulation and flocculation. Colloid systems. Coagulants and flocculants. Mechanism of coagulation process. Technological research of coagulation process (jar test). Factors affecting coagulation process. Technologies of	3
Filtration. Processes which take place during filtration. Filtration materials. Kinds of filters. Removal of pollutants with slow and fast filters.	2
Adsorption. Adsorption as unit process. Sorbents used in water treatment. Technological schemes of activated carbon use.	2
Iron and manganese control. Methods used for Fe and Mn removal. Parameters of iron and manganese removal.	3
Advanced oxidation processes. Use of AOP methods in water treatment.	2
Disinfection. Law requirements for water safety. Methods of disinfection. Physical and chemical methods of disinfection (effectiveness, advantages and disadvantages of methods). Toxic by-products of disinfection.	3
Ion exchange. Treatment of water for industry. Used ion exchangers. Technological schemes used for water softening and demineralization. Softening by precipitation	3
Membrane processes.	1
Analysis of selected water treatment plants technologies and effectiveness.	2
Final test	1
<b>Form of classes - laboratory</b>	<b>Hours</b>
Water and wastewater laboratory safety training	1
Analysis of physicochemical properties of water	1
Sedimentation	4

Coagulation	4
Adsorption	4
Iron control	4
Ion exchange and water softening	4
Disinfection	4
Visit to water treatment plant	4

### COURSE STUDY METHODS

1. blackboard
2. multimedia presentation
3. laboratory setup
4. the literature and instructions for laboratory classes

### METHODS OF ASSESMENT ( F - formative; S - summative)

<b>F1.</b> - activity in classes
<b>F2.</b> - evaluation of work during laboratory exercises
<b>S1.</b> – test
<b>S2.</b> - evaluation of the laboratory reports

### STUDENT WORKLOAD

Form of activity	Workload (hours)
Participation in lectures	29 h
Participation in classes	- h
Laboratory	30 h
Participation in project classes	-h
Participation in seminar	-
Preparation course on e-learning	-
Test	1 h
Entrance test for laboratory classes	- h
Project's defence	-
Exam	-
Consultation hours	30 h
<b>DIRECT TEACHING, hours/ ECTS</b>	<b>90 h / 3,6 ECTS</b>
Preparation for tutorials	- h
Preparation for laboratories	55 h
Preparation for projects	-
Preparation for seminars	-
Preparation for e-learning classes	-
Participation in e-learning classes	-
Working on project	-
Preparation for tests	30 h
Preparation for exam	-
<b>SELF-STUDY, hours/ ECTS</b>	<b>85 h / 3,4 ECTS</b>

<b>TOTAL (hours)</b>	<b>175 <math>\Sigma</math></b>
<b>TOTAL ECTS</b>	<b>7 ECTS</b>

**PRIMARY AND SUPPLEMENTARY TEXTBOOKS**

Pizzi N.: Water Treatment, principles and Practices of Water Supply Operations, AWWA, Denver 2010
Shutte F., Handbook of the Operation of Water Treatment Works, Water Research Commission, 2006.

**SUBJECT COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)**

1. Dr hab. Inż. Ewa Wiśniowska, prof. PCz., ewa.wisniowska@pcz.pl
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**NAME OF LECTURER (s) (NAME, SURNAME, E-MAIL ADDRESS)**

1. Dr hab. Inż. Ewa Wiśniowska, prof. PCz., ewa.wisniowska@pcz.pl
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