

MODULE INFORMATION SHEET

Name of Module Unit	Advanced Chemical Wastewater Treatment Methods
Name in polish language	Nowoczesne metody chemicznego oczyszczania ścieków
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Dept. of Informatics and Environment Quality Research
Responsible person	dr inż. Jan Bogacki

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
4	15	-	30	-	-	3

Learning outcomes (knowledge, skills, competences)

The objective of this course is to deliver knowledge of chemical methods applied to wastewater treatment. On successful completion of this course student:

- has knowledge of fundamental chemical wastewater treatment methods,
- has extensive knowledge and knows development trends in the field of chemical techniques and methods used in wastewater treatment.
- knows how to apply different methods to particular wastewater types.
- is able to analyze and assess the impact of selected process parameters on the technological efficiency of wastewater treatment.
- is able to analyze and use the role of physical and chemical processes and in the design, modernization and operation of water supply and wastewater disposal systems.

Chemical laboratories using wastewater give the students an opportunity to practice their skills at scientific wastewater treatment problem solving.

Competences: confirmed ability of applying knowledge in particular problems and applications.

Prerequisites

Basic knowledge of general chemistry.
Basic knowledge of environmental chemistry.

Rules for integrated grade setting

Integrated grade = 40% Exam (Lecture) + 60% Test (Laboratory)

Recommended readings

1. Advanced Physicochemical Treatment Processes (Handbook of Environmental Engineering), Lawrence K. Wang (Editor), Yung-Tse Hung (Editor), Nazih K. Shammass (Editor), Humana Press; 2006
2. Advanced Treatment Technologies for Urban Wastewater Reuse, Fatta-Kassinos, Despo, Dionysiou, Dionysios D., Kümmerer, Klaus (Eds.), Springer; 2016
3. Basic Principles of Membrane Technology, Mulder, Marcel, Springer; 1996
4. Advanced Oxidation Handbook, James R. Bolton, James Collins, American Water Works Association; 2016
5. Coagulation and Flocculation in Water and Wastewater Treatment Second Edition, John Bratby, IWA Publishing; 2016

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Chemical compounds in wastewater. Parameters determined in wastewater.	2	S
2	Wastewater treatment methods. Sedimentation and precipitation. Coagulation. Dissolved Air Flotation.	2	S
3	Adsorption. Membrane processes.	2	Ex
4	Oxidation processes: chlorination, ozonation, UV. Electrochemical processes. Advanced Oxidation Processes. Catalytic processes.	9	Ex
Total		15	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

Dr Jan Bogacki

Assessment method

Exam

Contents of laboratory

	Topics	Time (hrs.)	Scope (S / Ex)
1	Wastewater treatment using coagulation and dissolved air flotation.	6	S
2	Wastewater treatment using an Advanced Oxidation Processes (Fenton).	6	Ex
3	Wastewater treatment using a photochemical process.	6	Ex
4	Wastewater treatment using a precipitation process.	6	Ex
5	Wastewater treatment using an adsorption process.	5	S
6	Test	1	S
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for laboratory

Dr Jan Bogacki (2nd laboratory teacher dr hab. inż. Piotr Marcinowski

Assessment method for laboratory

Test