COURSE SYLLABUS

Course code	1070-ICGTE-MSA-104
Course name	Gas and Liquid Purification Processes
Course version	2026L
Level of education	second cycle programme
Form and mode of study	full-time study
Study profile	general academic profile
Field of study	Chemical and Process Engineering
Specialisation	Green Technologies in Chemical Engineering
Organizational unit	The Faculty of Chemical and Process Engineering
Implementing unit	The Faculty of Chemical and Process Engineering
Course unit	n/a
Course groups	-
Course status	Obligatory
Language of the course	English
Study stage code	ICZTC-S1-MSA-1070
Number of ECTS credits	3

Part I

01. Learning outcomes and the method of conducting classes	
Learning outcomes	see table "Learning outcomes"
Forms of classes and the number of hours in the semester	
lectures	30.00 h
laboratory	15.00 h

02. ECTS balance		
Number of ECTS credits	3	
Course workload	**Hours**	**ECTS**
Total number of hours and ECTS credits for the course:		
Hours and ECTS credits for courses involving direct participation of academic teachers	60	1.80
Hours and ECTS credits involving student's independent work	30	1.20
Total	90	3.00
Number of hours involving direct participation of academic teachers:		
Hours connected with class participation	45	
Other synchronous hours	15	
Total	60	
Number of hours involving student's independent work:		
Hours for student's independent work	30	

03. Course content	
laboratory	1. Testing the filtration of aerosol solid particles in non-woven filters 2. Depth filtration 3. foam separation 4. Wet dedusting 5. Membrane methods of gas separation

Part I

lectures	1) General characteristics of distributed systems and gas mixtures. 2) Mechanical methods of separating liquid and gas mixtures. 3) Sedimentation 4) Centrifuges 5) Depth and cake filtration 6) Membrane filtration 7) Using the electric field to purify gases and liquids 8) Sorption processes in the system liquid - gas, liquid - solid, gas – solid. 9) Foam separation 10) Ion exchange 11) Chemical oxidation 12) Basics of biological oxidation of pollutants in liquids. 13) Processes of removing gas impurities from gases, such as e.g., sulfur oxides, nitrogen oxides, volatile organic compounds (absorption, adsorption, condensation, combustion, biological methods)

Table: Learning outcomes	
Knowledge	
Outcomes code	P_W01
Description	Has knowledge of biological, chemical, and physico-chemical processes of wastewater treatment and water treatment.
Related field-of-study learning outcomes	K2_W01
Outcomes code	P_W03
Description	He has specialist knowledge of the processes of cleaning gases and liquids from solid and gaseous impurities carried out on various scales.
Related field-of-study learning outcomes	K2_W03
Outcomes code	P_W04
Description	Has extended knowledge necessary to understand the physical and chemical bases of liquid and gas purification processes and their mathematical description.
Related field-of-study learning outcomes	K2_W04
Skills	
Outcomes code	P_U06
Description	He can design and implement simple processes, unit operations and equipment used in the purification of gases from gaseous and aerosol pollutants.
Related field-of-study learning outcomes	K2_U06
Outcomes code	P_U12
Description	Can propose solutions for the removal of pollutants dissolved in water in accordance with the requirements of ecology and environmental protection.
Related field-of-study learning outcomes	K2_U12
Outcomes code	P_U18
Description	He can use various techniques of solution separation processes
Related field-of-study learning outcomes	K2_U18
Social competence	
Outcomes code	P_K04
Description	Able to think and act in a creative and entrepreneurial way. He is aware of the need to protect the environment. He knows what Green Technologies are.
Related field-of-study learning outcomes	K2_K04

Part II

04. Year and semester of studies	
Year	2026L
Semester	1

05. Course leader and course teachers	
lectures	Arkadiusz Moskal
laboratory	Arkadiusz Moskal

Part II

lectures	Arkadiusz Moskal

06. Course objective

Course objective	Familiarizing students with biological, chemical, and physicochemical processes used to purify gas and liquid streams generated in various technological processes. Acquisition by the student of the ability to predict the effects of separation of two-phase systems forming liquid and aerosol suspensions and to use the basic techniques of separation of dispersed systems and the conceptual apparatus of Chemical Engineering. Familiarizing students with sorption techniques with natural gas sources. Practical familiarization of students with the processes used for the separation of liquid dispersed systems and gas mixtures, including purification, also microbiological, of liquids and gases and determining the degree of their contamination. Independent conduct of the process of selection of separation techniques for selected distributed systems occurring in technological processes on an industrial scale, with particular emphasis on wastewater and waste gas treatment.

07. Teaching methods and techniques

laboratory	Practical exercises in the laboratory.
lectures	Multimedia presentation and discussions.

08. Methods of verifying learning outcomes

Knowledge	
Outcomes code	P_W01
Description	Has knowledge of biological, chemical, and physico-chemical processes of wastewater treatment and water treatment.
Verification methods	lectures: written test laboratory: written test
Outcomes code	P_W03
Description	He has specialist knowledge of the processes of cleaning gases and liquids from solid and gaseous impurities carried out on various scales.
Verification methods	lectures: written test laboratory: written test
Outcomes code	P_W04
Description	Has extended knowledge necessary to understand the physical and chemical bases of liquid and gas purification processes and their mathematical description.
Verification methods	lectures: written test laboratory: written test
Skills	
Outcomes code	P_U06
Description	He can design and implement simple processes, unit operations and equipment used in the purification of gases from gaseous and aerosol pollutants.
Verification methods	lectures: written test laboratory: written test
Outcomes code	P_U12
Description	Can propose solutions for the removal of pollutants dissolved in water in accordance with the requirements of ecology and environmental protection.
Verification methods	lectures: written test laboratory: written test
Outcomes code	P_U18
Description	He can use various techniques of solution separation processes

Part II	
Verification methods	lectures: written test laboratory: written test
Social competence	
Outcomes code	P_K04
Description	Able to think and act in a creative and entrepreneurial way. He is aware of the need to protect the environment. He knows what Green Technologies are.
Verification methods	lectures: written test laboratory: written test

09. Required and recommended reading list	
Required reading	$ 1. Mackenzie L. Davis, Water and Wastewater Engineering. Design and Principles and Practice., Mac Graw Hill, New York, 2010. 2. Judson King, Separation Processes, MacGraw Hill, New York 1980. 3. Frank George Kerry, Industrial Gas Handbook. Gas Separation and Purification, Taylor&Francis, 2007.
Recommended reading	$ 1. Mackenzie L. Davis, Water and Wastewater Engineering. Design and Principles and Practice., Mac Graw Hill, New York, 2010. 2. Judson King, Separation Processes, MacGraw Hill, New York 1980. 3. Frank George Kerry, Industrial Gas Handbook. Gas Separation and Purification, Taylor&Francis, 2007.

10. Other information	
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