



Subject card

Subject name and code	, PG_00062304						
Field of study	Recycling and Energy Recovery						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			8.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Tylingo					
	Teachers	dr hab. inż. Robert Tylingo					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	100.0	0.0	100
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study		SUM
	Number of study hours	100	10.0		90.0		200
Subject objectives	The aim of the course is to prepare students for the practical application of knowledge and skills essential for the efficient management of waste in the brewing industry, with an emphasis on innovative methods of recovery and utilization of resources. Students will understand the key processes and technologies used in beer production, considering the environmental and economic aspects of waste management. The subject highlights the importance of teamwork and business realities, preparing participants for creative problem-solving and effective collaboration within a team.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W05] analyzes practical issues in the field of recovery of raw materials and energy, using knowledge and understanding of: materials, devices and tools, processes and technologies.	Understanding technological processes in brewing, identifying waste streams, and exploring their recovery opportunities.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[K6_U05] plans, prepares and conducts engineering activities in the field of raw materials and energy recovery, applying practical knowledge and understanding of the specificity of materials, devices and tools, processes and technologies.	Practical skills in planning and implementing waste management strategies in the brewing industry.			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	[K6_K02] cooperates with other people in the implementation of teamwork, both as a leader and a team member, effectively achieving the assumed goals.	Development of teamwork skills, both as a leader and a group member, in the context of process engineering.			[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills		
	[K6_K04] effectively, clearly and unambiguously communicates information, describes activities and communicates their results/outcomes to engineers or the wider public using appropriate communication methods and tools.	Effective communication, presentation of solutions and research findings, utilizing various forms of transmission.			[SK2] Assessment of progress of work [SK1] Assessment of group work skills		

Subject contents	<p>The convention of conducting classes includes teaching methods, focusing on the implementation of group projects. During the last 5 weeks of the semester, students in teams of 3-5 engage in a project related to waste management from the brewing industry.</p> <ol style="list-style-type: none"> 1. Introduction to brewing technologies: Students visit a brewery to understand basic processes and operations used during beer production, with aspects related to waste included. 2. Teamwork and project management: Learning effective team collaboration, time management, and coordination of activities necessary to achieve project goals. 3. Research and development in recovery engineering: Participants use brewery facilities to conduct research and develop new technologies for recovering resources from waste. 4. Project finalization: Teams prepare the final product along with complete technical documentation, presenting their work results in front of a panel of experts. <p>The "Resource and Energy Recovery Engineering" course focuses on the practical application of knowledge in environmental protection, with an emphasis on modern recycling solutions. Responsible management of natural resources and the transformation of waste into valuable resources are keys to sustainable development.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 775 794 801">Subject passing criteria</th> <th data-bbox="794 775 1142 801">Passing threshold</th> <th data-bbox="1142 775 1489 801">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 801 794 835">group project evaluation</td> <td data-bbox="794 801 1142 835">60.0%</td> <td data-bbox="1142 801 1489 835">50.0%</td> </tr> <tr> <td data-bbox="453 835 794 869">presentation of project results</td> <td data-bbox="794 835 1142 869">60.0%</td> <td data-bbox="1142 835 1489 869">25.0%</td> </tr> <tr> <td data-bbox="453 869 794 902">activity during classes</td> <td data-bbox="794 869 1142 902">50.0%</td> <td data-bbox="1142 869 1489 902">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	group project evaluation	60.0%	50.0%	presentation of project results	60.0%	25.0%	activity during classes	50.0%	25.0%
Subject passing criteria	Passing threshold	Percentage of the final grade													
group project evaluation	60.0%	50.0%													
presentation of project results	60.0%	25.0%													
activity during classes	50.0%	25.0%													
Recommended reading	Basic literature	<p>Anderson, N.G., "Practical Process Research and Development", Academic Press, San Diego, California, USA, 2000. Synoradzki, L., Wisialski, J., "Podstawy projektowania procesów technologicznych. Od laboratorium do instalacji przemysłowej", OWPW, 2019. Filipkowski, P., Malinowska Pańczyk, E., Synowiecki, J., Tylingo, R., "Ćwiczenia laboratoryjne z technologii fermentacyjnych przemysłu spożywczego", Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2011,</p>													
	Supplementary literature	<p>Lewis, Michael J., and Tom W. Young. Brewing. Springer, 2002.</p> <p>Hayes, Ted. Beer: Tap into the Art and Science of Brewing, Oxford University Press, 2003.</p>													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed	<p>What are the methods for minimizing waste production in brewing? Designing an energy recovery system from brewing processes. Analysis of possibilities for recycling solid and liquid waste from breweries.</p>														
Work placement	Not applicable														