

Course title Projektowanie energooszczędnych procesów technologicznych / Design of energy-efficient technological processes		ECTS code 13.3.0897	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemical Business	Bachelor / Engineer	Full-time studies	
Teaching staff Dr Anna Gołębiewska			
Forms of classes, the realization and number of hours		ECTS credits 3	
A. Forms of classes, in accordance with the UG Rector's regulations lecture, laboratory classes		classes - 45 h tutorial classes – 5 h student's own work – 25 h	
B. The realization of activities in-class learning			
C. Number of hours 45 h (15 h lecture, 30 h laboratory classes)		Total: 75 h - 3 ECTS	
The academic cycle Third year, winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Designing experiences Performing experiments Experimental planning, service of chemical equipment Lecture with multimedia presentation		Form and method of assessment and basic criteria for evaluation or examination requirements A. Final evaluation, in accordance with the UG study regulations course completion (with a grade) B. Assessment methods Lecture: • written test: test as well as tasks and open questions (short written answer) Laboratory exercises: • tests, execution of a specific practical work and presentation of results in the form of a written report C. The basic criteria for evaluation or exam requirements	
Required courses and introductory requirements Mathematics, physics, chemistry, chemical technology Knowledge of the basics of mathematics, physics, chemistry, technical drawing, computer use, chemical apparatus, technological principles			
Aims of education To familiarize students with processes, technologies friendly to the environment and the development of practical skills in the field of modern industrial processes/installations To acquaint students with the design of the technological process in terms of biogas and biodiesel production using renewable raw materials and waste			
Course contents Lecture: The course will discuss environmentally friendly technologies and ways to verify them. Such as technologies for the production of biofuels from biomass, waste or renewable raw materials. The issues of the course will also include principles/elements of designing energy-efficient industrial processes, implementation of new technologies to the industry. Rational management of natural resources and clean production will be discussed. Laboratory exercises:			

As part of laboratory exercises, students will design and optimize technologies for the production of biofuels (biodiesel and biogas) from biomass. Familiarize themselves with the construction, operation principle and operation of technological installations in a technical scale.

Bibliography of literature

A. Literature required to pass the course

Rosik-Dulewska C., Podstawy gospodarki odpadami, PWN, Warszawa 2015

Kasprzycka-Guttman T. (red.), Odpady stałe, ciekłe i gazowe – zapobieganie, powstawanie, utylizacja, OW Forest, Warszawa 2009

Jędrzak A., Biologiczne przetwarzanie odpadów, PWN, Warszawa 2007

Bilitewski B., Hardtle G., Marek K., Podręcznik gospodarki odpadami, Wydawnictwo Seidel Przywecki, Warszawa 2006

1. Burczyk B. Zielona Chemia, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2006

2. Lewandowski W.M. Proekologiczne źródła energii odnawialnej, WNT W-wa 2001

3. Gradziuk P., Kowalczyk K., Kościuk B., Biopaliwa, Wydawnictwo Wieś Jutra 2002r

B. Extracurricular readings

Wolny T. (red.pl) Sprawdzone metody gospodarowania odpadami komunalnymi, Stowarzyszenie Technologii Ekologicznych SILESIA, Opole 2010

Wardasz A.J., Paliwa z odpadów. Technologie tworzenia i wykorzystania paliw z odpadów, PZLiTS, Poznań 2011

Knowledge

Student:

- defines the basic concepts of environmental technologies
- lists examples of green technologies
- lists and describes processes used in the processing, usage and disposal of waste
- describes the construction and operating principles of installations for the production of biogas and biodiesel, lists the basic factors affecting the efficiency of these processes
- discusses the impact of environmentally friendly technologies on the natural environment

Skills

Student:

- can choose the parameters of the technological process to minimize the negative environmental impacts
- describes the impact of selected installations/lines/processes on the environment
- examines the basic physicochemical properties of waste and products arising from their development.
- interprets the results of laboratory study
- prepares written reports on the implementation of the experiments

Social competence

Student:

- is aware of the negative impact of waste on the environment
- is aware of the dangers resulting from degradation of the natural environment and the need for changes in technology
- is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for the decisions made
- complies with the safety rules in the chemical laboratory
- cooperates in the team during laboratory classes and results development
- connects the importance of developing waste management technologies for good environmental and human health
- understands the need for further education