UNIWERSYTET GDAŃSKI

**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 Gołąbiewska

**Forms of classes, the realization and number of hours**

**A. Forms of classes, in accordance with the UG Rector's regulations**
lecture, laboratory classes

**B. The realization of activities**
in-class learning

**C. Number of hours**
45 h (15 h lecture, 30 h laboratory classes)

**ECTS credits** 3

classes - 45 h
tutorial classes – 5 h
student's own work – 25 h

Total: 75 h - 3 ECTS

**The academic cycle**
2021/22 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
Jędrczak 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 Wroclawskiej, Wroclaw 2006
2. Lewandowski W.M. Proekologiczne żródla energii odnawialnej, WNT W-wa 2001
3. Gradziuk P., Kowalczyk K., Kościk 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, PZIiTS, 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