COURSE DESCRIPTION CARD - SYLLABUS

Course name
Process optimization

Course

Field of study
Chemical and Process Engineering

Year/Semester
1/2

Area of study (specialization)
Chemical Engineering

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
30

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Mariusz B. Bogacki

E-mail : mariusz.bogacki@put.poznan.pl

Tel. 61 647 5979

Centrum Dydaktyczne Wydziału Technologii Chemicznej, pok. 124A

60-965 Poznań, ul. Berdychowo 4

Responsible for the course/lecturer:
prof. dr hab. inż. Grzegorz Musielak

E-mail:grzegorz.musielak@put.poznan.pl

Centrum Dydaktyczne Wydziału Technologii Chemicznej, pok. 126A

60-965 Poznań, ul. Berdychowo 4

Prerequisites

The student starting this course should have basic knowledge of mathematics, numerical methods, chemical engineering. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

Provide students with basic knowledge in the field of modeling and optimization of chemical processes.

Course-related learning outcomes

Knowledge

1. K_W01 The student has extended and deepened knowledge in the field of mathematics and computer science necessary for modeling, planning, optimization and characterization of industrial chemical processes as well as planning experiments and processing the results of experimental research.

Skills

1. K_U01 The student has the ability to obtain and critically evaluate information from literature, databases and other sources and to formulate opinions and reports on this basis.

2. K_U09 The student has the ability to analyze and solve problems related to chemical technology and process engineering, using for this purpose theoretical, analytical, simulation and experimental methods.

Social competences

1. K_K01 The student understands the need for lifelong learning; is able to inspire and organize the learning process of other people; is aware of the importance and non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made.

2. K_K06 The student can think and act in a creative and entrepreneurial way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired as part of each subsequent lecture is verified in the form of a test carried out within 6 days, starting from the day after the lecture, preceding the next lecture on the eCourses platform. The test consists of 10-15 questions (open and closed) scored differently. Passing threshold: 51% of the total number of points. The final grade of the lecture will be issued according to the following criteria: 51%-60% (3.0), 60%-72% (3.5); 72%-85% (4.0), 85%-93% (4.5), 93%-100% (5.0). The issues on the basis of which the questions are developed will be presented to students during the lecture.

The knowledge acquired during the project classes is verified by means of two 60-minute colloquia carried out during the 7th and 15th classes. Each colloquium includes a solution of 4 - 5 tasks scored differently. Colloquia will be carried out either in a stationary system or in the form of a test with open questions on the eCourses platform.

The final assessment of the project classes will be issued on the basis of the score obtained from the tests from the lectures and the colloquia from the tasks. The share of individual scores in the final assessment will be as follows: lecture test - 40% colloquia from tasks - 60%. Passing threshold: 51% of the total number of points. The final evaluation of the project will be issued according to the following criteria: 51%-60% (3.0), 60%-72% (3.5); 72%-85% (4.0), 85%-93% (4.5), 93%-100% (5.0).

Programme content

1. Basic information about optimization methods.

2. Optimality conditions for tasks without constraints.

3. Optimum conditions for tasks with equality constraints.

4. Optimum conditions for tasks with inequality constraints.

5. Duality of optimization tasks.

6. Linear programming.

7. Numerical methods used in optimization.

Teaching methods

Lecture: multimedia presentation.

Project: Analysis and solving of selected optimization problems.

Bibliography

Basic

1. Roman Krupiczka, Henryk Merta, Optymalizacja Procesowa, Wydawnictwo Politechniki Śląskiej, 1998.

2. Krzysztof Urbaniec, Optymalizacja w projektowaniu aparatury procesowej, Wydawnictwa Naukowo_Techniczne, Warszawa 1979.

3. Stanisław Sieniutycz, Optymalizacja w inżynierii procesowej, Wydawnictwo Naukowo - Techniczne, 1991.

4. Singiresu S. Rao, Engineering Optimization. Theory and Practice, Jon Wiley & Sons, Inc., Hoboken, New Jersey, 2009.

Additional

1. W. W, Kafarow, Metody cybernetyki w chemii i technologii chemicznej, Wydawnictwa Naukowo_Techniczne, Warszawa 1979.

2. Andrzej Nowak, Optymalizacja. Teoria i zadania, Wydawnictwo Politechniki Śląskiej, 2007.

3. Anna Danielewska-Tułecka, Jan Kusiak, Piotr Oprocha, Optymalizacja. Wybrane metody z przykładami, Wydawnictwo Naukowe PWN, 2021.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for project classes, preparation for tests) [1]	40	1,5

[1] delete or add other activities as appropriate