COURSE DESCRIPTION CARD - SYLLABUS

Course name
Industrial process design [S2TCh2-TP>PPP]

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)
Polymer Technology

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Student starting this subject should have knowledge of the basic principles of general, organic including polymer chemistry, physical chemistry, and chemical engineering, as well as polymer technology and processing, and methods of obtaining polymer composites. Student should know the mathematical tools used in chemical calculations and be able to use them as well as is able to search for information in scientific literature, databases and other properly chosen sources.

Course objective

Gaining basic knowledge of industrial process design and methods of synthesis, modification, processing of natural and synthetic rubber. Gaining skills related to designing of a production plant on the example of a tire manufacturing plant. To familiarize students with the car tire production plant.

Course-related learning outcomes

Knowledge:
Student has expanded and well-established knowledge in the field of polymer chemistry and other related areas of science, allowing to formulate and solve complex tasks related to polymer technology (K_W2). The student has knowledge of complex chemical processes, including the appropriate selection

of materials, raw materials, methods, techniques, apparatus and equipment for the implementation of the tire production process (K_W3). The student has a well-established and expanded knowledge in the field of rubber processing (K_W11). Student has established knowledge of occupational health and safety at the tire manufacturing plant (lists and applies health and safety regulations) (K_W10).

Skills:
Student has the ability to obtain and critically evaluate information from literature and other sources (K_U1). Student has the ability to work in a group, assuming different roles in it (K_U2). Student has the ability to plan a technological project which is tire production, including resource analysis, technical design, project financial assessment, environmental impact analysis and marketing (K_U20). Student is able to design and evaluate the course of the experiment and the process in the field of chemical technology and related fields (K_U22).

Social competences:
Student is conscious of limitations of science and technology in the area of polymer chemistry, including environment protection (K_K2). Student is conscious of limitation of his knowledge and understands the need of further continuous education in area of polymer chemistry (K_K1). Students can work in a team and are aware of their responsibility for their work and responsibility for the results of the teamwork (K_K4).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Determining the final grade based on partial grades received during the semester during classes in direct contact with the teacher (online in "live view" mode with the webcam turned on via the eKursy platform):
Grade for preparation for current classes - performance of the next stage of the car tire production plant project. Grade for activity during classes.
Grade for the team project of a tire production plant based on written form of the project (online sent via the eKursy platform or by e-mail using the university e-mail system), the final multimedia presentation, project defense.

Programme content

Issues in the field of industrial process design and methods of synthesis, modification, processing of natural and synthetic rubber.

Course topics

Designing industrial processes - basic knowledge, including the profitability of the project, environmental protection and health and safety rules.
Car tire construction.
Components of the rubber compound for tire production: preparation, properties, application.
Methods for preparing the rubber compound for tire production - mixing process (continuous and periodic methods) and apparatus.
Production technology of semi-finished products of car tire.
Car tire production technology.
Quality control of raw materials, semi-finished products and finished products (tire).
Trip to the car tire production plant.

Teaching methods

Informative lecture with multimedia presentation.
Project: project method. Performing individual stages of the project using computer work, preparing multimedia presentations.

Bibliography

Basic:
1. ”Projektowanie procesów technologicznych. Od laboratorium do instalacji przemysłowej”, L. Synoradzki, J. Wisialski, OWPW, 2006

2. „Technologia ogólna polimerów”, Z. Wirpsza, Politechnika Radomska, 1997
3. „Produkcja opon i dętek”, B. Jurkowska, B. Jurkowski, WNT, 1975
4. „Poradnik technologa gumy” J.R. White, S.K. De, Instytut Przemysłu Gumowego „STOMIL”, 2003

Additional:
1. "Handbook of Plastic Technologies", Charles A. Harper, The McGraw-Hill Companies, Inc, 2006
2. B. Jurkowska, B. Jurkowski, „Mieszanie kompozycji polimerowych", WPP, Poznań, 1991.
3. D. Jaroszyńska, R. Gaczyński, B. Felczak, „Metody badań fizycznych gumy", WNT, Warszawa, 1978

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00