SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Fundamentals of design and development of technological lines

Educational subject description sheet

Basic information

Field of study Biotechnology **Speciality** - **Organizational unit** Faculty of Biology and Biotechnology **Study level** first cycle (engineering degree) **Study form** full-time studies **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** BBTBTjS_D.310.01607.24 **Lecture languages** english **Mandatory** Obligatory subjects **Block** Major subjects **Disciplines** Biological sciences

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Teacher	Hanna Kowalska, Jolanta Kowalska, Agnieszka Ciurzyńska

Period	**Examination**	**Number of ECTS points**
Semester 5	Pass with grade **Activities and hours** Lecture: 15 Project exercises: 15	3

Goals

Code	Goal
C1	Providing students with knowledge of the general principles of technological design in the field of biotechnology and related
C2	Providing and developing knowledge and skills in the field of: - technical aspects and principles of designing biotechnological processes in the following topics: biotechnology in production and animal health protection, in plant production; selected branches of the pharmaceutical and chemical industries, as well as in the food industry, - carrying out material balances, - selection of standards recommended for the selected production profile, - computer-aided design; examples of CAD applications and packages, - construction issues, - product safety and quality (GMP, HACCP, etc.), - economic, hygienic, sanitary and ecological aspects, - making drawings in the Auto CAD program required for the execution of projects, such as schematic drawings, schematic drawings, arrangement of machines, plant land development concepts and others.
C3	Indication of the need to check and use: - current regulations related to design, e.g. construction law, water law and others. - literature sources: catalogs, company materials, Internet resources, patents and others. - the latest technical solutions in selecting technological solutions, including those based on market needs for specific products, selection of machinery and equipment, etc.
C4	Shaping the attitude/skills of cooperation in a team with other specialists

Entry requirements

Biotechnology, food engineering and production organization, computer science
The student knows the field of technical drawing (school knowledge), natural sciences, biology, chemistry, mathematics, and the use of computer programs

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the principles of designing and technological lines in the field of biotechnology	BTj_K3_W01_inz, BTj_K3_W02_inz, BTj_K3_W03, BTj_K3_W04	Written credit
W2	the need to identify the conditions related to the design of technological lines or plants depending on the location, raw material base, and market situation, the size and type of production waste, ways of its management or disposal, and the possibility of implementing selected quality standards, taking into account the adaptation to the guidelines contained in applicable standards and legal regulations of the country	BTj_K3_W01_inz, BTj_K3_W03, BTj_K3_W04, BTj_K3_W11, BTj_K3_W15_inz	Written credit
Skills – Student can:			
U1	design a technological line or a production plant as part of teamwork	BTj_K3_U15_inz, BTj_K3_U20	Project, Assessment of activity during classes
Social competences – Student is ready to:			
K1	use computer-aided design programs such as AutoCAD and search for information and news available in libraries, the Internet, engineering and design companies, etc. and creative use in achieving the set goal	BTj_K3_K01, BTj_K3_K05	Project

Code	Outcomes in terms of	Effects	Examination methods
K2	cooperate with other specialists in the design of technological lines or industrial plants	BTj_K3_K02, BTj_K3_K05	Project

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Technical aspects and principles of process design in biotechnology and food technology. Material balances. Recommended standards for the selected production profile. Computer-aided design; examples of CAD applications and packages. Construction issues. Land development concept. Economic, hygienic, sanitary and ecological aspects.	W1, W2	Lecture
2.	Teams (5-8 people) carry out a project of a biotechnological process in the following topics: biotechnology in production and animal health protection, in plant production; selected branches of the pharmaceutical and chemical industries, as well as in the food industry. Development of issues received from the teacher for the implementation of the plant project. During the exercises, current regulations related to designing, e.g. construction law, water law and others, are analyzed. Computer programs useful for designing are used, using literature sources: catalogs, company materials, Internet resources and others. with the impact of the plant on the environment and others.	U1, K1, K2	Project exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, Discussion, Teaching technique in the form of play, exact, task
Project exercises	Discussion, Brainstorm, Presentation, Teaching technique in the form of play, exact, task, Teamwork

Activities	Examination method	Percentage
Lecture	Written credit	30%
Project exercises	Project	55%
Project exercises	Assessment of activity during classes	15%

Activities	Credit conditions
Lecture	The points system applies. The condition for passing the lecture is to write a test covering the scope of the lecture material and to obtain at least 51% of points.
Project exercises	The points system applies. The condition for passing the classes is to obtain at least 51% of points for presentations on the progress of developing project issues (student activity), final presentation and evaluation of the project submitted in electronic form.

Literature

Obligatory

1. Mohan, C. O., Carvajal-Millan, E., Ravishankar, C. N., & Haghi, A. K. (Eds.). 2018: Food process engineering and quality assurance. CRC Press.
2. Maroulis, Z. B., & Saravacos, G. D. 2003: Food process design (Vol. 126). CRC Press. https://books.google.pl/books?hl=pl&lr=&id=OycSdO1F0_sC&oi=fnd&pg=PR5&dq=Food+Process+Design&ots=A986ZutmRf&sig=8Jg-rUy_ozLtJH8O9WLXB1Kin9w&redir_esc=y#v=onepage&q=Food%20Process%20Design&f=false
3. Saravacos, G. D., & Maroulis, Z. B. 2011:. Food process engineering operations. CRC Press.

Optional

1. Articles in English suggested by the teacher
2. Catalogs and brochures
3. AutoCAD LT 2019 Language Packs - Autodesk https://www.autodesk.com/support/technical/article/caas/tsarticles/ts/u5CP3BZNs2tQNEG6jeog3.html

Calculation of ECTS points

Activity form	**Activity hours***
Lecture	15
Project exercises	15
Preparing the project	20
Preparation for remote work	5
Conducting literature research	5
Preparation for exercises	5
Self-study on the content covered in class	5
Preparation of a multimedia presentation	5

Student workload	**Hours** 75
Number of ECTS points	**ECTS** 3

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K01	The graduate is ready to proper storage of data, updating and extending knowledge on topics related to biotechnology and the related sciences;
BTj_K3_K02	The graduate is ready to development and application of one’s skills in practice (including communication, teamwork), which enable effective lifelong learning with respect to biological sciences;
BTj_K3_K05	The graduate is ready to for thinking and acting in an entrepreneurial way
BTj_K3_U15_inz	The graduate can design modification of the features of a biological organism and the conditions of a process associated with the multiplication of biological material in accordance with the adopted assumptions, select devices and unit operations related to the extraction, purification and preservation of a bioproduct;
BTj_K3_U20	The graduate can plan and organise work, both individual and in a team
BTj_K3_W01_inz	The graduate knows and understands technologies of performing biotechnological processes
BTj_K3_W02_inz	The graduate knows and understands basics related to the life cycle of a biotechnological product, as well as devices and their instrumentation (measurement sensors) used in biotechnological production
BTj_K3_W03	The graduate knows and understands key aspects of biotechnology
BTj_K3_W04	The graduate knows and understands the necessity to use proper simple computational techniques (including statistical analysis, computational tools and computer software suites) for biological data
BTj_K3_W11	The graduate knows and understands the principles of OHS and ergonomics;
BTj_K3_W15_inz	The graduate knows and understands the systems currently recommended for managing quality and safety in the biotechnological industry; the principles of creating and developing the forms of individual entrepreneurship;