SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Monoclonal antibodies - production and use

Educational subject description sheet

Basic information

Field of study Biotechnology	**Didactic cycle** 2024/25
Speciality -	**Subject code** BBTBTjS_D.320.01623.24
Organizational unit Faculty of Biology and Biotechnology	**Lecture languages** english
Study level first cycle (engineering degree)	**Mandatory** Elective subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Biological sciences

Coordinator	Magdalena Żmigrodzka
Teacher	Magdalena Żmigrodzka

Period	**Examination**	**Number of ECTS points**
Semester 6	Exam **Activities and hours** Lecture: 15 Laboratory exercises: 30	4

Goals

Code	Goal
C1	Become skilled with the methods of the production and use of monoclonal antibodies in the serological diagnosis of infectious diseases and the diagnosis and therapy of neoplastic diseases, based on the newest scientific reports and tutors' scientific knowledge. Transfer of knowledge and practical skills from the introduced scope of the subject.

Entry requirements

Fundamentals of general immunology

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the principles of the production and use of antibodies monoclonal in cytometric studies flow-through, ELISA, and immunocytochemistry methods	BTj_K3_W06, BTj_K3_W08	Written exam, Presentation
W2	the principles of cell isolation from various biological materials, their preparation for immunophenotyping, and the evaluation of their activity using chosen monoclonal antibodies	BTj_K3_W06, BTj_K3_W08	Written exam, Presentation
W3	the principles of work using the flow cytometry technique	BTj_K3_W07_inz	Written exam, Presentation
Skills – Student can:			
U1	select and prepare monoclonal antibodies for flow cytometry, ELISA, and immunocytochemistry techniques	BTj_K3_U01_inz, BTj_K3_U14_inz	Presentation
Social competences – Student is ready to:			
K1	develop the skills needed in practice	BTj_K3_K02, BTj_K3_K03	Presentation

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	The structure and role of antibodies in the animal body. Definition and characterization of poly- and monoclonal antibodies. Application of monoclonal antibodies in the diagnosis of infectious diseases. Possibilities of using monoclonal antibodies in the diagnosis and treatment of cancer. The use of monoclonal antibodies in the diagnosis and treatment of parasitic diseases. Fundamentals of flow cytometry. Usage of flow cytometry technic in transplacental fetal-maternal leakage of red blood cells. Application and methods labeling of antibodies in immunocytochemistry and histochemistry.	W1, W2, W3	Lecture
2.	Production of monoclonal antibodies. Preparation of monoclonal antibodies, including labeling with fluorochromes, and biotinylation. Flow Cytometry Academy -computer program. Immunophenotyping of blood cells and cells isolated from body fluids and selected tissues. The intracellular staining of cytokines with monoclonal antibodies. Measurment of apoptosis and cell cycle analysis with flow cytometry technic. Evaluation of the phagocytic activity of neutrophils and monocytes from peripheral blood, and from other biological materials (milk, BALL).	W1, W2, W3, U1, K1	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Problem lecture, Presentation
Laboratory exercises	Laboratory (experiment), learning by experiment

Activities	Examination method	Percentage
Lecture	Written exam	75%
Laboratory exercises	Presentation	25%

Activities	Credit conditions
Lecture	maximum 25 points; 13 points required to pass
Laboratory exercises	maximum 8 points; 5 points required to pass

Literature

Obligatory

1. Fundamental immunology, Seventh edition; Author: William E. Paul; Brand: Wolters Kluwer Health
2. Flow Cytometry: First Principles, Second edition; Autor: Alice Longobardi Givan; Brand:John Wiley & Sons;
3. Flow Cytometry Today: Everything You Need to Know about Flow Cytometry, 1st ed.2022 ; Author: Claudio Ortholani; Brand: Springer;

Optional

1. Cytometry Part A; Journal of International Society for Advancement of Cytometry
2. websites: Becton Dickinson, Sigma, Bio-Rad, Thermofisher- protocols for immunothyping on-line
3. Flow cytometry in hematopathology; Author D. Nguyen; Brand: Humana Press 2007
4. Practical Flow Cytometry in Haematology: 100 Worked Examples; Authors: Mike Leach, Mark Drummond, Allyson Doig et al.; Brand: Wiley-Blackwell
5. Immunochemistry Author: Pam Wang Brand: Delve Publishing

Calculation of ECTS points

Activity form	Activity hours*
Lecture	15
Laboratory exercises	30
Preparation of a multimedia presentation	15
Preparation for the exam	30
Preparation for exercises	10
Student workload	**Hours** 100
Number of ECTS points	**ECTS** 4

* hour means 45 minutes

Effects

Code	Content
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_K03	The graduate is ready to for safe work via the selection and application of a proper technique of handling, storing and disposing of laboratory materials (e.g. using proper techniques in terms of handling, storing and disposing of bacteria, chemical substances and dangerous bio-waste);
BTj_K3_U01_inz	The graduate can utilise proper techniques and knowledge related to biotechnology in practice, under the care of a supervisor;
BTj_K3_U14_inz	The graduate can translate the results of experiments into practical solutions;
BTj_K3_W06	The graduate knows and understands the functions of various cells (prokaryotic and eukaryotic), being able to critically explain, how their properties are related to varying biological functions, knowing how they can be tested experimentally
BTj_K3_W07_inz	The graduate knows and understands experimental methods serving the examination of important areas in the field of biotechnology, chemistry, biochemistry, biophysics, molecular biology and the related sciences;
BTj_K3_W08	The graduate knows and understands the features of cellular metabolism and its control, including the knowledge of certain experimental techniques;