Description of optional subjects in the field of Biology, first cycle, Medical Biology offered in the academic year 2025/2026

Medical Virology (lecture, B-BF.44)
a. prof. dr hab. Agnieszka Szuster-Ciesielska
b. summer, 15 godz., 1 ECTS
c. none
d. written test
e. Classification and origin of viruses. Basic definitions and concepts regarding the structure and replication of viruses. Genetic diversity of viruses and their variability. Viral infection of the body - pathogenesis. Mechanisms of body immunity in viral diseases; latent infections. Characteristics of the most influential families of DNA and RNA viruses pathogenic to humans and animals - epidemiology of viral infections, zoonoses, and teratogenic viruses. The problem of eradication of viruses - Poxviridae and Picornaviridae. Viruses and cancer. Prevention of viral infections - vaccines and antiviral drugs.

Insects in biomedical studies (lecture, B-BF.46)
a. mgr Michał Sułek
b. summer, 15 godz. 1 ECTS
c. none
d. Project prepared in groups – a PowerPoint presentation on a chosen issue in insect biotechnology that was not discussed during the lecture series. Emphasis on creativity and independent scientific description of selected topics of interest (use of transgenic insects in agriculture, insects in the food industry, innovative drugs for pollinators, etc.)
e. **Introduction to insect immunobiology** - issues related to the immunological system, biodiversity, evolutionary success of insects
***Drosophila melanogaster* as a model organism** – features, history of the most important research that contributed to a better understanding of, among others, human immunology (Nobel prizes for work on *Drosophila* in 1933, 1946, 1995, 2004, 2011, 2017)
Galleria mellonella *as a model organism* - features, applications, practical aspects of working with the greater wax moth. The use of *G. mellonella* larvae in biomedical research. *Galleria mellonella* as a research model in the phenomenon of **immune priming** and a source of **antimicrobial peptides (AMPs)**
The phenomenon of immune priming (immunological "memory" of invertebrates). Research history; scenarios for inducing immunological memory; the phenomenon of trans-generational immune priming. Immune priming as an analogue of trained memory in vertebrates. An introduction to the issue; discussion of potential mechanisms; new research trends
Insects as a source of AMPs. What are antimicrobial peptides; mechanism of action; AMPs as new generation antibiotics; advantages and disadvantages/limitations of using antimicrobial peptides as biomedical agents; drugs approved for use and currently ongoing clinical trials.
Application of insect cell lines in the recombinant protein industry. Introduction to the issue of cell lines and working with cell cultures; specification of selected insect cell lines; the use of viral vectors in the production of recombinant proteins (*baculovirus expression vector system*); advantages and disadvantages/limitations in the use of insect cell lines

Electron and confocal microscopy (laboratory, B-BF.48)

a. dr Justyna Kapral-Piotrowska

b. summer, 30 godz., 2 ECTS

c. none

d. project prepared in groups

1. e. Construction, principle and working of the transmission and scanning electron microscope.
2. Preparation of samples for transmission electron microscopy (TEM): fixation, dehydration, embedding, trimming of blocks, cutting ultra-thin sections, staining.
3. Preparation of samples for scanning electron microscopy (SEM): fixation, dehydration, drying, sputter coating.
4. Observation of specimens using transmission and scanning electron microscope.
5. Construction, principle and working of confocal microscopy. Staining of apoptotic, necrotic and autophagic cells.

Recommended literature:

Electron Microscopy: A Brief History and Review of Current Clinical Application, 2014, Ronald E. Gordon

Transmission Electron Microscopy, 2009, David B. Williams , C. Barry Carter

Electron Microscopy: Principle, Components, Optics and Specimen Processing, 2018, Pranab Dey

Methods of Preparation for Electron Microscopy, 1987

Confocal Microscopy: Principles and Modern Practices, 2020, Amicia D. Elliott

Applications of plant in vitro cultures in biomedicine (laboratory, B-BF.51)

a. dr Kinga Lewtak

b. summer, 30 godz., 2 ECTS

c. none

d. final test

e. In vitro culture methodology: equipment, materials, sterilisation, media, growth regulators, etc. Induction of in vitro plant organogenesis and embryogenesis as a method of preserving valuable genotypes. Micropropagation techniques of therapy/valuable plants that allows circumvention of physiological reproduction barriers e.g. isolation and culture of zygotic embryos, in vitro pollination. Extraction of biologically active secondary metabolites from callus cultures on solid media and in suspension. Methods of storing plant cultures including cryopreservation technology and artificial seed formation.