



**INSTITUTE OF BIOCHEMISTRY AND BIOPHYSICS**  
POLISH ACADEMY OF SCIENCES

**Courses for PhD students**  
**The academic year 2024 / 2025**

Warsaw, July 2024

# AUTUMN 2024

## MONDAYS

### **MODEL ORGANISMS**

October 7<sup>th</sup> , 2024 - February 24<sup>th</sup> , 2025

15 meetings

language: English

## WEDNESDAYS

optional workshop

### **RESEARCH DATA MANAGEMENT**

November 6<sup>th</sup> and 13<sup>th</sup>, 2024

2 meetings

language: English

## WEDNESDAYS

optional workshop

### **OPEN SCIENCE**

November 20<sup>th</sup> and 27<sup>th</sup> , 2024

2 meetings

language: English

## FRIDAYS

### **PHILOSOPHY**

October 4<sup>th</sup> , 2024 - February 21<sup>st</sup> , 2025

15 meetings

language: English

# SPRING 2025

## MONDAYS

### **INTERACTIONS OF ORGANISMS**

March 3<sup>rd</sup> – June 23<sup>rd</sup> , 2025

15 meetings

language: English

## WEDNESDAYS

optional workshop

### **MATHEMATICAL MODELING IN BIOLOGY**

April - May, 2025

8 meetings

language: English

## FRIDAYS

### **BIostatISTICS**

March 7<sup>th</sup> – May 16<sup>th</sup>, 2025

10 meetings

language: English

### **COMMERCIALIZATION**

May 23<sup>rd</sup>, 30<sup>th</sup> - June 6<sup>th</sup>, 13<sup>th</sup> , 2025

4 meetings

language: English

## LECTURE

structure  
schedule  
language  
room  
requirements  
software

## MODEL ORGANISMS

series of 15 meetings (2 x 45 min each)  
Mondays 09:30 am  
October 2<sup>nd</sup>, 2023 – February 19<sup>th</sup>, 2024  
English  
Lecture hall E or on-line, depending on the speaker  
-  
-

## ASSESSMENT

credit  
language  
date  
room  
educational materials

- written exam (for PhD Students in biological sciences)
- to be announced (for PhD Students in chemical sciences)

English  
February 24<sup>th</sup>, 2025  
Lecture hall E  
-

## LECTURERS

### CONTACT PERSON

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

### COORDINATORS

Jacek Nowak, PhD

#### The course includes:

During the course students will have the opportunity to meet scientists working on various model organisms. The lecture series will provide answer to the following questions:

What is a model organism and why and when are model organisms used?

How can genetic manipulation of organisms be carried out and what is it used for?

What are the most important model organisms, their terminology, general structure, life cycle, and maintenance in the laboratory?

What type of model organisms is suitable to answer specific biological questions?

What model organisms are available in IBB and Ochota Campus?

## LECTURE

structure

schedule

language

room

## ASSESSMENT

credit

language

room

educational materials

## LECTURERS

## CONTACT PERSON

## PHILOSOPHY

series of 15 meetings (2 x 45 min each)

Fridays 09:30 am

October 4<sup>th</sup>, 2024 – February 21<sup>st</sup>, 2025

English

Room 7 / A

to be announced

English

Room 7 / A

-

Wojciech Bober, PhD

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))

Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

### The course includes:

The course in the philosophy of science will focus on modern philosophical problems encountered in scientific research. Classical problems and main positions will be only outlined. The stress will be put on the 20th-century developments in the philosophy of science, focusing on personages such as the Vienna Circle, Karl Raimund Popper, Thomas Kuhn and others. Topics addressed during the course should include: the problem of empirical knowledge, the logics of scientific research, the boundaries of science (what is science and what is not), the relevance of scientific theories to the reality. Some social and ethical problems in science may be addressed as well.

## LECTURE

structure  
schedule  
language  
room  
requirements  
software

## RESEARCH DATA MANAGEMENT

series of 2 meetings (2 x 45 min each)  
Wednesdays 09:30 am  
November 6<sup>th</sup> and 13<sup>th</sup>, 2024  
English  
Room 7 / A  
-  
-

## ASSESSMENT

credit  
language  
room  
educational materials

attendance (100%)  
English  
Room 7 / A  
-

## LECTURERS

Marta Hoffman, PhD ([martah@ibb.waw.pl](mailto:martah@ibb.waw.pl))

## CONTACT PERSON

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

### The course includes:

What is research data?

Things to consider while collecting data during a project

Selection and preparation of data for long-term preservation

Selection of data for open sharing

Who owns your research data and what does it mean?

## LECTURE

structure  
schedule  
language  
room  
requirements  
software

## OPEN SCIENCE

series of 2 meetings (2 x 45 min each)  
Wednesdays 09:30 am  
November 20<sup>th</sup> and 27<sup>th</sup> , 2024  
English  
Room 7 / A  
-  
-

## ASSESSMENT

credit  
language  
room  
educational materials

attendance (100%)  
English  
Room 7 / A  
-

## LECTURERS

Marta Hoffman, PhD ([martah@ibb.waw.pl](mailto:martah@ibb.waw.pl))

## CONTACT PERSON

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

### The course includes:

The publishing system in research and the Open Science movement – where has this come from?

The goals of Open Science (open publications, open data, and beyond)

Author (accepted) manuscripts, preprints, reviewed preprints, articles free-to-read, full open access articles – legal differences

Financial aspects of scientific publishing: subscriptions, page charges, article-processing charges,

double-dipping, predatory journals, transitional agreements

Where is this heading?

## LECTURE

structure  
schedule

## INTERACTIONS OF ORGANISMS

series of 15 meetings (2 x 45 min each)  
Mondays 09:30 am  
(March 3<sup>rd</sup>, 2025 – June 23<sup>rd</sup>, 2025)

language  
room

English  
Lecture hall E or on-line, depending on the speaker

## ASSESSMENT

credit

- written exam (for PhD Students in biological sciences)
- to be announced (for PhD Students in chemical sciences)

language  
date  
room

English  
June 30<sup>th</sup>, 2025  
Lecture hall E

educational materials

-

## LECTURERS

## CONTACT PERSON

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

## COORDINATORS

Magdalena Krzymowska, PhD, DSc ([krzym@ibb.waw.pl](mailto:krzym@ibb.waw.pl))

Patrycja Zembek, PhD ([patrycja.zembek@ibb.waw.pl](mailto:patrycja.zembek@ibb.waw.pl))

### The course includes:

This course offers a comprehensive view of interactions between microbes with their hosts. Topics covered in the course will include various aspects of pathogenesis i) similarities in plant and animal immunity with special emphasis on receptors sensing invaders; iii) the role of programmed cell death in defense and pathogenesis, iii) common molecular mechanisms of virulence of various pathogens and pests iv) interplay of phages & bacteria; v) animal and plant viral diseases vi) bacteria infecting animal cells – focus on secretion systems and effectors; vi) phytopathogenic bacteria; vii) fungi & Oomycetes as causative agents of diseases; viii) plant diseases caused by protists, insects and nematodes; ix) parasitic plants. To add some positive perspective, beneficial interactions with hosts will be presented. Mycorrhizal symbiosis and nodulation will illustrate this concept.

## LECTURE

structure  
schedule

language  
room  
requirements  
software

## ASSESSMENT

credit  
language  
educational materials

## LECTURERS

## CONTACT PERSON

## BIOSTATISTICS

series of 10 meetings (2 x 45 min each)  
Fridays 09:30 am  
(March 7th – May 16th, 2025)

English  
on-line,  
use your full name while logging in  
-

to be announced  
English  
-

Michał Aleksander Ciach, PhD

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

The course will focus on the fundamentals of statistics with a focus on applications in biological research.

We will cover the following topics:

- Introduction to data analysis and basic data exploration techniques - clustering and principal component analysis
- The interpretation of probability and randomness - what "random" means for a statistician
- The basics of probability theory - how randomness is modeled mathematically
- Application of probability theory to estimation - how to handle uncertainty
- Common statistics - the mean, the median, the mode
- Confidence intervals - a better way of handling uncertainty
- Statistical hypothesis testing - how to gain knowledge from statistics
- Odds Ratio - how can we trust if a drug is effective
- Linear regression - how the dose influences the outcome
- ANOVA - how to check if there is any difference at all between multiple groups

After completion of the course, the students will be able to perform basic statistical analyses using some of the most common statistical techniques used in biological and biomedical research.



## LECTURE

structure  
schedule

language  
room

## ASSESSMENT

credit  
language  
room  
educational materials

## LECTURERS

## CONTACT PERSONS

## COMMERCIALIZATION AND INTELLECTUAL PROPERTY

series of 4 meetings (2 x 45 min each)  
Fridays 09:30 am (May 23<sup>rd</sup> , 30<sup>th</sup> - June 6<sup>th</sup> , 13th, 2025)

English  
Room 7 / A

to be announced  
English  
Room 7 / A

Katarzyna Pala, PhD, CEO,  
FOOD4FUTURE TECHNOLOGIES SP. Z O.O.

Anna Rożkowicz, patent attorney, partner at WTS Patent Attorneys

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

**The course includes two parts:**

**IP rights** - protection of innovations and patent strategies. Introduction into intellectual property rights - presenting various in terms of length, scope and nature rights. Legal paths and substantial requirements for obtaining protection of inventions at national and international level, with a focus on innovations emerging from the biotech/chemistry/pharmaceuticals field.

**Commercialization of IP** – practical aspects and case studies. The practical aspects and case studies of IP commercialization, including the fundamental principles of generating revenue from knowledge. The advantages and disadvantages of lending versus selling, as well as the possibility of creating spin-off and start-up companies. The topic is illustrated with business cases and real-life examples.

## LECTURE

structure  
schedule

## MATHEMATICAL MODELING IN BIOLOGY

series of 8 meetings (5:2x45 lectures and 3:2x45 trainings)  
Wednesdays 09:30 am  
(April - May, 2025)

language  
room  
requirements  
software

English  
Room 7 / A

-  
-

## ASSESSMENT

credit

to be announced

language  
room  
educational materials

English  
Room 7 / A

-

## LECTURERS

Tomasz Turowski and Katarzyna Jonak

## CONTACT PERSONS

Anna Muszewska, PhD, DSc ([musze@ibb.waw.pl](mailto:musze@ibb.waw.pl))  
Adrian Iwaniuk ([sbm@ibb.waw.pl](mailto:sbm@ibb.waw.pl))

## COORDINATORS

Tomasz Turowski, PhD  
Katarzyna Jonak, PhD

1. Introduction to Mathematical Modeling in Biology:
  - Understanding mathematical modeling as a tool for gaining insights into biological processes.
  - Emphasizing the complementary nature of experimental and computational approaches in biology.
  - Highlighting successful applications of mathematical modeling in biology.
2. Types of Modeling:
  - Exploring quantitative vs. qualitative/conceptual models.
  - Distinguishing between deterministic and stochastic models.
3. Definition of Key Terms in Mathematical Modeling: variables, parameters, and equations.
4. Introducing experimental methods for collecting information on parameters and variables.
5. Testing Mathematical Models and Limitations of Models: Addressing simplifications and assumptions in mathematical models and their implications for accuracy and applicability.
6. Discussion on Future Directions: Exploring trends and challenges in mathematical modeling in biology, including multi-scale modeling, integration of omics data, and predictive modeling for personalized medicine.
7. Modeling Epidemics/Prey and Predator Models, and Competition Models.
8. Mathematical Modeling of Protein Signaling Pathways in Health and Disease.
9. Stochastic Models of Biophysical Systems: Simulating transcription and translation processes.
10. Introduction to Computational Tools for Mathematical Modeling:
  - Basics of programming in Python and relevant libraries.
  - Implementation of simple models in Python and utilization of standalone software for modeling, such as XPPAUT.