



INSTITUTE OF BIOCHEMISTRY AND BIOPHYSICS
POLISH ACADEMY OF SCIENCES

Courses for PhD students
The academic year 2022 / 2023

Warsaw, December 2022

AUTUMN 2022

Mondays

The power of model organisms in biological discoveries

October 3, 2022 - January 30, 2023

15 meetings

language: English

Fridays

Ethics in research

October 14, 2022 and 21, 2022

2 meetings

language: English

Scientific Presentations + Academic Writing and Publishing + Scientific Career Planning

October 28 – December 16, 2022

7 meetings

language: English

SPRING 2023

Mondays

Biological Imaging

February 27 – June 5, 2023, Mondays, 9 a.m.

June 12 - June 19, 2023, Mondays, 3 p.m.

Fridays

Machine learning/chemometrics - data analysis for scientists using Python

February 10 – April 14, 2023

10 meetings

language: English

Philosophy of science

April 7 – June 30, 2023

12 meetings

language: English

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The power of model organisms in biological discoveries

LECTURE	
title	The power of model organisms in biological discoveries
structure	lecture: 2 x 45 min per week for 15 weeks
schedule	Mondays, 9 a.m. October 3 rd 2022 - January 30 th 2023
language	English
room	on-line or lecture hall E (to be decided)
requirements	use your full name while logging in
EXAM	
exam	4 ECTS – written exam or 2 ECTS - attendance (min. 80%)
language	English
date	February 13 th , 2023
room	on-line or lecture hall E (to be decided)
educational materials	to be delivered after the lecture
coordinator/ contact person	Ulrike Topf, PhD, DSc utopf@ibb.waw.pl
contact person IBB PAS	Anna Płochocka, room 41 sbm@ibb.waw.pl

The power of model organisms in biological discoveries programme

DATE	TITLE	LECTURER (AFFILIATION)
03.10.`22	Why do we need model organisms?	Dr hab. Ulrike Topf (IBB PAS) Dr Krzysztof Drabikowski (IBB PAS)
10.10.`22	Bacteria - from tiny cell to big research	Dr. hab. Agata Starosta (IBB PAS)
17.10.`22	Small is beautiful - bacteriophages as models in biological studies	Prof. Małgorzata Łobočka (IBB PAS)
24.10.`22	Yeast- The stupid cell with all the answers	Dr hab. Joanna Kaminska (IBB PAS)
31.10.`22	Part 1: The art of reproduction: What can we learn from yeast about cell division? Part 2: What we Have Learned From Yeast Mitochondrial Genome POSTPONED to 12.12.2022	Part 1: Dr Katarzyna Jonak (IBB PAS) Part 2: Prof. Magdalena Rakowska-Boguta (IBB PAS)
07.11.`22	<i>Paramecium</i> – a very small but not very simple organism	Dr. Jacek K. Nowak (IBB PAS)
14.11.`22	<i>C. elegans</i> as model to dissect signalling pathways	Dr hab. Ulrike Topf (IBB PAS)
21.11.`22	<i>C. elegans</i> as a model to study physiology and disease	Dr. Krzysztof Drabikowski (IBB PAS)
28.11.`22	<i>Drosophila</i> – The Past and the Future ONLINE https://us06web.zoom.us/j/84967239632?pwd=amxMSGt3cTc3bHNGZGw4RGxkWHZRdz09	Prof. Markus Affolter (University Basel, Switzerland)
05.12.`22	The zebrafish as a model to study human diseases	Dr. Cecilia Winata (IIMCB)
12.12.`22	Part 1: The art of reproduction: What can we learn from yeast about cell division? Part 2: What we Have Learned From Yeast Mitochondrial Genome?	Part 1: Dr Katarzyna Jonak (IBB PAS) Part 2: Prof. Magdalena Rakowska-Boguta (IBB PAS)
09.01.`23	Salamander models for Regeneration and Ageing ONLINE	Dr. Maximina Yun (Center for Regenerative Therapies Dresden, Germany)
16.01.`23	Why do we need mice models to understand the emotional brain?	Dr hab. Ewelina Knapska (Nencki Institute of Experimental Biology PAS)
23.01.`23	<i>Arabidopsis thaliana</i> as a model species for studying plant biology	Dr. Anna Wawrzyńska (IBB PAS)
30.01.`23	Seed Biology - from laboratory to field	Dr. Julia Zinsmeister (IBB PAS)
13.02.`23	EXAM	-

Ethics in research

LECTURE	
title	Ethics in research
structure	lectures: 4 x 45 min per week for 2 weeks
schedule	Fridays, 9 a.m. October 14 th 2022 and 21 st 2022
language	English
room	on-line
requirements	use your full name while logging in
EXAM	
exam	2 ECTS - attendance (min. 80%)
language	English
date	-
room	-
educational materials	to be delivered after the lecture
coordinator/ contact person	Anna Muszewska, PhD, DSc musze@ibb.waw.pl

Programme

- **Ethics in the philosophical context** 14.10.2022, 9:00 AM
- **The role of society and communication** 14.10.2022, 11:00 AM
- **Legal frames of research and RRI** 21.10.2022, 9:00 AM
- **Data integrity and data manipulation** 21.10.2022, 11:00 AM

Dr. Paulina Seidler

The seminar will be a brief introduction to the topic of Ethic of Science. Relations between Science and Ethics will be presented first. Then ethics and some of the main ethical problems concerning science will be discussed based on selected papers delivered a few days in advance. Together we will examine such pressing problems like sharing data, reproducibility, research integrity and also fraud, misconduct involved data to consider proposed by philosophy or maybe even propose our own preventive solutions. Those challenges and issues should be resolved for better knowledge and better science. For knowledge that can be successfully verified, repeated, and reproduced. Based on credibility of shared data and fairness, trust, and honesty between scientists. Science needs standards of right conduct of research and action for the sake of science itself but also for public confidence and trust in science. Value neutrality of scientific inquiry is a myth. Every human field of activity needs ethical consideration. Especially such enquiry like science, which has

an increasing impact on the world. Science in order to be valuable and worthy must be epistemologically objective. It seems that science needs some kind of meta science involving norms, principles and values. Science needs Ethics.

Błażej Dawidson

According to one of the most popular definitions, culture is the totality of the spiritual and material accomplishment of a society (Tylor, *Primitive Culture*, 1871). Everything, that human has produced, both material and immaterial, constitutes culture. Therefore, science is one of its components and remains in a strong relation with society. During the "Ethics in the context of social communication" classes, the following issues will be discussed, grouped in three blocks:

Why is communication with a society needed?

- Presenting the key reasons, why it is important to involve the scientific community in communication with the public. Among others, we will discuss such issues as:
- A way, that science functions in a variable, uncertain, complex and ambiguous (VUCA) reality.
- Mutual responsibility of science in relation with society.
- Dealing with consequences of spreading fake news and the post-truth phenomena.

How to communicate with the public?

- Indication of selected directions, which simplifies the communication process between the scientific community and the public, including:
- Science communication, which facilitates the dialogue necessary to build the mutual trust.
- Public engagement in science (indicated as one of the pillars of responsible research and innovation – RRI), assuming perception of science and research activities in a broader context, beyond methodology, publications, or the technological side.

Examples of activities in the field of communication with the society

- Presentation of exemplary activities that are undertaken in the area of communication with a society:
- Activities performed directly by the scientific community.
- Activities facilitated by actors supporting researchers in communicating science (such as science centers, festivals, international organizations, etc.).

Dr. Zuzanna Warso

“Legal aspects of research ethics and the obligations of a researcher”

In this meeting, we will look into the following issues:

- legal obligations of a researcher related to the ethical aspects of research, focusing in particular on ethics issues related to the use of human cells and tissues in research, processing of personal data, research on animals, research involving non-EU countries, risks to the environment, health and safety, use of AI and the risk of misuse of research results,
- what tools and procedures have been developed to address the ethical challenges of research and how these should be implemented in your work (e.g. RRI tools, ethics self-assessment in Horizon Europe etc.),
- key aspects of research integrity.

Prof. Wojciech Fendler

If you need statistics to explain your result you should have planned a better experiment. Rutherford may be somewhat right when it comes to experimental physics, but in the biomedical world one cannot go far without at least rudimentary knowledge of statistical methods. But what if someone knows too much for his own good? What happens if multiple adjustments, overfitted models, cherry-picked observations, outlier removals and missing data imputation all are present in a single work that showcases stunning and game-changing results? Data can be easily manipulated, and the more knowledgeable the manipulator is, the harder the manipulations are to spot. Why and how do researchers lie with their data will be the subject matter of the talk and the most blatant examples of manipulation will be presented and discussed during the talk. Additionally, the signs of the dataset being altered and the results misreported will be presented and the PhD students will be trained to look for these when evaluating results of other authors with a dose of healthy criticism and well-founded suspicion.

Scientific Presentations + Academic Writing and Publishing + Scientific Career Planning

LECTURE	
title	Scientific Presentations + Academic Writing and Publishing + Scientific Career Planning
structure	series of 7 meetings (2 x 45 min each)
schedule	October 28, 2022 – December 16, 2022 Fridays 9:30 – 11:00
language	English
room	on-line or lecture hall E (to be decided)
requirements	use your full name while logging in
software	-
TYPE OF ASSESSMENT	
attendance credit	2 ECTS - attendance (min. 80%)
language	-
date	-
room	-
educational materials	-
Lecturer/Contact person	Piotr Wasylczyk, PhD, DSc pwasylicz@fuw.edu.pl
Coordinator at IBB PAS	Anna Muszewska, PhD, DSc musze@ibb.waw.pl

Biological Imaging

LECTURE	
title	Biological Imaging
structure	lecture: 2 x 45 min per week for 15 weeks
schedule	Mondays, 9 a.m. February 27 rd 2023 - June 5 th 2023 Mondays, 3 p.m. June 12 th 2023 - June 19 th 2023
language	English
room	on-line
requirements	use your full name while logging in
EXAM	
exam	4 ECTS – written exam or 2 ECTS - attendance (min. 80%)
language	English
date	June 26 th , 2023
room	lecture hall E (to be decided)
educational materials	to be delivered after the lecture
coordinator/ contact person	Liliana Surmacz, PhD, DSc surmacz@ibb.waw.pl Anna Anielska-Mazur, PhD aam@ibb.waw.pl Institute of Biochemistry and Biophysics PAS
contact person IBB PAS	Anna Płochocka, room 42 sbm@ibb.waw.pl Anna Muszewska, musze@ibb.waw.pl

Biological Imaging programme (EXAM: 26.06.2023)

Date	Speaker	Title
27.02.2023	dr Anna Anielska-Mazur, IBB	"Optical microscopy, a thing about how light touches the world of the researcher"
06.03.2023	prof. dr hab. J. Dobrucki, UJ	"Introduction to fluorescence microscopy"
13.03.2023	dr Anna Kasprowicz, UAM	"Lightsheet microscopy for 3D imaging"
20.03.2023	prof. dr hab. J. Dobrucki, UJ	"Imaging of dynamics and interactions between molecules in live cells"
27.03.2023	dr Svitlana Levchenko, UJ	"Fluorescence Lifetime Imaging Microscopy (FLIM): basic principles and applications in life sciences"
03.04.2023	dr hab. J.Olesiak-Bańska, PWr	"Fundamentals of multiphoton microscopy"
17.04.2023	prof. dr hab. J. Dobrucki, UJ	"Fluorescence super-resolution microscopies and their applications in cellular studies"
24.04.2023	dr hab. Joanna Grzyb, UW	"Measuring biomolecules diffusion in vitro and in vivo - or how to find if your molecule bind DNA"
08.05.2023	dr Łucja Kowalewska, UW	"Principles of transmission and scanning electron microscopy – sample preparation, visualization, and data analysis"
15.05.2023	dr Łucja Kowalewska, UW	"3D imaging in electron microscopy "
22.05.2023	Prof. Dr hab. Marcin Nowotny, IIMCB	"Cryo-electron microscopy - from basic principles to applications"
29.05.2023	dr Paweł Hermanowicz, Małopolska Centre of Biotechnology	"Atomic Force Microscopy as a tool for mapping mechanical properties of biological samples"
05.06.2023	dr Mirosław Zarębski, UJ	"Digital image processing and analysis"
12.06.2023 TIME: 15.00	dr Daniel Kierzkowski, Plant Biology Research Institute, Canada	"Quantitative imaging of plant development"
19.06.2023 TIME: 15.00	dr Katarzyna Kędzióra, prof. North Carolina University, USA	"What can microscopists learn from internet cats and self-driving cars? Deep learning methods in the analysis of microscopy images"

Machine learning/chemometrics – data analysis for scientists using Python

LECTURE	
title	Machine learning/chemometrics –data analysis for scientists using Python
structure	Lecture: 1 h per week (1 x 45 mins) (for 8 weeks, 7.5 h overall) Laboratory: 1:15 h per week(1 x 75 mins) (for 2 weeks, 2.5 h overall), two meetings one in the middle and one in the end of the course will be longer (75 instead of 45 min), and will include a workshop in Python
schedule	Fridays, lecture/laboratory 9:00 AM dates: February: 3,10,17,24 March 3,10,17,24,31, April 7,14
language	English
room	on-line
requirements	each student needs to have a computer use your full name while logging in
software	Python, preferably Anaconda
EXAM	
exam	2 ECTS to pass the course attendees will need to analyze data (their own or a set provided by the lecturer) using supervised and unsupervised methods using the provided scripts and present the results during a 10-15 min presentation.
language	English
date	depending on the number of attendees during lectures or on 7 th of April
room	on-line
educational materials	scripts for Python will be provided during classes
LECTURES	Emilia Witkowska Nery, PhD
LABORATORY	Emilia Witkowska Nery, PhD
Coordinator at IBB PAS	Anna Muszewska, PhD, DSc musze@ibb.waw.pl

Programme

Introduction to chemometrics/machine learning;

Data pre-treatment;

Unsupervised methods: Clustering

Unsupervised methods: Dimensionality reduction

Workshop1: Jupiter notebooks and Unsupervised methods

Supervised methods: Regression

Supervised methods: Classification

Neural Networks

Workshop2: Supervised methods

Philosophy of Science

LECTURE	
title	Philosophy of Science
structure	series of 12 meetings (2 x 60 min each)
schedule	April 7, 2023 – April 14, 2023 Fridays 11:00 online April 21, 2023 – June 30, 2023 Fridays 9:30 – 11:30
language	English
room	room A/7
requirements	-
software	-
TYPE OF ASSESSMENT	Exam – 4 ECTS Or Attendance (min 80%) - 2 ECTS
attendance credit	2 ECTS - attendance (min. 80%)
educational materials	Materials will be provided
Lecturer/Contact person	Dr. Paulina Seidler (pfseidler@yahoo.pl)
Coordinator	Dr hab. Anna Muszewska (musze@ibb.waw.pl)

Programme

1. Science and Philosophy
2. Science and Pseudoscience - Demarcation
3. Empiricism and Falsificationism - Vienna Circle and Popper
4. Explanation in Science
5. Laws of Science
6. Observation in Science
7. The Debate over Scientific Realism
8. Purpose of Science Inquiry
9. Theories of Scientific Progress
10. Relativism and Sociology of Science