



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Biophysics - modern physical methods supporting the development of biology

Course

Field of study

Year/Semester

Education in Technology and Informatics

2/3

Area of study (specialization)

Profile of study

general academic

Level of study

Course offered in

Second-cycle studies

polish

Form of study

Requirements

full-time

elective

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr hab. inż. Łukasz Piątkowski

email: lukasz.piatkowski@put.poznan.pl

Faculty of Materials Engineering and Technical
Physics

ul. Piotrowo 3 60-965 Poznań

Prerequisites

Basic knowledge of molecular physics, experimental methods, spectroscopic methods and laser techniques. The student is characterized by the ability to think logically, combine facts, analytically assess the suitability of experimental techniques to a given scientific problem. The student is characterized by an understanding of the need to learn and acquire new knowledge, as well as a broad perception of research problems.

Course objective

Knowledge and understanding of a wide range of physical experimental methods and their relationship to the development of biological research, with particular emphasis on technical aspects.



Course-related learning outcomes

Knowledge

has in-depth knowledge of physics, chemistry, electronics and other fields necessary to design selected types of devices and systems, K2-W03

has knowledge of the basic measurement methods and techniques used in fields related to the field of study as well as development trends and the most important achievements in the field of experimental techniques appropriate for the field of study being studied, K2-W12

Skills

can obtain information from literature, databases and other sources (in the mother tongue and in English), integrate them, interpret and critically evaluate them, draw conclusions and formulate and exhaustively justify opinions, K2-U04

can assess the usefulness and possibility of using both routine and new experimental techniques in the field of study, K2-U13

Social competences

can think and act creatively and enterprisingly, K2-K06

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Self-presentation on the relationship between the research conducted as part of the master's thesis and the topic of the lecture.

Credit based on a test consisting of open questions; the test is passed after obtaining at least 55% of the points. The test is conducted at the end of the semester.

Programme content

Lecture on research methods:

- Detection of single molecules,
- Electron microscopy - cryogenic (cryoelectron microscopy),
- Multiphoton microscopy,
- Imaging of chemical reactions,
- photothermal imaging,
- Pump-probe methods: Transient absorption, Frequency sum generation, Ultrafast microscopy.

Teaching methods

Lecture: presentations supported by scientific materials in the form of illustrations, films and scientific publications.



Bibliography

Basic

1. Peter Atkins, Julio de Paula, James Keeler; Physical Chemistry 11th Edition; Oxford University Press
2. Jay L. Nadeau; Introduction to experimental biophysics-biological methods for physical scientists 2nd edition; CRC Press

Additional

Internet resources, scientific publications.

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	4,0
Classes requiring direct contact with the teacher	26	3,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	4	0,5

¹ delete or add other activities as appropriate