



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Biophysics - modern physical methods supporting the development of biology [S2ETI1>BNMFWRB]

### Course

Field of study Education in Technology and Informatics	Year/Semester 2/3
Area of study (specialization) –	Profile of study general academic
Level of study second-cycle	Course offered in polish
Form of study full-time	Requirements elective

### Number of hours

Lecture 30	Laboratory classes 0	Other (e.g. online) 0
Tutorials 0	Projects/seminars 0	

### Number of credit points

4,00

### Coordinators

dr hab. inż. Łukasz Piątkowski prof. PP  
lukasz.j.piatkowski@put.poznan.pl

### Lecturers

### 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:

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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	4,00
Classes requiring direct contact with the teacher	26	3,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	4	0,50