GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Photophysics of biological systems, PG_00053322 | | |
| Field of study | Biomedical Engineering, Biomedical Engineering, Biomedical Engineering | | |
| Date of commencement of studies | February 2025 | Academic year of realisation of subject | 2024/2025 |
| Education level | second-cycle studies | Subject group | Optional subject group<br>Specialty subject group<br>Subject group related to scientific research in the field of study |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | Polish |
| Semester of study | 1 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Physics of Electronic Phenomena -> Faculty of Applied Physics and Mathematics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Marcin Dampc | |
| | Teachers | dr inż. Marcin Dampc | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 0.0 | 0.0 | 0.0 | 15.0 | 30 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 30 | 5.0 | 40.0 | 75 |

**Subject objectives**

The interactions between emectromagnetic radiation and biological systems will be presented and discussed. Biological systems will be represented by wide range of systems from isolated biomolecules to macroscopic sytems. Phenomena of radiation absorption and emission will serve as a foundation for further discussion of photochemistry in biosystems.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study | Advanced knowledge on atomic and molecular excitations enable student to understand processes behind the spectroscopic data from experiment. | [SW1] Assessment of factual knowledge<br>[SW2] Assessment of knowledge contained in presentation |
| [K7_U02] can perform tasks related to the field of study as well as formulate and solve problems applying recent knowledge of physics and other areas of science | Is capable of selecting apropriate experimental method for investigated phenomenon and determine the properities of biological systems. | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |

**Subject contents**

Radiation interactions with matter. Electronic, vibrational, rotational excitation. Photoionization. Fragmentation. Jabłoński`s diagram. Radiatian emission. Photochemistry. Multiphoton processes. Femtosecond photophysics. Free radicals. Photosynthesis. Radiation demage to DNA. Bioluminescence. Clinical phototherapies.

**Prerequisites and co-requisites**

Introduction to spectroscopy.

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Seminar | 50.0% | 50.0% |
| Written assessment | 50.0% | 50.0% |

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|---|---|---|
| Recommended reading | Basic literature | 1. Z. Kęcki "Introduction to molecular spectroscopy" PWN 1975<br>2. P. Suppan Chemistry and light, PWN 1997 |
| | Supplementary literature | 1. B. Mielewska "Biophysics" Wydawnictwo PG, 2015 |
| | eResources addresses | Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | 1. Selection rules for optical transitions.<br>2. Present and discuss one expamle of bioluminescence<br>3. Present and discuss one example of photoisomerisation process with practical application in medicine. | |
| Work placement | Not applicable | |

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