Title	Code
Molecular Physics (Fizyka molekularna)	**1010401251010410706**
Field: **TECHNICAL PHYSICS**	Year / Semester: **3 / 5**
Specialty: **-**	Course: **core**
Hours: Lectures: **2** Classes: **2** Laboratory: **-** Projects / seminars: **-**	Number of credits: **4**
	Language: **polish**

Lecturer:

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Status of the course in the study program:

Core course of the study for Technical Physics, Faculty of Technical Physics.

Assumptions and objectives of the course:

To get students some knowledge on:

- basis spectral methods and their applications in determination of processes occurring in a molecule (molecules) and interactions in molecular systems,
- correlation between structure of molecules and their photophysical properties
- examples of applications of molecular systems in molecular optoelectronics, photomedicine and environmental protection.

Contents of the course (course description):

1. Molecules, chemical bondings, molecular bondings, molecular structures.
2. Basic quantum methods for evaluation of molecular structure systems.
3. Energy of molecules. Boltzmann distribution. Population of molecular energy levels.
4. Types of molecular spectroscopy ? electronic, vibrational spectroscopies. Spectral parameters of spectral bands.
5. Molecule as a quantum pendulum. Vibrational energy.
6. IR spectroscopy. Fourier transformation. Raman spectroscopy.
7. Electronic energy. Einstein absorption and emission coefficients.
8. Jabłonski diagram. Energy levels. Radiative and non-radiative processes.
9. Absorption and fluorescence phenomena.
10. Absorption spectroscopy. Lambert-Beer low. Absorption parameters.
11. Fluorescence spectroscopy. Fluorescence parameters.
12. Spectroscopy in polarized light. Linear dichroism. Fluorescence anisotropy
13. Photothermal deactivation spectroscopy. Photoacoustics. Light-induced optoacoustics
14. Applications of molecular systems in modern optoelectronics and photomedicine.
15. Applications of molecular systems in environmental protection.

Introductory courses and the required pre-knowledge:

Basic knowledge in atomic physics and in quantum mechanics

Courses form and teaching methods:

Lectures illustrated with Power Point presentations

Form and terms of complete the course - requirements and assessment methods:

Written test and/or oral examination

Basic Bibliography:

1. H. Haken, H. C. Wolf , Molecular Physics and Elements of Quantum Chemistry, Introduction to Experiments and Theory, Springer, 2004
2. P. Suppan, Chemistry and Light, The Royal Society of Chemistry, 1994.

Additional Bibliography: