KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Principles and applications of fluorescence spectroscopy	13.3.1222

Name of unit administrating study

Faculty of Chemistry

Studies

faculty	field of study		
Wydział Chemii	Biznes chemiczny	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie
Wydział Chemii	Ochrona środowiska	type	drugiego stopnia
		form	stacjonarne
		specialty	wszystkie
		specialization	wszystkie

Teaching staff

dr inż. Krzysztof Żamojć

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes, Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 15 hours, Laboratory classes: 15 hours

ECTS credits

4
classes - 30 h
tutorial classes - 30 h
student's own work - 40 h
TOTAL: 100 h - 4 ECTS

The academic cycle

2024/2025 winter semester

Type of course

an elective course

Language of instruction

English

Teaching methods

- Lecture with the use of the multimedia presentation on fluorescence spectroscopy;
- Practical laboratory work – chemical experiments, analysis of obtained results and discussion

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- ssignment work – conducting research and presenting results
- written exam (test)

The basic criteria for evaluation

	Lecture: a positive note from an exam with approximately 30 closed questions: 91-100%: 5.0 81-90%: 4.5 71-80%: 4.0 61-70%: 3.5 51-60%: 3.0 < 51%: 2.0 Laboratory classes: a positive note from all short tests and reports; final note is an average from notes from tests and reports: 91-100%: 5.0 81-90%: 4.5 71-80%: 4.0 61-70%: 3.5 51-60%: 3.0 < 51%: 2.0

Method of verifying required learning outcomes

The method of verifying the acquisition of knowledge:
Written exam in the field of fluorescence spectroscopy. During the lecture and laboratory exercises, the student solves problems in writing (short tests, reports) or oral (oral answer) in the field of fluorescence spectroscopy.
The method of verifying the acquisition of skills:
Assessment of the student's involvement in discussions on the issues related to the subject. Assessment of independent conducting of chemical experiments by the student. Assessment of the Student's explanation of the course of chemical experiments, assessment of the correctness of the analysis of the results, drawing conclusions from the experiments and preparation of reports.
The method of verifying the acquisition of social competences:
Assessment of the student's ability to solve scientific and research problems on the basis of individual and team work.

Required courses and introductory requirements

A. Formal requirements

lack

B. Prerequisites

lack

Aims of education

Familiarize students with the basic and more advanced aspects of fluorescence spectroscopy.
Familiarize students with the use of spectrofluorometer.

Course contents

Topics of the lecture: absorption of the light; ground and excited states; types of electronic transitions; absorption, excitation, and emission spectra; photophysical processes in the excited state; fluorescence quenching; the studies of the mechanisms of reactions - qualitative and quantitative methods; instrumentation.
Topics of laboratory classes: spectrofluorometer operation; basic definitions and laws related with fluorescence spectroscopy; the studies of the mechanisms of fluorescence quenching; determination of aggregation number, cmc and hydrophobicity of the surfactants' micelles with the use of steady-state fluorescence emission spectra; the studies of the influence of various factors on the fluorescence emission spectra; determination of the stoichiometry and association constants of complexes.

Bibliography of literature

Extracurricular readings
J.R. Lakowicz – Principles of fluorescence spectroscopy
B. Valeur – Molecular fluorescence

The learning outcomes (for the field of study and specialization)	Knowledge
Chemical Business: K_BChII_W06 knows and understands tasks in the field of chemistry, environmental protection and economics that are the subject of human activity to a degree that allows independent work on a research, scientific and measurement position K_BChII_U04 is able to independently plan and perform specific research	Students: know and interpret main photophysical processes in ground and excited states as well as basic definitions and laws related with fluorescence spectroscopy; define types of electronic transitions; know differences and similarities between absorption, excitation and emission spectra; know the definitions and main mechanisms of fluorescence quenching; know main qualitative and quantitative methods of the studies of mechanisms or reactions; know the build of spectrofluorometer; define various factors which have an influence on the fluorescence emission spectra.

tasks in the field or in the laboratory, interpret their results working individually or in a team, assuming various roles and functions in it
K_BChII_K04
is willing to properly assess the acquired knowledge, respect it and disseminate it in order to solve specific cognitive and practical issues
Chemistry:
K_W01
uses in-depth knowledge of spectroscopic methods of chemical compound analysis
K_U01
plans and implements chemical experiments of extended complexity
K_U02
critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors
K_U04
applies acquired knowledge of chemistry and related scientific disciplines
K_K02
works in a team taking on various roles in it
Environmental Protection:
K_OŚII_W09
applies safety and hygiene principles when working independently on a test or measurement stand in a laboratory or in the field
K_OŚII_U07
has advanced skills in presenting the results of their own research, discussions based on literature data and public speaking, including leading a debate
K_OŚII_K02
recognises threats, creates safe work conditions and is responsible for the safety of own and other people's work
K_OŚII_K07
is willing to undertake individual and team activity; to professionally plan and organise its course and set priorities for their actions

Skills

Students: present plainly – in both speech and writing – correct chemical argumentation, interpret and analyze information connected with fluorescence spectroscopy presented as text, tables, plots, schemes, figures, can use spectrofluorometer, can experimentally determine the mechanism of fluorescence quenching, aggregation number, cmc and hydrophobicity of the surfactants' micelles, can determine the influence of various factors on the fluorescence emission spectra as well as the stoichiometry and association constants of complexes, interpret information, formulate conclusions and explain opinions.

Social competence

Students: understand need for learning, inspire other for learning; cooperate in group, taking different roles; exhibit creativity in determination of priorities necessary for realization of different tasks; understand social aspects of practical use of knowledge and abilities as well as connected with them responsibility.

Contact

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