UNIWERSYTET GDAŃSKI

Course title
Light induced reactions and processes

ECTS code

Name of unit administrating study
Faculty

Studies

Field of study	Type	Form	
Chemistry	Master Degree	Full-time studies	

Teaching staff
dr inż. Beata Bajorowicz, dr inż. Anna Malankowska, dr inż. Aleksandra Pieczyńska, prof. dr hab. inż. Adriana Zaleska-Medynska

Forms of classes, the realization and number of hours:
Lecture (15 h)
Laboratory (30 h)

A. Forms of classes, in accordance with the UG Rector's regulations

B. The realization of activities

C. Number of hours

ECTS credits 3

The academic cycle

Type of course
Facultative

Language of instruction
English

Teaching methods

Experiments designing
Experiments conducting
Lecture with multimedia presentation

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

A. Final evaluation, in accordance with the UG study regulations

B. Assessment methods
Lecture: written exam
Laboratory exercise: conducting experiments, report preparation (in the form of poster and oral poster presentation)

C. The basic criteria for evaluation or exam requirements
Lecture:

- positive grade from the written exam covering the subjects mentioned in the lecture program; the grade scale according to the UG Study Regulatory;

Laboratory exercises:

- Presence in the laboratory classes and practical conducting of experiments in accordance with the instructions
- Positive evaluation of the report on laboratory experiments (in the form of poster and oral poster presentation)

Required courses and introductory requirements
Knowledge of the principles of general chemistry , math, principles of the inorganic chemistry, organic chemistry and analytical chemistry

Aims of education

- To gain knowledge in the field of light induced reactions and processes
- To gain knowledge in the field of photocatalysts preparation
- To gain knowledge in the field of the criteria of photochemical process concept design
- To develop ability to characterize materials possessing photocatalytic properties

Course contents

A. Lecture

Fundamentals of semiconductor-based photocatalysis. Application of semiconductor photocatalysis in synthesis of organic compounds. Photodynamic therapy. Photoelectrocatalysis in energy generation: photoelectrocatalytic CO_2 conversion and photoelectrocatalytic hydrogen generation. Perovskite based solar cells.

B. Laboratory

Design of novel photocatalyst: theoretical design of new photocatalyst for transformation of low value chemical in valuable chemical compounds (based on literature review), followed by experimental synthesis of designed photocatalyst, its characterization (UV-Vis spectroscopy, PL spectroscopy, Raman spectroscopy, FTIR spectroscopy and SEM imaging) and photoactivity measurements. Laboratory will be realized in the form of individual work of each student with tutor (from design of the photocatalyst to preparation and full characterization). Final results will be prepared in the form of poster presentation and will be presented at final poster presentation.

Bibliography of literature

A. Literature required to pass the course

B. Extracurricular readings

Knowledge

1. Explaining and characterizing selected photochemical reaction and processes
2. Classifying operation units
3. Characterizing the most important devices and apparatus used in photochemical processes (photoreactors, photoelectrochemical cells, etc.)

Skills

1. Determine the criteria of photocatalysts process design
2. Design the preparation and characterization of new materials
3. Construct of process flow diagram for photocatalytic material preparation
4. Analyze experimental results

Social competence

1. Student understands the concept of modern materials process design
2. Student is aware of the value and responsibility for his/her own work results
3. Student understand the needs of future education
4. Student demonstrates creativity in individual and teamwork and keeps open to the suggestions of the teacher and other team members