

SYLLABUS

Name: Modern pyrotechnics (WTCCXCSE-MP)

Name in Polish:

Name in English:

Information on course:

Course offered by department: Faculty of Advanced Technologies and Chemistry

Course for department: Faculty of Advanced Technologies and Chemistry

Term: Winter semester 2024/2025 Year

Cordinator of course edition: dr inż. Mateusz Szala

Default type of course examination report:

Exam

Language:

English

Short description:

1. Introduction to modern pyrotechnics,
2. High-nitrogen compounds in pyrotechnics,
3. UV and IR screening smokes,
4. Advanced composite propellants,
5. Test methods for pyrotechnics,

Description:

1. Materials and compounds in modern pyrotechnics,
2. Copper and strontium salt of aminotetrazole derivatives,
3. Preparation of white and black IR-screening smoke,
4. Making of composite propellant with NQ and/or TAGAZ,
5. Sound level, combustion velocity and IR-screening measurement,
6. New ideas in modern pyrotechnics,
7. New fuels and new oxidizers in modern pyrotechnics,
8. High-nitrogen compounds in pyrotechnics,
9. UV and IR active pyrotechnic mixtures,
10. Composite propellants with high-nitrogen compounds,

Bibliography:

Podstawowa:

1. H. Ellern, Military and Civilian Pyrotechnics, CPC, New York 1968.
2. R. Cheret, Detonation of condensed explosives, Springer-Verlag, New York 1993.
3. J. Sabatini et al., High-nitrogen-based pyrotechnics: development of perchlorate-free green-light illuminants for military and civilian applications, Chem. Asian J. 2012, 7, p.1657.
4. R. Shortridge et al. Elimination of perchlorate oxidizers from pyrotechnic flare compositions, Final Report, SERD, 2007.

Uzupełniająca:

1. N. Kubota, Propellants and Explosives, Wiley-VC, New York 2002
2. A. A. Szydłowski, Podstawy pirotechniki, Wydawnictwo MON, Warszawa 1957
3. J. P. Agrawal, High-energy Materials, Wiley-VCH, New York 2010

Learning outcomes:

K_W01 - global scientific and technological achievements covering theoretical foundations and general issues and selected issues detailed - appropriate for a given scientific discipline

K_U01 - development trends in a scientific discipline

K_U01 - obtain necessary information related to the conducted research, using sources, including English-language ones

K_U01 - independent research expanding existing scientific and creative achievements

Assessment methods and assessment criteria:

The condition for passing the subject is to receive a positive grade from the colloquium (in the form of a multiple choice test) and to pass the test questions concern knowledge provided during lectures and acquired independently by the student during the study of the lecture topics.

The test contains 10 questions with four assigned answers. The student's task is to indicate the correct answers. For indicating each correct answer, the student receives 1 point, for indicating an incorrect answer - zero. The maximum number of points for the test is 10. Grades: 5 points - satisfactory, 6 points - satisfactory +, 7 points - good, 8 points - good+, 9-10 points - very good.

The achievement of the W1 and W2 effects is verified during the colloquium on lectures and activity during classes.

The achievement of the U1 effects is checked during seminars, based on the implementation of assigned tasks and as a result of the assessment of the reports prepared.

A very good grade is given to a student who has acquired the knowledge, skills and competences provided for by the learning outcomes to a very good

degree, and in addition demonstrates interest in the subject, approaches the assigned tasks in a creative way and demonstrates independence in acquiring knowledge. Demonstrates perseverance and independence in overcoming difficulties and systematic work.

A good grade is given to a student who has acquired the knowledge and skills provided for by the learning outcomes to a good degree. Is able to solve tasks and problems of medium difficulty.

A satisfactory grade is given to a student who has acquired the knowledge and skills provided for by the learning outcomes to a sufficient degree.

Independently solves tasks and problems of low difficulty. There are noticeable gaps in his knowledge and skills, which he is able to fill under the guidance of a teacher.

A failing grade is given to a student who has not acquired the knowledge, skills and competences within the scope of the necessary requirements.

The final grade for the subject consists of: the grade from the colloquium, grades from the seminars and the student's commitment and approach to learning.
Practical placement:
There are no internships planned for this subject
Form of study
LLP Erasmus
Introductory subjects
General chemistry Inorganic chemistry
Programs
General Education Content Group
Form of course / number of hours / final requirement
Lecture: 20h + Laboratory: 20h +
Author
dr Mateusz Szala
ECTS balance
1. Participation in lectures 20 2. Participation in laboratories 24 3. Independent study of lecture topics 15 4. Independent preparation for the laboratory 10 5. Preparation for the exam 5 Total student workload: 54 / 2 Tasks with the participation of teachers: 24 / 2 Tasks related to scientific activity: 54 / 4.0 ECTS points
Information on course edition:
Default type of course examination report:
Exam
Bibliography:
<i>missing bibliography in English</i>