SYLLABUS

Name: ***Hazardous materials detection technologies (WTCCXCSM-HMDT)***
Name in Polish:
Name in English: ***Hazardous materials detection technologies***

Information on course:

Course offered by department: Faculty of Advanced Technologies and Chemistry
Course for department: Faculty of Advanced Technologies and Chemistry
Term: Summer semester 2024/2025 Year
Cordinator of course edition: dr inż. Edyta Budzyńska

Default type of course examination report:

Graded pass

Language:

English

Course homepage:

http://www.wtc.wat.edu.pl

Short description:

The objectives of the course is: to provide an introduction into the field of hazardous materials, to introduce the problems related to air monitoring, to familiarize students with various sampling and detection technologies for hazardous materials, to teach how to take a sample containing trace amounts of hazardous substances and analyse it, to teach how to prepare analytical reports.

Description:

LECTURES
1. Properties of hazardous materials and specifics of their analysis / 2-hour
2. Sampling and preparation for detection and identification of trace amounts of substances / 4 hours
3. Laboratory analysis of samples containing dangerous substances / 4 hours
4. Detection and determination of substances using field instruments / 4 hours

LABORATORIES
Students perform laboratory exercises on:
1. Laboratory analysis of samples containing traces of hazardous substances (chemical warfare agents) / 4 hours
2. Operation and applications of portable detection devices / 4 hours

SEMINARS
During the seminars, the following topics will be considered:
1. Techniques used in the analysis of hazardous substances / 4 hours
2. On-site analysis of trace amounts of hazardous substances / 4 hours

Bibliography:

Basic literature:
1. Hazardous Materials Air Monitoring and Detection Devices, Chris Hawley, Delmar/Thomson Learning, 2002 - 134, sygn. III-18299/TWB. 35
2. Field Detection Technologies for Explosives, Yin Sun, ILM Publications, 2010, 69492.
Supplementary literature :
3. Detection Technologies for Chemical Warfare Agents and Toxic Vapors, Yin Sun, Kwok Y. Ong; CRC Press, 2005
4. Hazardous Materials Characterization: Evaluation Methods, Procedures, and Considerations; Donald A. Shafer, Wiley 2005
5. Emergency Characterization of Unknown Materials; Rick Houghton; Taylor & Francis, 2007.

Learning outcomes:

W1/Has well-established and extended knowledge of the chosen specialty./K_W02
W2/Has the computer science and chemistry knowledge to effectively use commercial chemical packages and scientific information databases./K_W07.
W3/Has extended knowledge in the field of analytical chemistry, allowing theoretical justification of the choice of analytical method and determination of the chemical composition of substances or their mixtures./K_W11
W4/Knows classical and instrumental analytical methods, their analytical capabilities, and theoretical basis. Knows ways of checking the reliability of results from quantitative chemical analysis and statistical methods for evaluating the study results. Knows the tendencies development of analytical equipment./K_W12
U1/Can plan and perform experimental tests or observations in a chemical laboratory using occupational health and safety principles, safe handling of chemicals, and selection and disposal of chemical waste K_U03.
U2/Can use research and scientific equipment to analyze mixtures and environmental samples./K_U06
U3/Can find the necessary information in professional literature, databases, and other sources, knows essential scientific journals in the field of chemistry and can assess the reliability of the information obtained K_U10.
U4/Can interact with others in teamwork and take a leading role in teams./K_U16
K1/Recognizes the importance of knowledge in problem-solving cognitive and practical and expert consultation in case of difficulty solving the problem yourself. Can critically evaluate the content received./K_K01
K2/Is ready to fulfill social obligations, inspiring and organizing activities for the benefit of the environment and initiating action for the use of public interest./K_K02
K3/Understands the social aspects of the practical application of acquired knowledge and skills (especially in business) and the related responsibility./K_K04

Assessment methods and assessment criteria:

Students will be assessed based on their participation in the exercises, seminars, and written colloquium.
All laboratory exercises must be completed successfully to qualify for the written colloquium.
The learning objectives W1, W2, W3, W4 and skills U1, U2, U3, and U4 are assessed during written colloquium and laboratories.
The purpose of K1, K2, and K3 is assessed during seminars.

Practical placement:

not applicable

Mode of study

full-time studies

Form of study

second-cycle studies

Course

elective

Introductory subjects

1. General and inorganic chemistry – Knowledge of basic chemical laws
2. Organic chemistry – Knowledge of the basic properties of organic compounds and chemical reactions
3. Analytical chemistry and instrumental analysis – Knowledge of basic analytical techniques
4. Chemical sensors – General knowledge of converting a "chemical" signal into an electrical signal
5. Nuclear chemistry

Programs

Chemistry

Form of course / number of hours / final requirement

lectures - 14 hours / grade passing
laboratories - 8 hours / passing
seminars - 8 hours / passing

Author

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ECTS balance

Activity/ hours
1. Participation in lectures / 14
2. Self-study of lectures / 14
3. Participation in laboratories / 8
4. Self-preparation for laboratories / 14
5. Participation in seminars / 8
6. Participation in the consultation / 2
Hours/ECTS
Total student workload: 60/2
Classes with teachers: 32/1
Classes related to scientific work: 60/2

Information on course edition:

Default type of course examination report:

Graded pass

Bibliography:

missing bibliography in English