

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND  
TECHNOLOGY**

**SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE:**  
prof. dr hab. inż. Katarzyna Chojnacka, dr inż. Małgorzata Mironiuk  
**DEPARTMENT: Chemical Department**  
**SCIENTIFIC DISCIPLINE: Chemical Engineering**

**COURSE CARD**

**Course name in Polish:** Praktyczne aspekty funkcjonowania akredytowanego laboratorium badawczego  
**Course name in English:** Practical aspects of accredited activity of testing laboratory

**Course language Polish / English\***

**University-wide general course type\*: Yes/ No**

**1) ~~basic course~~**

**2) ~~specialist course~~**

**3) ~~seminar~~**

**4) ~~humanistic course~~**

**5) ~~language~~**

**Subject code: CIQ100101W**

\* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30			
Grading	Exam, inspection, evaluation classes	Exam	Oral presentation	

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of basic issues related to management systems
2. Basic knowledge of analytical chemistry
3. Knowledge of basic chemical calculations (conversion of concentrations, etc.)

**COURSE OBJECTIVES**

- C1 To acquaint PhD students with the accreditation system of testing laboratories in Poland and with the basic requirements of the PN-EN ISO 17025 accreditation standard
- C2 Showing the practical aspects of an accredited testing laboratory
- C3 Acquaint the PhD student with modern methods of analysis using modern measurement equipment
- C4. Acquaint the PhD student with the methods of ensuring the quality of tests and obtaining reliable, reliable and useful test results
- C5. Preparation of a PhD student for work in the PN-EN ISO 17025 management system

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**PROGRAM CONTENTS**

<b>Form of classes – mixed forms (mix)</b>		<b>Number of hours</b>
Mix1	<b>Lecture</b> - introduction to issues related to the management system by PN-EN ISO 17025, discussion of the accreditation system in Poland, operating principles of the testing laboratory in the accreditation system (conducting arrangements with the client; validation of research methods, sampling and preparation of test samples; quality control tests; measurements traceability, certified reference materials, proficiency testing and interlaboratory comparisons; internal audits)	4
Mix2	<b>Practical classes in the laboratory</b> - collection and preparation of samples for testing; sample digestion using microwaves; ICP-OES technique - calibration, sample preparation, qualitative and quantitative analysis; AAS method with amalgamation technique - sample preparation, quantitative analysis; elemental analysis method - sample preparation, calculation of daily correction factor, quantitative analysis of C and N; titration methods for the determination of nitrogen content - sample preparation, quantitative analysis.	24
Mix3	<b>Reporting Session</b> - presentation and interpretation of the test results obtained during practical classes	2
<b>Total hours</b>		<b>30</b>

**TEACHING TOOLS USED**

- N1. Lecture with multimedia presentation  
 N2. Scientific discussion  
 N3. Classes in the testing laboratory (performing tests)

**ACHIEVED SUBJECT LEARNING OUTCOMES**

Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	Exam
Skills	P8S_UW	Report in the form of a multimedia presentation, observation and evaluation of work during classes
Skills	P8S_UO	
Skills	P8S_UK	
Social competence	P8U_K	Report in the form of multimedia presentations, group work
Social competence	P8S_KK	
Social competence	P8S_KR	

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**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

- [1] Szczepaniak W. Metody instrumentalne w analizie chemicznej, PWN, Warszawa, 1996.
- [2] Cygański A. Chemiczne metody analizy ilościowej. Wydawnictwo WNT, Warszawa 2013
- [3] Namieśnik J., Łukasiak J., Jamrógiewicz Z.: Pobieranie próbek środowiskowych do analizy. Wydawnictwo Naukowe PWN, Warszawa 1995;
- [4] Namieśnik J., Jamrógiewicz Z., Pilarczyk M., Torres L.: Przygotowanie próbek środowiskowych do analizy. WNT, Warszawa 2000;
- [5] Bulska E., Metrologia Chemiczna Sztuka Prowadzenia Pomiarów. Wydawnictwo Malamut, Warszawa 2008
- [6] Dokumenty Polskiego centrum Akredytacji: DA-01, DA-02, DA-05, DA-06, DA-08, DAB-07 /available online/

**SECONDARY LITERATURE:**

- [1] Scientific and technical journals
- [2] Minczewski J., Marczenko Z. Chemia Analityczna, PWN, Warszawa, 1997, t:1-3;

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

**prof. dr hab. inż. Katarzyna Chojnacka**  
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