

<b>Course title</b> Analiza instrumentalna/Instrumental analysis		<b>ECTS code</b> 13.3.0412	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemistry	Master	Full-time studies	
<b>Teaching staff</b> Dr hab. Grzegorz Romanowski			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>A. Forms of classes, in accordance with the UG Rector’s regulations</b> lecture, audytorium classes, laboratory classes		classes 75 h tutorial classes 15 h student’s own work 85 h TOTAL: 175 h - 7 ECTS	
<b>B. The realization of activities</b> In-class learning			
<b>C. Number of hours</b> lecture 30 h, audytorium classes 15 h, laboratory classes 30 h			
<b>The academic cycle</b> First year, winter semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish and english	
<b>Teaching methods</b>  Lectures including multimodal presentation  Laboratory experiments  Case studies		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> Course completion (with a grade), exam	
		<b>B. Assessment methods</b>  the final grade is based on partial grades received during the semester, performance of final essay – conducting research and presentation of thier results, test	
		<b>C. The basic criteria for evaluation</b>  • obtaining 51% of points from the written exam consisting of 10-15 open questions covering the issues listed in the lecture program content, • passing two accounting colloquia, i.e. obtaining 51% of points for each, including electroanalytical, spectroscopic and chromatographic methods, each colloquim can be corrected once, • positive assessment (51% of points) for each of the laboratory test covering the subject of the experiments performed as part of the laboratory exercises, the performance of the experimental part covered by the program of classes and the development of results obtained in the experimental part (report).	
<b>Required courses and introductory requirements</b> completed analytical chemistry course			

knowledge of chemical methods of qualitative and quantitative analysis

#### **Aims of education**

- acquainting students with the principles of electroanalytical, spectroscopic and chromatographic methods as well as stages of the analytical process,
- developing skills in basic instrumental analyzes and their statistical evaluation,
- developing the skills of solving problems by yourself during chemical analysis

#### **Course contents**

##### **A. Lecture:**

Stages of the analytical process, methods of analytical measurement, development of results and their statistical assessment, spectroscopic methods (molecular spectroscopy: UV-Vis, IR, NIR; atomic spectroscopy), chromatographic methods (gas chromatography, high performance liquid chromatography, planar chromatography), electroanalytical methods (potentiometry, conductometry, coulometry, polarography, voltammetry, amperometric titration)

##### **B. Seminar:**

Chemical calculations using absolute and comparative methods of analytical measurement in the field of spectroscopic, chromatographic and electroanalytical methods.

##### **C. Laboratory:**

Basics of laboratory work with apparatus, performing determinations and chemical analyzes related to spectroscopic methods (UV-Vis spectroscopy), chromatographic methods (gas chromatography) and electroanalytical methods (potentiometry, conductometry, coulometry, polarography, voltammetry, amperometric titration).

#### **Bibliography of literature**

##### **Literature required to pass the course**

##### **A. Literature required to pass the course:**

###### **A.1. Literature used during classes**

- W. Szczepaniak – Metody instrumentalne w analizie chemicznej, PWN, Warszawa
- A. Cygański – Metody spektroskopowe w chemii analitycznej, WNT, Warszawa
- A. Cygański – Podstawy metod elektroanalitycznych, WNT, Warszawa

###### **A.2. Literature for individual studies**

- G.W. Ewing – Metody instrumentalne w analizie chemicznej, PWN, Warszawa
- J. Minczewski, Z. Marczenko – Chemia analityczna – t. III – Analiza instrumentalna, PWN, Warszawa

## **B. Extracurricular readings**

- D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch – Podstawy chemii analitycznej, PWN, Warszawa
- J. Garaj – Fizyczne i fizykochemiczne metody analizy, WNT, Warszawa

## **Knowledge**

1. Defines the basic laws in electroanalytical, spectroscopic and chromatographic methods.
2. Describes the construction and operation of the apparatus used in the above methods.
3. Selects the analytical method for a specific sample.
4. Explains the principles of sample preparation for analysis.
5. Explains the principles of analysis using various instrumental techniques.
6. Recognizes the limitations of using each method.

## **Skills**

1. Uses basic formulas to calculate the amount of analyte.
2. Carries out the measurement in accordance with the exercise instructions.
3. Interprets the results in qualitative and quantitative aspects along with their statistical processing.
4. Recognizes and operates the apparatus used in the analytical laboratory.

## **Social competence**

1. Is aware of the financial conditions of the selected instrumental method.
2. Demonstrates an active attitude in the face of an analytical problem.
3. Demonstrates the ability to critically assess the analysis and results obtained.
4. Takes care of the apparatus and environment used (utilization of chemical waste water).