


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
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 Społecznego

UNIA EUROPEJSKA
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Course title		ECTS code	
Electroanalytical methods		13.3.0468	
Name of unit administrating study			
Faculty of Chemistry			
Studies			
faculty	field of study	type	pierwszego stopnia
Wydział Chemii	Chemia	form	stacjonarne
		specjalty	analityka i diagnostyka chemiczna
		specialization	wszystkie
Teaching staff			
prof. dr hab. inż. Tadeusz Ossowski; dr Anna Wcisło; mgr Elżbieta Adamska; dr Iwona Dąbkowska			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		6	
Laboratory classes, Lecture		classes - 75 h	
The realization of activities		tutorial classes – 10 h	
classroom instruction		student's own work – 65 h	
Number of hours		Total: 150 h - 6 ECTS	
Lecture: 30 hours, Laboratory classes: 45 hours			
The academic cycle			
2023/2024 summer semester			
Type of course		Language of instruction	
obligatory		polish	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
<ul style="list-style-type: none"> - Laboratory exercises: performing planned experiments, analyzing the results of experiments combined with discussion - multimedia-based lecture 		Final evaluation	
		<ul style="list-style-type: none"> - Graded credit - Examination 	
		Assessment methods	
		<ul style="list-style-type: none"> - Laboratory exercises: determination of the final grade based on five partial grades obtained during the semester (50%), work efficiency in the laboratory, reports on experiments (30%) and calculation test (20%). - written exam with open questions - written exam (test) 	
		The basic criteria for evaluation	
		<ul style="list-style-type: none"> • getting 51% of points from the written exam consisting of 5-15 open questions and 10-40 test questions covering issues mentioned in the lecture's program content. • Laboratory exercises: determination of the final grade on the basis of partial grades received during the semester (50%), work efficiency in the laboratory (development of results obtained in the experimental part in the form of report, application of safety and health at work in the electroanalytical laboratory.) (30%) and calculation test (20%). 	
Method of verifying required learning outcomes			
Required courses and introductory requirements			
A. Formal requirements			
completed course in general chemistry, analytical chemistry			

B. Prerequisites knowledge of the basics of general and analytical chemistry, ability to write equations of oxidation-reduction reactions, knowledge of the principles of work and safety in a chemical laboratory	
Aims of education A. Formal requirements: completed course in general chemistry, analytical chemistry B. Prerequisites: knowledge of the basics of general and analytical chemistry, ability to write equations of oxidation-reduction reactions, knowledge of working principles and safety in a chemical laboratory	
Course contents A. Lecture topics: Theoretical foundations of electroanalytical methods, types of measurement techniques. Potentiometry: pH-metric electrodes, measuring principles in the water environment, measuring apparatus. Conductometry: principles and measuring apparatus, probes and measuring cells, conductivity models, practical applications for analytical purposes. Electrogravimetry: classical, internal and controlled potential, electrolysis in qualitative and quantitative analysis. Voltamperometric and polarographic measurement techniques in chemical analysis: cyclic and linear voltammetry, coulometry. Voltammetric stripping in chemical analysis. B. Laboratory topics: Potentiometric measurements: types of electrodes, ion-selective electrodes, measurement techniques. pH-metric measurements. Calibration of a combined electrode and multi-proton acid titration, Electrogravimetry: measurement methods, micro and macro analysis of components. Electrolytic determination of copper and nickel in solution. Conductometric determination of complex mixtures. Voltammetric methods: experimental methods, principles of measuring, system construction, techniques and measurement methods, reversibility of the electrode process. Determination of ascorbic acid content by cyclic voltammetry. Electrochemical concentration (stripping) methods in the analysis: concentration methodology, amalgams. The influence of voltammetric stripper parameters on the peak current. Titration analysis. Automation and computerization of electrochemical methods. Assessment of the usefulness of a given electrochemical method in the context of the purpose and scope of the analysis. Acquiring the skills of selection, servicing of apparatus and appropriate electroanalytical techniques to perform a specific electroanalytical determination. Learning to obtain electrochemical data, assess their accuracy. Evaluation of the precision of the markings.	
Bibliography of literature Literature required to pass the course 1. Cygański – Podstawy metod elektroanalitycznych, WNT, Warszawa 2. Z. Galus – Elektrochemiczne metody wyznaczania stałych fizykochemicznych, PWN, Warszawa 3. J. Garaj – Fizyczne i fizykochemiczne metody analizy, WNT, Warszawa A.2. studiowana samodzielnie przez studenta 1. W. Szczepaniak – Metody instrumentalne w analizie chemicznej, PWN, Warszawa 2. J. Minczewski – Chemia analityczna – t. III, PWN, Warszawa 3. Z. Galus – Teoretyczne podstawy elektroanalizy chemicznej, PWN, Warszawa 4. A. Kisza – Elektrochemia – cz. I i II, WNT, Warszawa 5. L. Sobczyk, A. Kisza, K. Gatner, A. Koll – Eksperymentalna chemia fizyczna, PWN, Warszawa B. Literatura uzupełniająca: 1. K. Kraman – Zastosowania elektrod jonoselektywnych, WNT, Warszawa	
The learning outcomes (for the field of study and specialization)	Knowledge 1. Defines basic terms in electrochemical analysis. 2. Describes and classifies types of electrochemical methods and their applications. 3. Lists and defines types of electrodes. 4. Defines the electrode processes and presents their mechanisms. 5. Explains the methods of measurement of basic electrochemical quantities. 6. Describes the construction and operation of electrochemical devices, eg. potentiostat, conductometer, laboratory power supply, galvanostat
	Skills 1. Uses appropriate electroanalytical techniques to solve a given analysis problem. 2. Selects electrodes and uses them in electrochemical analysis. 3. Interprets the measurement results obtained during electrochemical analysis. 4. Prepares the results of the analysis in the form of a report containing a description of the experiment, calculations and interpretation of the data. 5. Illustrates and analyzes the course of titrations made with electroanalytic methods. 6. Analyzes the composition of the solution based on electroanalytical techniques. 7. Organizes the workplace in accordance with the principles of health and safety at the electroanalytical laboratory
	Social competence

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| | <ol style="list-style-type: none">1. Improves skills in the use of electrochemical devices.2. Effectively communicates in a group and uses the experience of other people.3. Is guided by the principle of saving materials and resources. |
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Contact

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