

Course code:

Plan position:

A. INFORMATION ABOUT THE COURSE

B. Basic information

Name of course	<i>Modern analytical techniques</i>
Field of studies	Chemical Technology
Level of studies	First degree
Profile of studies	General academic
Form of studies	Stationary
Specialty	Chemical and food analytics
Unit responsible for the field of studies	Faculty of Chemical Technology and Engineering
Name and academic degree of teacher(s)	Łukasz Dąbrowski, PhD, Terese Rauckyte-Żak, PhD
Introductory courses	Background of chemistry and physics from secondary school and basic knowledge of algebra
Introductory requirements	Course of General Chemistry

C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
winter	15		30				6

2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
KNOWLEDGE			
W1	Has knowledge of selected techniques for the characterisation and determination of chemical compounds and is familiar with contemporary trends in analytical techniques.	ACS_O1_K_W06	P6S_WG P6S_WG_inż
W2	Knows the basic techniques and tools used in solving simple engineering tasks related to chemical and food analysis.	ACS_O1_K_W08	P6S_WG P6S_WG_inż
SKILLS			
U1	Be able to prepare a study on instrument calibration and evaluation of results obtained using selected analytical techniques.	ACS_O1_K_U03	P6S_UK P6S_UW_inż P6S_UW
U2	Able to work individually and as part of a team in an analytical laboratory.	ACS_O1_K_U04	P6S_UO

U3	Be able to use computer programmes to support tasks typical of chemical analytics.	ACS_O1_K_U07	P6S_UW_inz P6S_UW
U4	Be able to distinguish between types of chemical reactions and have the ability to select them for analytical methods of quantitative and qualitative determination of chemical compounds and be able to use basic modern laboratory techniques.	ACS_O1_K_U12	P6S_UO P6S_UW_inz P6S_UW
SOCIAL COMPETENCES			
K1	He/she is aware of the responsibility for collaborative tasks associated with teamwork in the analytical laboratory.	ACS_O1_K_K04	P6S_KK P6S_KO

3. TEACHING METHODS

A. Traditional methods used ***

Multimedia lecture, laboratory exercises, demonstration.

B. Distance learning methods used ***

Synchronous method (classes conducted in a way that ensures direct interaction between the student and the teacher in real time, enabling immediate flow of information, the method can be used only if it is provided for in the study plan for a given cycle of education):
e.g. remote lecture in the form of videoconference, remote discussion, etc.

Asynchronous method used as an auxiliary (a method that does not ensure direct interaction between the student and the teacher in real time, used only as an auxiliary / complementary method):
e.g. online educational videos, online multimedia presentations, etc.

4. METHODS OF EXAMINATION

Written pass of lectures, reports of laboratory classes

5. SCOPE

Lectures	Concept and development trends in modern analytical techniques. Basic concepts: method, methodology, analytical techniques. Automation and miniaturisation possibilities of selected analytical techniques (gravimetric, volumetric, etc.). Portable devices. Overview, sampling, evaluation of physical properties, and thermal analysis. Spectroscopic methods. Chromatographic methods. Electrophoretic and electrochemical methods. Combination methods, unique detectors, and problem solving. Applications that illustrate the use of the methods.
Laboratories	Operation and calibration of basic equipment in the laboratory for the implementation of selected analytical techniques: e.g. electronic burettes, electronic laboratory balances, as well as ancillary equipment such as automatic pipettes, bottle dispensers, solvent evaporation equipment, etc. Application of the robotic arm in the analytical laboratory. Statistical processing and interpretation of results and their graphical representation. Exercises are chosen by the teacher, the exercises relate to the topics discussed in the lectures.

6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Form of assessment					
	Oral examination	Written pass	Colloquium	Project	Presentation	Report
W1		x				
W2		x				
U1						x
U2						x
U3						x
U4						x
K1						x

7. LITERATURE

Basic literature	<ol style="list-style-type: none"> Jarosz M. (red.), 2006, Nowoczesne techniki analityczne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa Namieśnik J. Chrzanowski W., Szpinek P. (red.), 2003, Nowe horyzonty i wyzwania w analityce i monitoringu środowiskowym CEEAM, Politechnika Gdańska, Gdańsk Minczewski J., Marczenko Z., 2011, Chemia analityczna, PWN, Warszawa
Supplementary literature	<ol style="list-style-type: none"> Gallagher S.R. (ed.), Wiley E.A. (ed.), D., 2008, Current Protocols Essential Laboratory Techniques, John Wiley & Sons, Inc., Hoboken, New Jersey Szczepaniak W., 2008, Metody instrumentalne w analizie chemicznej, Wydawnictwo Naukowe PWN, Warszawa Materials prepared by the teacher, laboratory equipment catalogues

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	45
	Supervision hours	30
Student's own work	Preparation for classes	30
	Reading assignments	20
	Other (preparation for exams, tests, carrying out a project etc)	25
Total student workload		150
Number of ECTS points		6