GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Instrumental Techiques for Food Analysis, PG_00054754		
Field of study	Biotechnology		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Dorota Martysiak-Żurowska	
	Teachers	dr hab. inż. Dorota Martysiak-Żurowska dr inż. Agata Sommer	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	18.0	50

Subject objectives

To familiarize students with instrumental analysis techniques used for food testing and the directions and possibilities of their development. To familiarize students with the possibilities of practical use of advanced instrumental methods in food quality assessment and the principles of selecting the appropriate measurement method.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U01	The student is able to use knowledge of mathematics, physics and chemistry to analyze and interpret measurement results.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment
K6_U09	The student is able to select and practically apply instrumental methods of analysis to examine the properties and quality of food.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
K6_W09	The student has theoretical knowledge and the ability to use advanced instrumental analytical methods to analyze and evaluate food quality.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents	Lecture: Preparation of samples for instrumental analysis - methods of extraction and separation of mixtures. Techniques for separating mixtures in biotechnology. Permeation techniques for separating mixtures. Chromatographic techniques: high-performance gas chromatography (HR-GC), liquid chromatography (HPLC), exclusion, ion exchange, planar and examples of application in biotechnology and food analysis. Capillary electrophoresis and capillary electrochromatography. Spectroscopic and thermal techniques in food analysis. Laboratory: The identification and quantitative determination of the fatty acid composition of the vegetable oils by gas chromatography. Determination of the solid fat content of fats using the pulsed NMR method. Investigation of phase and polymorphic changes and determination of the oxidative stability of edible fats using the DSC. The quantitative determination of trans isomers in hydrogenated fat applying infrared spectrophotometry. Spectrophotometric determination of natural pigments in foods. Analyzing the rheological properties of food using the viscosimetric method.
Prerequisites and co-requisites	Knowledge of the basics of chromatographic, spectroscopic and more important separation methods used in biotechnology. Structure of the main ingredients of food: lipids, fatty acids, proteins, amino acids, carbohydrates.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory: participation in course, theoretical preparation, preparation of a report.	60.0%	60.0%
Lecture: colloquium	60.0%	40.0%

Recommended reading

Basic literature	Szczepaniak W., Metody instrumentalne w analizie chemicznej, PWN 2004, Warszawa Minczewski J., Marczenko Z., Chemia analityczna, tom 3, Analiza instrumentalna, PWN 1985, Warszawa Cygański A., Metody spektroskopowe w chemii analitycznej, WNT 2002, Warszawa. Cygański A., Metody elektroanalityczne, WNT 1995, Warszawa 3.
Supplementary literature	Schultze D. Termiczna Analiza Różnicowa. PWN, Warszawa, 1974.Pawłowicz R., Drozdowski B. Oznaczanie fazy stałej w tłuszczach. Żywność. Nauka. Technologia. Jakość, 2004, 39, 59-68.Praca zbiorowa pod red. Z. E. Sikorskiego. Chemia Żywności. WNT, Warszawa, 2007.
eResources addresses	Adresy na platformie eNauczanie: Techniki instrumentalne w analizie żywności 2023/24 - Moodle ID: 38470 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38470

Example issues/ example questions/ tasks being completed	Extraction into the SPE solid phase (mechanism of analyte separation, types of fillings, stages of SPE analysis, calculation of the degree of preconcentration).Supercritical fluid extraction (SFE) and its use for technical and analytical purposes.Capillary electrophoresis - capillary electrophoresis techniques and its application in food analysis. Determination of the fatty acid composition in fats, high-fat food products and tissue fats using the HR-GC high-performance gas chromatography technique.
Work placement	Not applicable