



Subject card

Subject name and code	Instrumental Techniques for Food Analysis, PG_00054754						
Field of study	Biotechnology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
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 Biotechnology of Food -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Dorota Martysiak-Żurowska				
	Teachers						
Lesson types	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_W09		The student has theoretical knowledge and the ability to use advanced instrumental analytical methods to analyze and evaluate food quality.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K6_U09		The student is able to select and practically apply instrumental methods of analysis to examine the properties and quality of food.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	K6_U01		The student is able to use knowledge of mathematics, physics and chemistry to analyze and interpret measurement results.		[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		

Subject contents	Course content – lecture 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
	Lecture: colloquium	60.0%	40.0%
	Laboratory: participation in course, theoretical preparation, preparation of a report.	60.0%	60.0%
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		
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.		
Practical activites within the subject	Not applicable		

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