



## Subject card

Subject name and code	Instrumental Techniques 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	<p>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.</p> <p>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.</p>											
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	<table border="1" data-bbox="448 546 1487 703"> <thead> <tr> <th data-bbox="448 546 794 584">Subject passing criteria</th> <th data-bbox="794 546 1141 584">Passing threshold</th> <th data-bbox="1141 546 1487 584">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 584 794 663">Laboratory: participation in course, theoretical preparation, preparation of a report.</td> <td data-bbox="794 584 1141 663">60.0%</td> <td data-bbox="1141 584 1487 663">60.0%</td> </tr> <tr> <td data-bbox="448 663 794 703">Lecture: colloquium</td> <td data-bbox="794 663 1141 703">60.0%</td> <td data-bbox="1141 663 1487 703">40.0%</td> </tr> </tbody> </table>			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%
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Example issues/ example questions/ tasks being completed	<p>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.</p> <p>Determination of the fatty acid composition in fats, high-fat food products and tissue fats using the HR-GC high-performance gas chromatography technique.</p>											
Work placement	Not applicable											