

A COURSE SYLLABUS – DOCTORAL SCHOOL

REGARDING THE QUALIFICATION CYCLE FROM 2020 TO 2024 AND FROM 2021 TO 2025

GENERAL INFORMATION ABOUT COURSE				
Course title	Modern instrumental method for food analysis			
Name of the unit running the course	Doctoral School at University of Rzeszów			
Type of course (<i>obligatory, optional</i>)	Compulsory optional (specialist)			
Year and semester of studies	II and III semesters III and V			
Discipline	Food technology and nutrition			
Language of Course	polish			
Name of Course coordinator	Dr hab. Ireneusz Kapusta. Prof. UR			
Name of Course lecturer	Dr hab. Ireneusz Kapusta. Prof. UR			
Prerequisites	General chemistry, Food chemistry, Food analysis			
BRIEF DESCRIPTION OF COURSE (100-200 words)				
<p>The main objective of the course is to learn the chromatographic methods of qualitative and quantitative chemical analysis - the theoretical basis of the methods used and their practical application. The course includes a significant part of the program content of instrumental analysis. Laboratory classes are aimed at familiarizing with the apparatus, using it, as well as independent performance of analyzes and elaboration of results. The effect of education is the acquisition of skills and competencies regarding the selection of methods and equipment to perform a specific analytical determination, acquisition of analytical data, identification of analytes based on the obtained spectra. The methods of preparing samples for analysis and the construction of liquid chromatographs are widely discussed. Differences in the chemical structure of the analyzed compounds and the possibility of their determination are discussed.</p>				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge (no.)				
K_1	Knows modern techniques used in the detection and determination of the content of food ingredients	P8S_WG/3	L, Cl	test
K_2	He knows the structure and principle of operation of modern apparatus used in food analysis	P8S_WG/1	L, Cl	test
K_3	Knows the development trends in the method of testing the composition and nutritional value of foods	P8S_WG/2	L, Cl	test
Skills (no.)				
S_1	He can choose an analytical method and assess its usefulness in the context of the purpose of the analysis	P8S_UW/2	Cl	Test, observations during practice

	qualitative and quantitative analysis			classes
S_2	He can use laboratory techniques, including chemical	P8S_UW/1	CI	Observations during practice classes
S_3	He can indicate the physicochemical phenomena that are the basis of a given measuring system	P8S_UW/2	L, CI	Test, observations during practice classes
S_4	Can communicate on specialist topics related to food analysis	P8S_UK/1 P8S_UK/2 P8S_UK/3 P8S_UK/4 P8S_UK/5	L, CI	Test, observations during practice classes, discussion
Social competence (no.)				
SK_1	Appreciates the importance of food analysis in understanding the chemical composition and determining its quality and safety	P8S_KK/3	CI	Observations during practice classes, discussion
SK_2	He is critical in assessing the contribution of his own research activity to the development of food science	P8S_KK/1	CI	Observations during practice classes, discussion
SK_3	Able to initiate action on behalf of the public interest	P8S_KO/2	CI	Observations during practice classes, discussion

LEARNING FORMAT – NUMBER OF HOURS

Semester (no.)	Lectures	Seminars	Lab classes	Internships	others	ECTS
III, V	5	10				0

METHODS OF INSTRUCTION

E.G, LECTURE: A PROBLEM-SOLVING LECTURE/A LECTURE SUPPORTED BY A MULTIMEDIA PRESENTATION/ DISTANCE LEARNING CLASSES: TEXT ANALYSIS AND DISCUSSION/PROJECT WORK (RESEARCH PROJECT, IMPLEMENTATION PROJECT, PRACTICAL PROJECT)/ GROUP WORK (PROBLEM SOLVING, CASE STUDY, DISCUSSION)/DIDACTIC GAMES/ DISTANCE LEARNING LABORATORY CLASSES: DESIGNING AND CONDUCTING EXPERIMENTS)

Lecture supported by a multimedia presentation, laboratory classes

COURSE CONTENT

1. Lectures/ Seminars:

1. Ultra Performance Liquid Chromatography - General Information (UPLC)
2. Construction and principle of operation of an ultra-efficient liquid chromatograph (UPLC)
3. Types of detectors used in ultra-performance chromatography liquid
4. Mass detector - construction and principle of operation

5. Coupled techniques - tandem mass spectrometry
6. Stable isotopes in food control

2. Seminars / Lab classes/ others:

1. Presentation of the set for ultra-performance liquid chromatography, development isocratic and gradient elution methods
2. The use of photodiode detector in qualitative and quantitative analysis polyphenolic compounds
3. Presentation of the double quadrupole mass detector, familiarization with electrospray ionization technique, registration of mass spectra in the ion mode negative and positive.
4. Application of field-activated chemical dissociation technique for identification polyphenolic compounds, interpretation of spectra
5. Application of experiments: registration of a single ion, reaction monitoring multiple in the analysis of polyphenolic compounds found in food

COURSE ASSESSMENT CRITERIA

Participation in classes, participation in a scientific discussion, final test covering a theoretical issue from the content of lectures and laboratory exercises.

Written test - the pass mark is to give at least 50% correct answers.

Punctuation: 51-60% (3,0); 61-70% (3,5); 71-80% (4,0); 81-90% (4,5); 91-100% (5,0).

**TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES
– NUMBER OF HOURS AND ECTS CREDITS**

Activity	Number of hours
Scheduled course contact hours	15
Other contact hours involving the teacher (consultation hours, examinations)	3
Non-contact hours – student`s own work (preparation for classes or examinations, project, etc.)	15
Total number of hours	33
Total number of ECTS credits	0

INSTRUCTIONAL MATERIALS

Compulsory literature:	WITKIEWICZ Z., PODSTAWY CHROMATOGRAFII CIECZOWEJ. WNT DE HOFFMAN, CHARETTE J., STROOBANT V. SPEKTROMETRIA MAS WNT
Complementary literature:	Leo M.L. Nollet, Fidel Toldra HPLC in Food Analysis CRC Press Mike S. Lee Mass Spectrometry Handbook Wille