



# UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

## Food chemistry Educational subject description sheet

### Basic information

<b>Field of study</b> Biotechnology	<b>Education cycle</b> 2025/26	
<b>Speciality</b> -	<b>Subject code</b> ND000000NBTS.18.0725.25	
<b>Organizational unit</b> The Faculty of Biotechnology and Food Science	<b>Lecture languages</b> english	
<b>Study level</b> First-cycle (engineer) programme	<b>Mandatory</b> optional	
<b>Study form</b> Full-time	<b>Block</b> major subjects (conducted) in foreign languages	
<b>Education profile</b> General academic	<b>Disciplines</b> Food technology and nutrition	
	<b>Subject related to scientific research</b> Yes	
	<b>Subject shaping practical skills</b> Nie	
<b>Teacher responsible for the subject</b>	Anna Gliszczyńska	
<b>Other teachers conducting classes</b>	Anna Gliszczyńska	
<b>Period</b> Semester 4	<b>Examination</b> exam	<b>Number of ECTS points</b> 3.0
	<b>Activities and hours</b> lecture: 14 laboratory classes: 28	

## Goals

C1	The aim of the course is to familiarize students with the chemical, physical and sensory properties of the main food ingredients: carbohydrates, lipids, proteins, colorants, polyphenols, non-proteinaceous nitrogen compounds, fragrances and others. The program of the course also consists issues related to the understanding of functional properties of food ingredients, the interactions between them and their conversions during technological processes. Also impact of all these compounds on human health and presentation of selected food additives. As a part of laboratory classes, the student uses the knowledge from the area of methods of isolation and purification of organic compounds to extract selected food components from plant / animal biological raw material or food product.
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## Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	chemical composition of food products, main food ingredients, their chemical, physical, technological and biological properties at an advanced level	NB_P6S_WG01, NB_P6S_WG02, NB_P6S_WG03, NB_P6S_WG04	written exam
W2	interactions between food components, their functional properties and the degree of their impact on the health of the body and identify hazards	NB_P6S_WG01, NB_P6S_WG03, NB_P6S_WG04, NB_P6S_WG05	written exam
W3	in an advanced stage, chemical, physicochemical and instrumental methods of isolation of selected food ingredients from food products / raw materials	NB_P6S_WG04, NB_P6S_WG05	written exam
<b>Skills - Student can:</b>			
U1	perform procedures of isolation of specific food components using chemical and physical methods and techniques from the field of general chemistry using appropriate equipment and paying attention on the principles of health and safety	NB_P6S_UW01, NB_P6S_UW02	written exam, observation of student's work, performing tasks
U2	confirm by means of chromatographic /spectroscopic/physicochemical/chemical techniques that isolated the main component from the raw material or food product and prepare a report from laboratory work and obtained results	NB_P6S_UW02	written exam, observation of student's work, performing tasks
U3	properly use terminology in the field of general and organic chemistry also in a foreign language	NB_P6S_UK08, NB_P6S_UK09	written exam, observation of student's work, performing tasks
U4	understand the need to broaden the knowledge in the field of food chemistry and methods of analysis of food ingredients	NB_P6S_UW04, NB_P6S_UW05, NB_P6S_UW06	written exam, observation of student's work, performing tasks
U5	has the ability to communicate in English at a B2 level	NB_P6S_UK09	written exam, performing tasks
<b>Social competences - Student is ready to:</b>			
K1	critical assessment of own knowledge and skills in food chemistry	NB_P6S_KK01	observation of student's work, performing tasks
K2	keep the safety rules and be aware of the rules of work in a chemical laboratory and the risks arising from the presence in chemical laboratory	NB_P6S_KO02, NB_P6S_KO03	observation of student's work, performing tasks

## Balance of ECTS points

Activity form	Activity hours*	
lecture	14	
laboratory classes	28	
presentation/report preparation	5	
project preparation	5	
consultations	6	
exam participation	2	
exam / credit preparation	25	
<b>Student workload</b>	<b>Hours</b> 85	<b>ECTS</b> 3.0
<b>Workload involving teacher</b>	<b>Hours</b> 44	<b>ECTS</b> 1.7
<b>Practical workload</b>	<b>Hours</b> 28	<b>ECTS</b> 1.0

\* hour means 45 minutes

## Study content

No.	Course content	Activities
1.	1. Scope of food chemistry. The chemical composition of food products. 2. Water as a food component. 3. Structure, occurrence and properties of mono- and disaccharides in food. 4. Non-enzymatic browning of food - Maillard reactions and their importance in forming the traitssensory food products. 5. Polysaccharides and their occurrence in food. 6. Structure, occurrence and properties of fatty acids. 7. Structure, occurrence and properties of TAG. 8. Structure and the role of phospholipids in food. 9. Proteins in food products. 10. Non-protein nitrogen compounds. 11. Occurrence, structure and properties of polyphenols. 12. Colorants in food. 13. Fragrances in food part 1 14. Fragrances in food part 2 15. Allergens, mutagens, carcinogens and anticarcinogens, contamination of food.	lecture

No.	Course content	Activities
2.	1. Isolation of trimyristin from nutmeg 2. Isolation and identification of the volatile compounds of spices 3. Isolation of curcumin from curcuma 4. Properties of reducing sugars occurring in food 5. Isolation of piperine from black pepper 6. Isolation of phospholipids from egg yolk 7. Isolation of caffeine from tea leaves 8. Separation of pigments from plant material 9. Isolation of theobromine from cacao each student performs 5 out of 9 exercises mentioned above (marked with numbers 2-10)	laboratory classes

## Course advanced

### Teaching methods:

case analysis, text analysis, teamwork, discussion, participation in research, lecture, classes

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	written exam, observation of student's work, performing tasks	50%

## Entry requirements

general chemistry, organic and inorganic chemistry

## Literature

### Obligatory

1. Food Chemistry, H.-D.Belitz, W.Grosch, Springer-Verlag, 2004.
2. Chemical and Functional Properties of Food Components, ed. by Z.Sikorski, Taylor and Francis Group, 2007.

### Optional

1. Food Chemistry, R. Fennema, Marcel Dekker, Inc. 1996.

## Kierunkowe efekty uczenia się

Kod	Treść
NB_P6S_KK01	The graduate is ready to critically evaluate his/her knowledge and skills and consult experts in solving professional problems
NB_P6S_KO02	The graduate is ready to take responsibility for high quality and safety of biotechnology products
NB_P6S_KO03	The graduate is ready to take responsible action for the social environment, fulfill social obligations and act in an entrepreneurial manner
NB_P6S_UK08	The graduate is able to prepare written studies and oral presentations on issues in the field of biotechnology, present them and justify their position, appropriately use the available literature, respecting the principles of protection of industrial property and copyrights
NB_P6S_UK09	The graduate is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages
NB_P6S_UW01	The graduate is able to plan and perform experiments, select appropriate biological material and unit operations, interpret the obtained results, including using appropriate statistical methods and information technology, and formulate conclusions
NB_P6S_UW02	The graduate is able to perform analyses using chemical, biological and physical methods and techniques in the field of biotechnology and food technology using appropriate apparatus
NB_P6S_UW04	The graduate is able to identify risks and assess the quality of biotechnological and food products
NB_P6S_UW05	The graduate is able to search for and use information from various sources to critically analyze the functioning of existing technical and technological solutions
NB_P6S_UW06	The graduate is able to make economic evaluation of selected technical and technological solutions
NB_P6S_WG01	The graduate knows and understands at an advanced level the facts and concepts of chemistry, mathematics, physics, biochemistry, microbiology, cell biology and molecular biology, as well as the relationships between selected natural phenomena, relevant to the field of biotechnology
NB_P6S_WG02	The graduate knows and understands at an advanced level the molecular and cellular basis of the functioning of organisms and the techniques used in the study of biological material
NB_P6S_WG03	The graduate knows and understands at an advanced level the possibilities of using various organisms and enzymes to perform biotechnological processes and the risks affecting the quality of bioproducts
NB_P6S_WG04	The graduate knows and understands at an advanced level the chemical, biological and instrumental methods used in biotechnology and food analysis
NB_P6S_WG05	The graduate knows and understands problems in the quality of plant and animal raw materials, the technology of their processing, and chemical and biological hazards in food production