



Food chemistry
Educational subject description sheet

Basic information

Field of study Food quality management and analysis	Education cycle 2021/22
Speciality -	Subject code WBiNoZNZJS.I4BO.0725.21
Department The Faculty of Biotechnology and Food Science	Lecture languages English
Study level First-cycle (engineer) programme	Mandatory optional
Study form Full-time	Block major subjects (conducted) in foreign languages
Education profile General academic	Disciplines Food technology and nutrition
	Subject related to scientific research Yes
	Subject shaping practical skills No
Teacher responsible for the subject	Witold Gładkowski
Other teachers conducting classes	Witold Gładkowski

Period Semester 3	Examination exam	Number of ECTS points 5.0
	Activities and hours lecture: 15 laboratory classes: 30	

Goals

C1	knowledge about chemical, physical and sensory properties of main food constituents: carbohydrates, lipids, proteins, colorants, fragrances etc.
C2	knowledge about interactions and changes of food components during food storage and processing
C3	knowledge about structure and role of selected functional food additives

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	Student knows the chemical composition of food, can characterize the structure and properties of basic food components at the advanced level, describes and explains interactions between particular food components	NZ_P6S_WG01, NZ_P6S_WG03	written exam, written credit
W2	Student explains the influence of changes in food on the quality of food products at the advanced level, identifies the chemical hazards during food production and storage	NZ_P6S_WG04, NZ_P6S_WG06	written exam, written credit
W3	Student knows the physicochemical basis of techniques used to the isolation of some food components	NZ_P6S_WG05	written exam, written credit
Skills - Student can:			
U1	Student isolates selected food components using various laboratory methods and techniques	NZ_P6S_UW06	observation of student's work, active participation
U2	Student carries out simple experiments allowing to identify the food components	NZ_P6S_UW01	observation of student's work
U3	Student can interpret physicochemical processes and analyze hazards taking place during processing and food preservation	NZ_P6S_UW05, NZ_P6S_UW07	written exam
U4	Student can work individually and collectively, care for laboratory equipment and cleanliness in the laboratory, avoid of hazards in chemical laboratory, work safely for himself and other laboratory workers	NZ_P6S_UO13	observation of student's work
U5	Student is able to complete the knowledge about different isolation techniques	NZ_P6S_UU14	observation of student's work
Social competences - Student is ready to:			
K1	Student is ready to critical evaluation of his knowledge from food chemistry	NZ_P6S_KK01	observation of student's work
K2	Student is ready to use his knowledge to solving problems connected with isolation of food components	NZ_P6S_KK01, NZ_P6S_KO03	observation of student's work

Balance of ECTS points

Activity form	Activity hours*
lecture	15
laboratory classes	30
exam / credit preparation	50
consultations	14
exam participation	2

class preparation	15	
report preparation	10	
Student workload	Hours 136	ECTS 5.0
Workload involving teacher	Hours 61	ECTS 2.0
Practical workload	Hours 40	ECTS 1.5

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	<ol style="list-style-type: none"> 1. The scope of food chemistry as the science. Chemical composition of food. 2. Water as the main food component. 3. The structure, properties and the properties of mono- and disaccharids. 4. Non-enzymatic browning of food - Maillard reaction and their application in formation of sensoric properties of food products. 5. Polysaccharides in food and their significance in food. 6. Structure, occurrence and properties of fatty acids in food. 7. Structure and modifications of triacylglycerols and phospholipids. 8. Proteins in food products 9. The nonprotein nitrogenous compounds 10. Vitamins. 11. The occurrence, structure and properties of polyphenols. 12. Food colorants. 13. Flavor compounds in food. Formation of flavour during food processing. 14. Allergens, mutagens, cancerogens and anticancerogens, food contamination. 	lecture

2.	<ol style="list-style-type: none"> 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 and cholesterol from egg yolk 7. Isolation of caffeine from tea leaves 8. Separation of pigments from plant material 9. Isolation of theobromine from cacao 	laboratory classes
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Course advanced

Teaching methods:

lecture

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

Literature

Obligatory

1. Food Chemistry, H.-D. Belitz, W. Grosch, Springer-Verlag, 2009.
2. Food Chemistry, R. Fennema, Marcel Dekker, Inc. 1996.
2. Chemical and Functional Properties of Food Components, ed. Z. Sikorski, Taylor and Francis Group, 2007.

Optional

1. Food Chemistry, R. Fennema, Marcel Dekker, Inc. 1996.
2. V. A. Parthasarathy, B. Chempakan, T.J. Zachariah „Chemistry of spices” □Oxford University Press, 2008.

Effects

Code	Content
NZ_P6S_KK01	Use of gained knowledge and to do critical data analysis in solving various problems in the quality management and food analysis, as well as, for consulting experts
NZ_P6S_KO03	Demonstrate an active attitude in solving problems related to quality management and food safety
NZ_P6S_UO13	Cooperate and work in a group, lead a team of people and be aware of responsibility for implemented joint actions
NZ_P6S_UU14	Independently plan and develop own professional or scientific career, understands the need for lifelong learning
NZ_P6S_UW01	Use possessed knowledge and collect data to analyze processes and phenomena in food economy, including economic and marketing analyzes of various enterprises
NZ_P6S_UW05	Indicate appropriate methods, techniques and technologies used in food production and preservation
NZ_P6S_UW06	Select and apply appropriate methods and analytical techniques using laboratory equipment and control-measuring devices
NZ_P6S_UW07	Analyze hazards, estimate the level of risk and indicate critical control points in the selected production processes
NZ_P6S_WG01	Advanced knowledge in chemistry, biochemistry, microbiology, mathematics and physics related to the quality management and food analysis
NZ_P6S_WG03	Advanced properties of the plant and animal food raw materials and products, as well as, auxiliary materials
NZ_P6S_WG04	Unit operations applied in food processing and preservation related to food quality
NZ_P6S_WG05	Advanced methods / techniques of food analysis, conditions of their use and methods of validation
NZ_P6S_WG06	At an advanced level the chemical, biological and physical risks during the production, processing and storage of food raw materials and products, assessing their impact on food quality and safety