UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Food chemistry

Educational subject description sheet

Basic information

Field of study Biotechnology	**Education cycle** 2021/22
Speciality -	**Subject code** ND000000NBTS.I8.0725.21
Organizational unit 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 Nie

Teacher responsible for the subject	Anna Gliszczyńska
Other teachers conducting classes	Anna Gliszczyńska

Period	**Examination**	**Number of ECTS points**
Semester 4	exam **Activities and hours** lecture: 15 laboratory classes: 30	4.0

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.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	chemical composition of food products, main food ingredients, their chemical, physical, technological and biological properties at an advanced level	NB_P6S_WG01	written exam, oral credit, report
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_WG03, NB_P6S_WG09	written exam, oral credit, report
W3	in an advanced stage, chemical, physicochemical and instrumental methods of isolation of selected food ingredients from food products / raw materials	NB_P6S_WG04	written exam, oral credit, report
Skills – Student can:			
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_UO12, NB_P6S_UW03	oral credit, observation of student’s work, report
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_UO12, NB_P6S_UW05, NB_P6S_UW07	oral credit, observation of student’s work, report
U3	properly use terminology in the field of general and organic chemistry	NB_P6S_UK09	oral credit, observation of student’s work, report
U4	understand the need to broaden the knowledge in the field of food chemistry and methods of analysis of food ingredients	NB_P6S_UU13	oral credit, observation of student’s work, report
Social competences – Student is ready to:			
K1	critical assessment of own knowledge and skills in food chemistry	NB_P6S_KK01	observation of student’s work
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_KK02, NB_P6S_KO03	observation of student’s work

Balance of ECTS points

Activity form	Activity hours*
lecture	15
laboratory classes	30
presentation/report preparation	6
project preparation	12
consultations	6
exam participation	2
exam / credit preparation	49

Student workload	**Hours** 120	**ECTS** 4.0
Workload involving teacher	**Hours** 47	**ECTS** 1.8
Practical workload	**Hours** 30	**ECTS** 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
2.	1. Equipment of the food chemistry laboratory, health and safety rules and description of method how to use equipment available in the laboratory 2. Isolation of trimyristin from nutmeg 3. Isolation and identification of the volatile compounds of spices 4. Isolation of curcumin from curcuma 5. Properties of reducing sugars ocurring in food 6. Isolation of piperine from black pepper 7. Isolation of phospholipids from egg yolk 8. Isolation of caffeine from tea leaves 9. Separation of pigments from plant material 10. 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, brainstorming, teamwork, discussion, participation in research, lecture, classes

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	written exam, oral credit, observation of student’s work, report	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 critical assessment of own knowledge and skills and seeking experts' opinions
NB_P6S_KK02	The graduate is ready to use the knowledge in the field of biotechnology and food sciences to solve professional problems
NB_P6S_KO03	The graduate is ready to take responsibility for high quality and safety of biotechnological products
NB_P6S_UK09	The graduate can communicate with specialists in the field of biotechnology and food technology using specialized terminology
NB_P6S_UO12	The graduate can collaborate and work in a group, taking various roles, being responsible for the safety of own and other work
NB_P6S_UU13	The graduate can plan the path of own scientific and professional development, understand the need for lifelong learning and the graduate can updating knowledge related to the proffession
NB_P6S_UW03	The graduate can perform analyzes using chemical, biological and physical methods and techniques from biotechnology and food technology using appropriate equipment
NB_P6S_UW05	The graduate can identify and evaluate the quality of biotechnological and food products, and their impact on human and animal health as well as natural environment
NB_P6S_UW07	The graduate can search for and use information from various fields of science for critical analysis of the functioning of existing technical and technological solutions
NB_P6S_WG01	The graduate knows and understands at an advanced level facts and concepts in chemistry, mathematics, physics, biochemistry, microbiology, cell biology and molecular biology adapted to Biotechnology
NB_P6S_WG03	The graduate knows and understands relationships between selected natural phenomena appropriate for biotechnology studies
NB_P6S_WG04	The graduate knows and understands in an advanced level, chemical, biological and instrumental methods used in biotechnology and food analysis
NB_P6S_WG09	Issues in the field of quality of plant and animal raw materials, their processing technologies and microbiological hazards in food production