Course name:

CEREAL PROCESSING

ECTS	**4**
Course status	**complementary**
Course final assessement/evaluation of outcomes	**completion with grade**
Prerequisites	**no prerequisites**

Main field of study:

field of study name (capital letters)

Profile of study	**General-academic**
The code of studies (education level)	**SI/SM (bachelor/master)**
Semester of studies	**summer**
Language of instruction	**English**

Course offered by:

Name of faculty offering the course	**Faculty of Food Technology**
Name of department offering the course	**Department of Carbohydrate Technology**
Course coordinator	**Krzysztof Buksa PhD. DSc. Eng., associate professor**

Learning outcomes of the course:

Symbol of outcome	Description of learning outcome	Reference to	
		main field of study outcomes	discipline#
KNOWLEDGE – student knows and/or understands:			
CP_W1	Student knows main cereals and basic chemical composition of cereal grain. He knows bioactive compounds in cereal grain and is able to characterize them. He gains the knowledge about future prospects for technology of cereals and cereal-based products.	TŻ1_W01 TŻ2_W01 TŻ2_W02 TŻ2_W03 TŻ2_W04 TŻ2_W06 TŻ2_W09	R
CP_W2	Student gains the knowledge about the influence of milling process on chemical composition of the flour. He has the basis knowledge of chemical composition of dietary fiber and methods of analysis its compounds. He knows the influence of dietary fiber on technological properties in food production. He knows the division of proteins and the role of different fractions of proteins in cereal products. He is able to char-acterize the methods of protein isolation, examination of their structure and the influence of protein on technological properties.	TŻ1_W01 TŻ1_W02 TŻ2_W01 TŻ2_W02 TŻ2_W03 TŻ2_W04 TŻ2_W06 TŻ2_W09	R
CP_W3	He is able to characterize polysaccharides in cereal grain taking into account their molecular dimensions. He knows the methods of molecular mass determination and practical application of the knowledge about cereal polysaccha-rides molecular structure in technology of cereals and cereal based products.	TŻ1_W01 TŻ2_W01 TŻ2_W02 TŻ2_W03 TŻ2_W04 TŻ2_W09	R

CP_W4	Student has basic knowledge about dough and bread making process of wheat and rye bread. He is able to explain physical chemical and biochemical changes which may have place during rye and wheat bread making process. Student is able to characterize substances responsible for taste, smell and texture of cereal food products. He is able to characterize methods of controlling of bread quality. He is able to present future of bread quality assessment.	TŻ1_W01 TŻ1_W03 TŻ2_W01 TŻ2_W02 TŻ2_W03 TŻ2_W04	R
SKILLS – student is able to:			
CP_U1	Student knows how to identify and determine the sugar content in cereal grain and its derivatives (flours and cereal based products) using TLC and HPLC chromatography. He knows how to operate a HPLC chromatograph. He knows how to use the chromatographic software. He is able to calculate the results obtained by LC .	TŻ1_U01 TŻ2_U01 TŻ2_U03 TŻ2_U05 TŻ2_U06 TŻ2_U07 TŻ2_U08	R
CP_U2	Student gains the knowledge how to determine molecular mass of starch, inulin, arabinoxylan, beta-glucan and pro-tein using SEC chromatography. He is able to prepare the sample for SEC chromatographic analysis. He knows how to operate a HPSEC/RI chro-matograph. He knows how to use the chromatographic software. He is able to calculate obtained by SEC results.	TŻ1_U01 TŻ2_U01 TŻ2_U02 TŻ2_U05 TŻ2_U04 TŻ2_U07 TŻ2_U08	R
CP_U3	Student gains the knowledge about wheat bread making and evaluation of its quality by 3D scanning, texture analysis and HPLC. He is able to carry out baking of rye bread sourdough bread and gluten-free bread and evaluate of its quality by 3D scanning, texture analysis and HPLC.	TŻ1_U01 TŻ2_U01 TŻ2_U03 TŻ2_U05 TŻ2_U06 TŻ2_U07	R
CP_U4	Student knows how to carry out a determination of substances affecting smell, taste and appearance of food prod-ucts in cereals and the products derived from cereals. He is able to prepare the samples for chromatographic analysis. He knows how to operate a HPLC/RI/UV chromatograph. He knows how to apply the chromatographic software to calculate obtained results.	TŻ1_U01 TŻ1_U03 TŻ2_U05 TŻ2_U06 TŻ2_U07	R
SOCIAL COMPETENCE- student is ready to:			
CP_K1	Student is able to express objective evaluation of his work and work of his team. He is able to cooperate and work in team. He understands risk of application of low quality materials and improper technology.	TŻ1_K01 TŻ2_K01 TŻ2_K05 TŻ2_K06	R
CP_K2	Student creatively solves analytical problems and organizes workshop. He creatively solves problems with applica-tion of new materials and technologies in cereal processing.	TŻ2_K03	R

Teaching contents:

Lectures	**15**	**hours**
	Chemical composition of cereal grain. What are bioactive components in cereals? Effect of milling process on chemical composition of the flour and soluble and insoluble dietary fiber content. Analysis of the composition of dietary fiber.	
	An impact of dietary fiber on technological properties in food production. How big are cereals polysaccharides? Methods of determination of molecular mass of cereal polysaccharides. Practical application of the knowledge of polysaccharide molecular structure in technology of cereals and cereal-based products.	

Topics of the lectures	Cereal proteins – what is their role in cereal products? Methods of isolation of proteins and examination of their structure and properties.
	The principles of wheat bread baking and evaluation of its quality. Baking of rye bread and sourdough bread and evaluation of its quality. Gluten-free bread baking. Controlling of bread quality.
	Substances affecting smell, taste and appearance of cereal food products. Future prospects for technology of cereals and cereal-based products.

Accomplished learning outcomes	TŻ2_W01, TŻ2_W02, TŻ2_W03, TŻ2_W04, TŻ2_W05, TŻ2_W06, TŻ2_W09, TŻ2_W10, TŻ2_K01 TŻ2_K02, TŻ2_K03, TŻ2_K04
Verification methods, rules and criteria of outcome assessment	Written examination (test). Share in final grade 70%.

Classes **15** **hours**

Topics of the classes	TLC and HPLC chromatography – modern, accurate, simple and fast me-thods for determination of sugar composition in cereal grains. SEC chromatography as a tool for determination of molecular mass of flour polysaccharides such as: starch, inulin, water soluble arabinoxylans, beta-glucans and proteins.
	Wheat bread making and evaluation of its quality by 3D scanning, texture analysis and HPLC.
	Baking of rye bread and sourdough bread and evaluation of its quality by 3D scanning, texture analysis and HPLC.

Accomplished learning outcomes	TŻ2_U01, TŻ2_U02, TŻ2_U03, TŻ2_U05, TŻ2_U07, TŻ2_U08, TŻ2_U09, TŻ2_U10, TŻ2_U11, TŻ2_K01 TŻ2_K02, TŻ2_K03, TŻ2_K04
Verification methods, rules and criteria of outcome assessment	Attendance at at least 2 classes. Share in final grade 30%.

Seminars **…** **hours**

Topics of the seminars	
Accomplished learning outcomes	*symbol of learning outcomesof the seminars*
Verification methods, rules and criteria of outcome assessment	*together with participation in the final asessement (in %)*

References:

Basic	1. Materials supplied by the lecturer 2. Eliasson A.C. (2006). Carbohydrates in food, 2nd edition. Taylor & Francis, New York. 3. Ito R., Matsuo Y. (2010). Handbook of carbohydrate polymers: development, properties and applications. Nova Science Pub Inc.
Supplementary	*1. AOAC. Official methods of analysis. 18th edn. Gaithersburg Association of Official Analytical Chemists International (2006).2. Kamerling J.P. 2007. Comprehensive Glycoscience. From Chemistry to Systems Biology. Elsevier ltd. 3. Standard Methods of the ICC – International Association for Cereal Science and Technology. 2007. ICC – Vienna.*

Structure of learning outcomes:

Discipline: R – Agricultural science - discipline nutrition and food technology	*4*	ECTS**
Discipline: # (*provide appripriate symbol - if the course relates to more than one academic discipline*)	*…*	ECTS**

Structure of student activities:					
Contact hours		32	hours	1,6	ECTS**
including:	lectures	15	hours		
	classes and seminars	15	hours		
	consultations	1	hours		
	participation in research	0	hours		
	mandatory trainerships	0	hours		
	participation in examinations	1	hours		
e-learning		…	hours	…	ECTS**
student own work		58	hours	2,4	ECTS**

Syllabus valid from the academic year 2021/2022

*** where 10 hours of classes = 1 ECTC (in case of 15 h → 2 ECTS)**

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes

academic discipline code: RZ - animal science and fishery, PB - biological sciences, etc.