Załacznik nr 1

Course name:
FACULTATIVE SPECIALIZATION SUBJECT I - NEW TRENDS IN CARBOHYDRATE TECHNOLOGY

ECTS	4
Course status	directional - optional (available for the learning path)
Course final assessment /evaluation of outcomes	graded pass
Prerequisite	no prerequisites

Main field of study*:*
Food Technology

Educational profile	General academic
Code of studies and education level	***SI/one grade***
Semester of studies	5/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 and Cereal Processing
Course coordinator	dr hab. inż. Dorota Gumul, prof. URK

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands			
FT13_W1	basic characteristics of raw materials and carbohydrate products both in terms of processing and application. It recognizes and describes unit operations in the sugar and starch industry. He knows industrial ways of obtaining hydrocolloids. Recognizes elements of machinery in the sugar, confectionery, starch and related industries. He distinguishes individual products and indicates the technologies of their obtaining	TŻ1_W01 TŻ1_W02 TŻ1_W03 TŻ1_W06	RT
FT13_W2	the basic chemical structure, and physical properties of saccharides and the principles of the molecular structure of saccharides linking with the application possibilities. Recognizes saccharide modification products used in food technology in terms of their production and properties	TŻ1_W01 TŻ1_W02 TŻ1_W03 TŻ1_W06 TŻ1_W12	RT
SKILLS – student is able to			

FT13_U1	Performs technologically important analyses of raw materials and products rich in carbohydrates by qualitative (detection) and quantitative (content analysis) methods. Uses the possibility of instrumental analysis to examine the quality of products, intermediate products and carbohydrate raw materials	TŻ1_U01 TŻ1_U03 TŻ1_U04 TŻ1_U06 TŻ1_U07	RT
FT13_U2	Isolates the starch from the biological material and determines its basic morphological characteristics. Identifies adulterations of selected carbohydrate products and can detect non-starch polysaccharides	TŻ1_U01 TŻ1_U03 TŻ1_U04 TŻ1_U06 TŻ1_U07	RT
FT13_U3	Verify the results of laboratory tests and interpret them critically. Presents test results in the form of concise reports	TŻ1_U01 TŻ1_U03 TŻ1_U04 TŻ1_U06 TŻ1_U07	RT
SOCIAL COMPETENCIES – student is ready to:			
FT13_K1	Able to apply creative solution of analytical problems. Can work in a group and possesses the ability to make objective judgements about results of the team's work	TŻ1_K02 TŻ1_K03 TŻ1_K04	RT
FT13_K2	acting in accordance with the principles of ethics, demonstrating openness to the problems of modern technology while recognizing the relationship between technological processes and their impact on the environment	TŻ1_K02 TŻ1_K03 TŻ1_K04	RT

Teaching contents

Lectures	30 hours
Topics	Basic Chemistry and Physics of Sugars Sugar beet and and cane as basic raw material for sucrose production Sugar technology production form sugar beet vs. cane - technological parameters, operation and properties and application of final products Honey - natural sweetening agent. Production and properties. Basic raw materials for confectionery industry. Properties and production Natural and artificial sweetening agents Starch as main carbohydrate for food industry . Starch production technology Acid and enzymatic starch hydrolysis. Technology, properties of hydrolysates and their application. Increased applicability of starch as a consequence of changes in molecular structure Polysaccharide hydrocolloids - modern functional food ingredients. Hydrocolloids vs modified starches - nutritional and technological aspects. Potato industry: technological properties of the raw material. Potato storage, reconditioning and their influence on the functional properties. Refined potato products - fried, extruded and expanded products. Characteristics of by-products from carbohydrate industry and its use in zero-waste technology

Accomplished learning outcomes	*FT13_W1; FT13_W2*
Means of verification, rules and criteria of assessment	*A written/oral credit; at least 50% of the correct answers to the questions asked should be given for a positive assessment. Participation in the course final assessment - 60%*

Classes:	30 hours
Topics	Analysis on the characteristics of products and semi-finished products of the sugar industry. Determination of purity and quality of sugars of different origin. Quantitative and qualitative analysis of sugar raw materials and technological by-products Analysis of honeys of different origin (nectar and honeydew). Identification of adulterations, honey, enzymatic activity, carbohydrate composition and acidity. Analysis on the quality of other, basic raw materials for the confectionery industry Basics of knowledge about plant-based biopolymers. Morphology and chemical composition of a potato. Evaluation of starch content, starch characterization by laboratory method. Morphological studies of starch of various botanical origin. Qualitative evaluation of starch. Analysis of refined potato products (chips, fries). Polysaccharide hydrocolloids. Detection of plant rubbers in raw materials and food products. Determination of crude fiber content. Investigation of technological properties of hydrocolloid solutions. Chemical/ enzymatic modification, as a tool to effectively change the properties of starch. Analysis of industrial products (starch hydrolysates) taking into account rheological properties and solubility. Determination of hydrolysis degree.
Accomplished learning outcomes	*FT13_U1; FT13_U2; FT13_U3; FT13_K1; FT13_K2*
Means of verification, rules and criteria of assessment	*Laboratory class credit obtained on the basis of:* *- individual reports of laboratory work (average of obtained grades) - participation in the final evaluation of the module 20%* *- pass colloquium in the field of laboratory classes (positive mark for min. 55% of points) - participation in the final evaluation of the 20% module*

References:

Basic	*1. Eliasson A-C. Starch in Food: Structure, function and applications. CRC, 1 edition, 2004* *2. Lisiewska G., Leszczyński W. Potato Science and Technology. Elsevier 1989* *3. Whistler R.Y., Bemiller J.N. Starch Chemistry and Technology. Elsevier 3 edition. 2009*
Supplementary	*1. Asadi M. Beet-Sugar Handbook. Wiley-Interscience, 2006.* *2. Draycott P. Sugar Beet. Wiley-Blackwell, 1 edition, 2006* *3. Guenthner J.F. The International Potato Industry. Woodhead Publishing Ltd, 2002*

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences		ECTS **
Area of academic study: T – technological sciences	4	ECTS**

Structure of student activity

Contact hours		64	hrs.	2,6 ECTS**
Including:	lectures	30	hrs.	

	classes and seminars	30	hrs.		
	consultations	2	hrs.		
	participation in research	0	hrs.		
	obligatory traineeships	0	hrs.		
	participation in examination	2	hrs.		
e-learning		0	hrs.	0	ECTS**
student own work		36	hrs.	1,4	ECTS**

*Areas of academic study in the fields of: H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport and health sciences; R – Agricultural, forestry and veterinary sciences; A – the arts
** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes