University of Gdańsk

Subject card

Subject name and code	Carbohydrates - a basic component of nutricion, PG_00081949						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2026/2027			
Education level	Bachelor's studies		Subject group	Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Laboratory of Glycochemistry -> Department of Organic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Beata Liberek					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		5.0		15.0	50
Subject objectives	Studies on the structure, properties, functions and metabolism of carbohydrates and their derivatives, which are the nutrition components.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	Students are familiar with basic carbohydrates, their divisions and derivatives. Students are familiar with different forms of the same sugar and explain behavior of carbohydrates in aqueous solution. Students explain the special role of glucose and fructose in nutrition. Students know the basic reactions of sugars, Maillard browning, caramelization, and glycation.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Students recognize configurationally different monosaccharides, selected disaccharides, oligosaccharides, and polysaccharides. Students draw possible forms of sugars, for specific conditions assign the product of the sugar reaction. Students differentiate stages and products of the Maillard reaction, caramelization and glycation.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	Students understand the need of a comprehensive view of a problem, discuss different aspects of a problem, keep criticism, appreciate the particular components of the newly gained knowledge.	[SK1] oral statement/conversation/ discussion [SK4] test/exam - oral or written
[CHEML3_U09] Is able to learn independently.	Students list derivatives of monosaccharides found in food, and recognize their functions. Students list oligosaccharides crucial in nutrition and recognize their functions. Students recognize functions of starch and its modifications. Students recognize other plant polysaccharides and their functions.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.	Students know monosaccharides and their derivatives found in food and are familiar with their functions. Students are acquainted with oligosaccharides found in food and their functions. Students define functions of starch and other plant polysaccharides. Students are familiar with metabolic processes of sugars.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion

Subject contents

Carbohydrates classification and functions. Structural diversity of aldoses and ketoses. Ring forms of sugars. Optical activity of sugars. Mutarotation. Reducing and non-reducing sugars. Other equilibriums of sugars in aqueous solution. Conformations of monosaccharide ring. Glucose: characteristic, sources, metabolic conversions. Glucose fermentations. Fructose, glucose-fructose syrup, honey. Other hexoses and pentoses as the nutritional ingredients. Monosaccharides with other functional groups: deoxysugars, aminosugars, uronic acids and their role in nutrition. Derivatives of monosaccharides: glyconic acids, aldaric acids, alditols, esters and their role in nutrition. Glycosides: structure, classification, occurrence in food. Disaccharides and oligosacchides in food. Prebiotics. Cyclic oligosaccharides. Polysaccharides: classification and occurence. Starch: structure, sources, metabolism, hydrolysates, chemical modifications. Cellulose: structure, modifications. Other plant polysaccharides: hemicelluloses, beta-glucans, pectins, gums. Maillard browning: reactants, stages and key reactions, final products. Acrylamide: forming and toxicity. Proteins glycosylation. Caramelization.

Prerequisites and co-requisites

Knowledge of the basic organic groups of compounds, their structure and properties.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
A positive result of the test, which consists of 50 questions.	51.0%	100.0%

Recommended reading

Basic literature	S. W. Cui, Food Carbohydrates: Chemistry, Physical Properties and Applications R. E. Wrolstad, Food Carbohydrate Chemistry

	Supplementary literature	H. M. I. Osborn, Carbohydrates L. Stryer, Biochemistry
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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