University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Selected issues of carbohydrate chemistry, PG_00082501						
Field of study	Chemistry						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2025/2026			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Optional subject group			
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	3.0			
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		40.0	75
Subject objectives	To familiarize students with the basic issues of modern sugar chemistry and glycobiology.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Characterizes carbohydrate divisions due to their structure, functional groups, size, properties. Explains the methods of protection and deprotection of functional groups in carbohydrates; Describes strategies of glycosidic bonds formation; Lists the glycosyl donors commonly used; Characterizes glycosides used in medicine; Describes conformations of monosaccharide ring, explains factors influencing their stability; Describes conformations of oligosaccharides and glycans;	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Recognizes and appreciates the need to harmonize and complement each other elements of different sciences; Shows creativity in solving problems; Maintains criticism formulating conclusions; Understand the need for deliberate and group action.	[SK1] oral statement/conversation/ discussion [SK4] test/exam - oral or written
[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	Recognizes glycoconjugates, characterizes their division and functions; Defines proteoglycans and glycosaminoglycans and their functions; Characterizes peptidoglycan; Describes biosynthesis of N-glycans; Characterizes mucins; Identifies blood groups determinants; Explains the role of mannose-6-phosphate in a cell.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	Explains NMR applications in structural analysis of carbohydrates.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion

Subject contents

Carbohydrate functions; Structural diversity of aldoses and ketoses; Optical rotation of saccharides; Sugar equilibriums in aqueous solution; Reductive and non-reductive carbohydrates; Protecting groups in carbohydrate chemistry: ether, sillyl, ester, acetal, introduction and deprotection; Strategies of glycosidic bond synthesis; Commonly used glycosyl donors; Bonding of sugar with amino acid; Glycosides in medicine: antibiotics, vitamins, alkaloids, steroids, terpenes, flavonoids; Pyranose ring conformations: factors influencing conformer stability, anomeric effect, conformational analysis, application of NMR for conformational studies; Furanose ring conformations; Oligosaccharide conformations; Glycan conformation: Carbohydrate biosynthesis; Glycoconjugates: division and functions; Proteoglycans, glycosaminoglycans, peptidoglycans; Glycoproteins: division and biosynthesis; N-glycosylation of peptide chain; O-Glycans; Blood groups determinants; Mannose-6-phosphate as a tag.

Prerequisites and co-requisites

Basic knowledge of organic chemistry.

Assessment methods and criteria

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

Recommended reading

Basic literature	H. M. I. Osborn, Carbohydrates J. F. Stoddart, Stereochemistry of Carbohydrates A. Varki, R. D. Cummings, J. D. Esko..., Essentials of Glycobiology
Supplementary literature	M. Miljkovic, Carbohydrates, Synthesis, Mechanisms, and Stereoelectronic Effects S. Hanessian, Preparative carbohydrate chemistry
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.