UNIWERSYTET GDAŃSKI

Course title	**ECTS code**
Wykład monograficzny - Wybrane zagadnienia z chemii cukrów/Monographic lecture - Selected issues of carbohydrate chemistry	13.3.1111

Name of unit administrating study
Faculty of Chemistry

Studies

Field of study	Type	Form	
Chemical business	Masters	Full-time studies	

Teaching staff
dr hab. Beata Liberek, prof. UG

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
lecture

B. The realization of activities
In-class learning

Number of hours
lecture 30 h

ECTS credits

classes 30 h
tutorial classes 10 h
student's own work 35 h
TOTAL: 75 h - 3 ECTS

The academic cycle
2021/2022 summer semester

Type of course
obligatory

Language of instruction
Polish

Teaching methods
Lecture with a multimedial presentation

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
Course completion (with a grade)

B. Assessment methods
test

C. The basic criteria for evaluation or exam requirements
Achievement of at least 51% of the total number of points from the single choice test. The test consists of about 40 questions. The percentage result is correlated with the mark in the way indicated in "Study Regulations of University of Gdansk".

Required courses and introductory requirements

a. **Formal requirements** First degree studies completed.
b. **Prerequisites** Basic knowledge of organic chemistry.

Aims of education

• To familiarize students with the basic issues of modern sugar chemistry and glycobiology.
• Preparing students to use modern solutions for sugar synthesis and analysis.
• To prepare students to properly describe carbohydrate and glycobiology issues.

Course contents

Carbohydrate functions; Structural diversity of aldoses and ketoses; Optical rotation of saccharides; Sugar equilibriums in aqueous solution; Reductive and non-reductive carbohydrates; L series of monosaccharides: L-fucose and L-idouronic acid; 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.

Bibliography of literature

A. Literature required to pass the course

A. Wiśniewski, J. Madaj Podstawy Chemii Cukrów, 1997
H. M. I. Osborn Carbohydrates
J. F. Stoddart Stereochemistry of Carbohydrates
A. Varki, R. D. Cummings, J. D. Esko... Essentials of Glycobiology
J. Świderski, J. Struciński, A. Temeriusz Podstawy Chemii Węglowodanów, 1973

B. Extracurricular readings

Knowledge

Student 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; Explains NMR applications in structural analysis of carbohydrates; Describes conformations of oligosaccharides and glycans; Recognizes glycoconjugates, characterizes their division and functions; Defines proteoglycans and lists glycosaminoglycans; Characterizes peptidoglycan; Describes biosynthesis of N-glycans; Characterizes mucins; Identifies blood groups determinants; Explains the role of mannose-6-phosphate in a cell.

Skills

Classifies carbohydrates according to their structure, functional groups, size, properties; Indicates appropriate methods of protection and deprotection of functional groups in sugars; Designs a strategy for glycoside synthesis; Recognizes glycosides used in medicine; Analyses monosaccharide ring conformations; Concludes about the structure of saccharide based on NMR; Predicts oligosaccharide and glycans conformations; Classifies glycoconjugates, assigns them functions; Recognizes proteoglycans, glycosaminoglycans, peptidoglycan; Discusses biosynthesis of N-glycans; Recognizes mucins; Verifies blood group substances; Discusses the role of mannose-6-phosphate in the cell.

Social competence

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.