BS Chemistry Semester-V					
Programme	**BS Chemistry**	**Course Code**	**Chem-376**	**Credit Hours**	**2**
Course Title	**Carbohydrate**		**Course Type**	**Major (Elective)**	

Course Introduction

This course needs to demonstrate the in-depth knowledge on occurrence, classification, chemical structure, physical properties, biological importance and metabolism of different types of carbohydrates.

Introduction, occurrence and importance of Carbohydrates in biosphere and life processes. Detail Classification of carbohydrates and their biological significance. Structures, chemical and physical properties of monosaccharides, oligo saccharides and polysaccharides. Homo-polysaccharides and Hetro-polysaccharides with special emphasis on Glycosaminoglycans. Haworth configuration, D and L configuration of monosaccharides. Optical isomerism and mutarotation in glucose, Invert sugar. A brief discussion of digestion, absorption, and transport of Carbohydrates. Description about the Metabolism, biological importance and ATP production of carbohydrates; glycolysis, citric acid Cycle, HMP pathway, uronic acid pathway. Gluconeogenesis, glycogenesis, glycogenolysis, electron transport chain, oxidative phosphorylation and uncoupler agents involved in oxidative phosphorylation.

Learning Outcomes

1- This course will help students to understand major types of carbohydrates and their function in the human body.
2- Students will be able to learn metabolism and metabolic pathways of carbohydrates and their use in life.
3- It will also help in understanding of ATP production in cell, normal level of blood sugar and its regulation.

Course Content		Assignments/Readings
Week 1	General lecture about carbohydrates	-
	Occurrence and importance of Carbohydrates in biosphere and life processes	Class base learning/test
Week 2	Detail Classification of carbohydrates and their biological significance	Class base learning/test
	Structures, chemical and physical properties of monosaccharides, oligo saccharides and polysaccharides	Class base learning/test
Week 3	Homo-polysaccharides and Hetro-polysaccharides with special emphasis on Glycosaminoglycans	Class base learning/test
	Haworth configuration, D and L configuration of monosaccharides	Class base learning/test
Week 4	Optical isomerism and mutarotation in glucose, Invert sugar	Class base learning/test
	Class discussion	-
Week 5	A brief discussion of digestion, absorption, and transport of Carbohydrates	Class base learning/test
	Description about the Metabolism, biological	Class base learning/test
	importance and ATP production of carbohydrates	
Week 6	Glycolysis	Class base learning/test
	Class Discussion	-
Week 7	Citric acid Cycle	Class base learning/test
	Detail about the HMP pathway	Class base learning/test
Week 8	Class Discussion	-
	Quiz (Give marks, if necessary, from assignment)	-

Week 9	Mid Term Exams	-
Week 10	Uronic acid pathway	Class base learning/test
	Class Discussion	-
Week 11	Gluconeogenesis pathway	Class base learning/test
	Glycogenesis pathway	Class base learning/test
Week 12	Glycogenolysis	Class base learning/test
	Discussion on the Assigned topic for assignment	-
Week 13	Electron transport chain	Class base learning/test
	Oxidative phosphorylation	Class base learning/test
Week 14	Uncoupler agents involved in oxidative phosphorylation	Class base learning/test
Week 15	Class discussion	-
	Quiz (Give marks, if necessary, from assignment)	-
Week 16	Submission of assignments. If required then discussion the whole chapter for final term exams preparation	-

Reading Material

1- Lehninger, A. L., Nelson, D. L., & Cox, M. M. (2020). *Principles of biochemistry* (8th ed.). W. H. Freeman and Company.
2- Stryer, L. (2021). *Biochemistry* (9th ed.). W. H. Freeman and Company.
3- Murray, R. K., Bender, D. A., Botham, K. M., Kennelly, P. J., & Rodwell, V. W. (2018). *Harper's biochemistry* (32nd ed.). McGraw-Hill Education.
4- Champ, C., Harvey, R. A., & Ferrie, D. R. (2021). *Lippincott's biochemistry* (6th ed.). Wolters Kluwer.

Teaching Learning Strategies

- Lecturing using white/black board/Multimedia
- Written Assignments/Quiz/Task/Presentation
- Discussion about practical
- Checking the results and discussion

Assignments: Types and Number with Calendar

Assignment, Quiz, Task, Presentation etc.