



The Hashemite University
Course Syllabus
General Biochemistry

1	Course title	General Biochemistry
2	Course number	111501107
3	Credit hours (theory)	3
	Contact hours (theory)	Lectures: 3 sessions / week, Each session: 2 hours
4	Course meeting time Course location	Variable
5	Program title	Doctor of Medicine
7	Awarding institution	The Hashemite University
8	Faculty	Faculty of Medicine
9	Department	Basic medical sciences
10	Level of course	First year medical students
11	Year of study and semester (s)	2018/2019 Summer Course
12	Final Qualification	MD degree
13	Other department (s) involved	None
14	Language of Instruction	English
15	Date of production/revision	01/2019

Course Coordinator:

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Course Description:

After presenting some preliminary principles of biochemistry in previous course of molecular biology, this comprehensive course will introduce medical students to more advance knowledge on biochemistry. At the beginning there is more emphasis on understanding enzymes as efficient biological protein catalyst, in addition to the factors which affect their activation and inhibition. Then students will learn the correlation between vitamins and coenzymes as well as some bioenergetics before they are introduced to the metabolism of human body. This part will cover the anaerobic and aerobic metabolism of carbohydrates, amino acids and protein metabolism, lipid metabolism and finally their integration which involves the coordination between these metabolic pathways under different nutritional states.

Intended Learning Outcomes (ILOs):

At the end of this course student should be able to understand:

- Relationship between structure and functions of biochemical molecules.
- Water soluble but not fat-soluble vitamins are precursors of coenzymes.
- Why human body prefer aerobic metabolism over anaerobic metabolism.
- Why carbohydrates can be converted to fats inside the body, but the reverse pathway does not take place.
- Why metabolic pathways are varied according to the body nutritional state.

Students will become acquainted with principles of basic biochemistry and body metabolism, as pre-request subjects needed for the subsequent introduction to the courses of clinical biochemistry in the modules.

Topic Outline and Schedule:

Topic	Lecture outline
Introduction	1. What is biochemistry? 2. Outlines of biochemistry application in medicine
Enzymes I	1. Understanding enzymes as a catalyst 2. The catalytic cycle 3. How enzymes accelerate cellular reactions? 4. The basis of enzyme classifications

	5. Exploring the factors affecting the rate of enzymic reaction
Enzymes II	<ol style="list-style-type: none"> 1. Effect of substrate concentration on rate of enzymatic reaction 2. Understanding enzyme kinetics 3. Michaelis-Menten equation 4. What are K_m and V_{max} values? 5. Enzyme activation and inhibition 6. Irreversible and reversible inhibitors 7. Kinetics of reversible inhibitors
Enzymes III	<ol style="list-style-type: none"> 1. What are isozymes? 2. Application of isozymes in diagnosis 3. Control of enzyme activity <ol style="list-style-type: none"> a. Allosteric regulation b. Covalent modification
Enzymes cofactors	<ol style="list-style-type: none"> 1. Inorganic cofactors 2. Coenzymes <ol style="list-style-type: none"> a. Thymine pyrophosphate b. Flavin c. Nicotinamide d. Pyridoxalphosphate e. Cobalamin f. Tetrahydrofolate g. Biotin h. Ascorbic acid
Bioenergetics	<ol style="list-style-type: none"> 1. Potential and kinetic energy 2. Laws of thermodynamics 3. Gibbs free energy 4. Exergonic and endergonic reactions 5. High energy compounds 6. Energy coupling
Introduction to Metabolism	<ol style="list-style-type: none"> 1. Definition of metabolism 2. Anabolism and catabolism 3. Autotrophic versus heterotrophic nutrition 4. Human as heterotrophic nutritional organism
Carbohydrates metabolism I Anaerobic metabolism	<ol style="list-style-type: none"> 1. Glycolysis <ol style="list-style-type: none"> a. First phase b. Second phase 2. Pentose phosphate pathway 3. Metabolism of non-glucose sugars <ol style="list-style-type: none"> a. metabolism of fructose. b. metabolism of galactose c. metabolism of glucuronic acid 4. Glycogen metabolism <ol style="list-style-type: none"> a. Glycogen synthesis b. Glycogen breakdown
Carbohydrates metabolism II Aerobic metabolism	<ol style="list-style-type: none"> 1. Gluconeogenesis: Synthesis of glucose from lactate, amino acids and glycerol 2. Krebs cycle 3. Electron transport and oxidative phosphorylation 4. Inhibitors of electron transport and oxidative phosphorylation
Lipids metabolism	<ol style="list-style-type: none"> 1. Fatty acids metabolism <ol style="list-style-type: none"> a. Fatty acid synthesis

	b. Fatty acid catabolism 2. Cholesterol synthesis 3. Eicosanoids synthesis from fatty acids
Amino acids metabolism	1. Synthesis of non-essential amino acids 2. Catabolism of amino acids 3. Nitrogen metabolism and urea cycle 4. Heme synthesis from glycine and succinyl-CoA
Integration of metabolism	1. Coordination between metabolic pathways under different nutritional states. 2. Central junction points in metabolism 3. Amphipathic pathways

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

1. Textbook & references
2. Lecture notes

Evaluation Methods:

Grading Policy:

Grades can be based on the following:

- First in-course exam (MCQ): 30 %
 Second in-course exam (MCQ): 30 %
 Final exam at end of the semester (MCQ): 40 %
 Total Points 100

Course Policies:

Attendance policies:

If a student is absent for a teaching session then they must discuss this with the course instructor. If a student is absent for more than 25% of the course then he may be liable to fail the course

B- Absences from exams and handing in assignments on time:

If a student misses an examination then they will have the opportunity for a make-up examination, according to the university regulations.

C- Health and safety procedures:

College Members and students must at all times, conform to Health and Safety rules

and procedures.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom. Students violate this policy would be subjected to disciplinary action according to the Hashemite University disciplinary policies

References:

- Harper's Biochemistry. By Robert K. Murray and Co., latest edition.

Additional information:

The semester is 8 weeks:

Lectures: 3 sessions / week,

Each session: 2 hours