

LIFS 2220 (2021/22 Spring Semester)

BIOCHEMISTRY II

Faculty Instructor: Prof. Robert Ko

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Time: Tue, Thu (4:30 – 5: 45 pm)

Venue: LT-J

Course Description:

Credit Points: 3

Prerequisite(s): LIFS 1902

Exclusion: Nil

The student will learn the principle of bioenergetics as well as major biochemical pathways and regulatory mechanisms involved in intermediary metabolism. The course encompasses the following topics: Energetics of life, introduction to metabolism and experimental analysis of metabolism; Carbohydrate metabolism; Lipid metabolism; Metabolism of nitrogenous compounds; Nucleotide metabolism; Integration and control of metabolic processes

Learning outcomes:

At the end of this course, the student is able to:

- (1) explain the general design of metabolic pathways based on the bioenergetic principle;
- (2) describe how carbohydrates (glucose and glycogen), lipids (fatty acids and triglycerides) and nitrogenous compounds (amino acids and nucleotides) are synthesized and degraded, and more importantly, how metabolic pathways are regulated and recognize the biochemical basis of some diseases arising defects in metabolism;
- (3) have a holistic view of metabolism, and recognize how different pathways are functionally interlinked and how they are regulated by extracellular and intracellular signals
- (4) recognize how metabolism can be related to issues in lifestyle, health, and diseases

Assessment Scheme:

- (a) Examination: Two Exams with MC questions and True/False statements
- (b) Percentage of exam and coursework

Assessment

90% by Exam

10% by a short essay (300 words)
with a topic on metabolism-related
issues in lifestyle, health, and
diseases.

Assessing Course ILOs

(1), (2), (3)

(1), (2), (3), (4)

- (c) The grade is assigned based on students' performance in all assessments.

Student Learning Resources:

Recommended Reading:

Textbooks

Biochemistry, Mathews, van Holde, Appling & Anthony-Cahill (4rd Edition) 2012
(Textbook)

Benjamin/Cummings

Biochemistry, Berg, Tymoczko, Stryer (7th Edition) 2012 (reference book)

W.H. Freeman and Company

Teaching and Learning activity:

The student will need to attend lectures and understand some important details of metabolic pathways as well as create an integrated view of intermediary metabolism. To assist the student in achieving these learning goals, a web-based learning platform (CANVAS) is made available to students. As such, students can review lecture videos and PowerPoint slides,

Class Schedule

Chemical Logic and Introduction to Metabolism

Feb 8-Mar 22
(13 Le)

Carbohydrate Metabolism I - *Glycolysis*

Oxidative Process I - *Citric Acid Cycle*

Electron Transport, Oxidative Phosphorylation, and Oxygen

- *Oxidative Phosphorylation*

Oxidative Process II - *Pentose Phosphate Pathway*

Carbohydrate Metabolism II

Gluconeogenesis

Glycogen Metabolism

Exam I 19 April

Lipid Metabolism

Fatty acid Oxidation and Biosynthesis

Metabolism of Glycerophospholipids

Eicosanoids

Mar 24 – May 10
(11 Le)

Metabolism of Nitrogenous Compounds

Nucleotide Metabolism

Integration and Control of Metabolic Processes

Interdependence of Major Organs in Fuel Metabolism

Hormonal Regulation of Fuel Metabolism

Extracellular Signaling

Exam II (TBA)