

## LIFS 2220 (2022/23 Spring Semester)

### BIOCHEMISTRY II

**Faculty Instructor:** Prof. Robert Ko

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**Time:** Mon, Wed (10:30 – 11: 50 am)

**Venue:** LT-D

#### **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 (4<sup>th</sup> Edition) 2012 (Textbook)

**Benjamin/Cummings**

Biochemistry, Berg, Tymoczko, Stryer (7<sup>th</sup> 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, as well as Q&A session of each topic.

## Class Schedule

### **Chemical Logic and Introduction to Metabolism**

**Feb 6-Mar 20**  
(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 12 April (covering lectures from Feb 6 – Mar 20)**

### **Lipid Metabolism**

**Mar 22 – May 8**  
(10 Le)

*Fatty acid Oxidation and Biosynthesis*

*Metabolism of Glycerophospholipids*

*Eicosanoids*

### **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) (covering lectures from Mar 22 – May 8)**