

LIFS 2220 (2018/19 Spring Semester)

BIOCHEMISTRY II

Faculty Instructor: Prof. Robert Ko

Email address: bcrko@ust.hk

Supporting Instruction Assistant: Hoi Yan Leung

Email: hoiyan@ust.hk

Time: 9:00 – 10:20 (TUE)

9:00 – 10:20 (THU)

Venue: LT-C

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 issues in lifestyle, health and disease

Assessment Scheme:

- (a) Examination duration: Exam I (120 min); Exam II (120 min); comprised of multiple choice questions, short answer questions.
- (b) Percentage of exam and coursework

<u>Assessment</u>	<u>Assessing Course ILOs</u>
45% by Exam I	(1), (2), (3)
45% by Exam II	(1), (2), (3)
10% by a short essay (300 words) with a topic on metabolism-related issues in lifestyle, health, and disease.	(1), (2), (3), (4)

- (c) The grade is assigned based on students' performance in 3 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 to 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. In addition to attending lectures, students can get access to self-directed learning aids for all topics as well as performing the review questions.

Class Schedule

Chemical Logic and Introduction to Metabolism

Jan 31-Apr 16

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

Lipid Metabolism

Fatty acid Oxidation and Biosynthesis

Metabolism of Glycerophospholipids

Eicosanoids

Exam I (covered up to glycogen metabolism) April 25

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

Apr 30-May 9

Examination II (covering from Apr 30- May 9)

TBA