BIEN2410: Cellular and Systems Physiology for Engineers (spring semester, 2023)

Course Instructor:
Prof. Becki Yi Kuang, Rm 5578, Ext. 2617, email: kekuang@ust.hk

Course TA:
Mengyu Chen, email: mchenca@connect.ust.hk

Time and Venue:
Lecture: Mon 04:30PM - 05:50PM and Fri 12:00PM - 01:20PM; CYTG009B
Tutorial: Tue 06:00PM - 06:50PM
1) Tutorial before quiz; 4502 *(Only on Feb 28; April 04; May 09)*
3) Office hour; Rm 5578 (15 min each; 4 slots each section; reserve by email to TA)

Course Objectives:
This course will introduce the basic knowledge of physiology at both cellular and system level and the application of these knowledge in engineering biological materials/devices.

Reference Reading Materials:
Guyton and Hall Textbook of Medical Physiology - 12th-Ed. PDF available online.

The condensed lecture slides can be downloaded from the course website at Canvas.

Evaluation:
40 min quiz (3; choose top 2 out of 3) 60%
Written assignment (2 pages) 10%
In class exercise 15%
Participation (in class quiz on Canvas; attend 18 lectures) 15%
Bonus** (1 point for 15 min appointment in office hour; maximum 1 point)

Quiz 1 covers lecture 0-6
Quiz 2 covers lecture 7-14
Quiz 3 covers lecture 15-21

Depends on whether we will have full on-campus mode or mixed mode, we will alter the format of the Quiz accordingly.
Type of questions will be appeared in the quiz:
1) Multiple choices
2) Decide whether the statement is true/correct (√) or false/incorrect (x)
3) Fill in the blanks; matching
4) Short answer

Course contents:

Week 1-4	**Our Cells**	
Feb. 03 (Fri)	Lecture 0	Introduction of the course
Feb. 06 (Mon)	Lecture 1	The general features of a cell
Feb. 10 (Fri)	Lecture 2	The components of a cell
Feb. 13 (Mon)	Lecture 3	The flow of genetic information
Feb. 17 (Fri)	Lecture 4	The transportation of substances
Feb. 20 (Mon)	Lecture 5	The environment of cells
Feb. 24 (Fri)	Lecture 6	The communication between cells
Week 5-12	**Our Systems**	
Feb. 27 (Mon)	Lecture 7	Electrical potentials of cells I
Mar. 03 (Fri)	Lecture 8	Electrical potentials of cells II & Muscle contraction I
Mar. 06 (Mon)	**Quiz 1**	*(40 min quiz followed by 20 min review)*
Mar. 10 (Fri)	Lecture 9	Muscle contraction II
Mar. 13 (Mon)	Lecture 10	Excitation-contraction
Mar. 17 (Fri)	Lecture 11	Pump of life
Mar. 20 (Mon)	Lecture 12	Rhythmical excitation
Mar. 24 (Fri)	Lecture 13	Circulatory system
Mar. 27 (Mon)	Lecture 14	Microcirculation and lymphatic
Mar. 31 (Fri)	Lecture 15	Blood cells
April 03 (Mon)	Lecture 16	Urinary system
April 14 (Fri)	**Quiz 2**	*(40 min quiz followed by 10 min review)*
April 17 (Mon)	Lecture 17	Respiratory System I
	Topics for written assignment will be released on Canvas	
April 21 (Fri)	Lecture 18	Respiratory System II
April 24 (Mon)	Lecture 19	Gastrointestinal system I
April 28 (Fri)	Lecture 20	Gastrointestinal system II
May 05 (Fri)	Lecture 21	Basics of pharmacokinetics
May 08 (Mon)	Lecture 22	How do we sense the world (content will not be used in Quiz 3)
May 16 (Tue)	*Upload written assignment onto Canvas.*	
TBA	**Quiz 3**	*(40 min quiz followed by 20 min review)*