Division of Life Science
The Hong Kong University of Science and Technology

LIFS 2010 Modern approaches to Biochemical and Cell Biological Research
Fall semester, 2023-2024

Instructors: Prof. David Banfield (E-mail: bodkb@ust.hk) (course coordinator)
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Time and Venue: Wednesday & Friday 13:30 – 14:50 LT-C

Course Description
Credits: 3
Pre-requisite: LIFS 1902

Course description
This is the signature course for the Program in Biochemistry and Cell Biology (BCB). Our current understanding of biochemical reactions and internal organization of a cell was progressively enriched by technological and conceptual breakthroughs in the 20th century. This course will use personal and scientific stories of six prominent scientists to highlight research areas that are still being actively pursued today. Topics to include are DNA and protein biochemistry, physical and chemical methods for biological research, and the use of genetically tractable model organisms.

Intended Learning Outcomes
On successful completion of this course, students are expected to be able to:

1. Understand how inter-disciplinary approaches contribute to the advancement of biological research.
2. Understand the historical and personal context in which landmark discoveries were made by prominent scientists.
3. Explain and differentiate the technologies used for modern biological research.
4. Create short biographies of prominent scientists by gathering and analyzing information on their discoveries.

Teaching approach
The primary delivery mode of the course will be interactive lectures and tutorials. Students are expected to participate in live discussions. Short videos and written articles will be provided as supplementary background information for out-of-class review. The scientific validity of articles from the mass media will be evaluated during tutorials through instructor-led class discussions.

Assessment scheme

Assessment Task	Percentage	Intended Learning Outcomes assessed
Mid-term written exam [A]	40%	1, 2, 3
Final written exam [B]	40%	1, 2, 3
Written assignment [C]	20%	1, 2, 3, 4

A. Closed-book exam. 1 hour 10 mins.

B. Closed-book exam. 1 hour 10 mins.

C. This individual written assignment is due on **30-Nov-2023**. Students will choose one from a list of scientists and write his/her biography focusing on one significant scientific discovery. The report should be 2 pages of text (12 pt font size, Times New Roman, single space, 1-inch page margins, references in APA format).

Students are expected to maintain academic integrity for all assessments (https://registry.hkust.edu.hk/resource-library/academic-integrity).

Assessment rubrics

Written assignment: biography of a scientist

	Needs improvement	Good	Excellent
Summarizes the scientific training received by the scientist.	Inaccurate information on the doctoral and postdoctoral research of the scientist.	Correct information on the doctoral and postdoctoral research of the scientist.	Correct information on the doctoral and postdoctoral research of the scientist. Identification of potential links between his/her training and subsequent independent research.
Describes and explains the methods used in the seminal discovery of the scientist.	Lack of understanding of the methods and their potential shortcomings.	Understands the methods and their potential shortcomings.	Understands the methods and identifies alternative approaches that can be used to extend principles established by the discovery.
Assesses the influence of the seminal discovery to scientific research by others.	Incorrect interpretation on the scientific impact of the seminal discovery.	Correct interpretation on the scientific impact of the seminal discovery.	Correct interpretation on the scientific impact of the seminal discovery. Identification of potential societal impact of the discovery.

Student learning resources

Course material will be drawn from scientific and general news articles that are publicly available. Essential material will be deposited into the CANVAS system.

Course schedule

Week	Date	Topic		Instructor
1	06-09-2023	Module 1: Seymour Benzer	Lecture	Mak
	08-09-2023	Biological clocks	Lecture	Mak
2	13-09-2023		Lecture	Mak
	15-09-2023		Tutorial	Mak
3	20-09-2023	Module 2: John Sulston	Lecture	Mak
	22-09-2023	Animal development	Lecture	Mak
4	27-09-2023		Lecture	Mak
	29-09-2023		Tutorial	Mak
5	04-10-2023	Module 3: Eugene Kennedy	Lecture	Mak
	06-10-2023	Fat synthesis	Lecture	Mak
6	11-10-2023		Lecture	Mak
	13-10-2023		Tutorial	Mak
7	18-10-2023	Mid-term exam		Mak
	20-10-2023	Module 4: George Palade	Lecture	Banfield
8	25-10-2023	Secretion and membrane trafficking	Lecture	Banfield
	27-10-2023		Lecture	Banfield
9	01-11-2023		Tutorial	Banfield
	03-11-2023	Module 5: Gunter Blobel	Lecture	Banfield
10	08-11-2023	Mechanisms of protein targeting	Lecture	Banfield
	10-11-2023		Lecture	Banfield
11	15-11-2023		Tutorial	Banfield
	17-11-2023	Module 6: Paul Nurse	Lecture	Banfield
12	22-11-2023	The mechanics of the cell cycle	Lecture	Banfield
	24-11-2023		Lecture	Banfield
13	29-11-2023		Tutorial	Banfield