

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

**LIFS 2010      Modern approaches to Biochemical and Cell Biological Research**  
Fall semester, 2021-2022

**Instructors:**      Prof. David Banfield (E-mail: bodkb@ust.hk) (course coordinator)  
                         Dr. Ho Yi MAK (E-mail: hym@ust.hk)

**Time and Venue:**      Tuesday & Thursday      09:00 – 10:20      LT-B

**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 20<sup>th</sup> 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. Apply the knowledge on biochemical and cellular processes to create posts on social media.
5. 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
Final written exam <sup>A</sup>	45%	1, 2, 3
Written assignment 1 <sup>B</sup>	30%	1, 2, 3, 5
Written assignment 2 <sup>C</sup>	25%	1, 2, 3, 4

A. 3 hours.

B. This individual written assignment is due on **25-Oct-2021**. 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, excluding the reference list).

C. This individual assignment is due on **06-Dec-2021**. Students are required to create an infographic to compare and contrast classical and recent techniques for tackling a biological question. Choose one from a list of questions.

Students are expected to maintain academic integrity for all assessments (<http://ugadmin.ust.hk/integrity/student-1.html>).

## Assessment rubrics

### Written assignment: biography of a scientist

	Needs improvement	Good	Excellent
<b>Summarizes the scientific training received by the scientist.</b>	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.
<b>Describes and explains the methods used in the seminal discovery of the scientist.</b>	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.
<b>Assesses the influence of the seminal discovery to scientific research by others.</b>	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	02-09-2021	Module 1: Seymour Benzer	Lecture	Mak
2	07-09-2021	Biological clocks	Lecture	Mak
	09-09-2021		Lecture	Mak
3	14-09-2021		Tutorial	Mak
	16-09-2021	Module 2: John Sulston	Lecture	Mak
4	21-09-2021	Animal development	Lecture	Mak
	23-09-2021		Lecture	Mak
5	28-09-2021		Tutorial	Mak
	30-09-2021	Module 3: Eugene Kennedy	Lecture	Mak
6	05-10-2021	Fat synthesis	Lecture	Mak
	07-10-2021		Lecture	Mak
7	12-10-2021		Tutorial	Mak
	14-10-2021	Briefing session on written assignments		Mak
8	19-10-2021	Module 4: George Palade	Lecture	Banfield
	21-10-2021	Public holiday		
9	26-10-2021	Secretion and membrane trafficking	Lecture	Banfield
	28-10-2021		Lecture	Banfield
10	02-11-2021		Tutorial	Banfield
	04-11-2021	Module 5: Gunter Blobel	Lecture	Banfield
11	09-11-2021	Mechanisms of protein targeting	Lecture	Banfield
	11-11-2021		Lecture	Banfield
12	16-11-2021		Tutorial	Banfield
	18-11-2021	Module 6: Paul Nurse	Lecture	Banfield
13	23-11-2021	The mechanics of the cell cycle	Lecture	Banfield
	25-11-2021		Lecture	Banfield
	30-11-2021		Tutorial	Banfield