

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

LIFS 2010 Modern approaches to Biochemical and Cell Biological Research
Fall semester, 2016-2017

Instructors: Prof. David Banfield (E-mail: bodkb@ust.hk) (course coordinator)
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Time and Venue: Tuesday & Thursday 09:00 - 10:20 Room 2502

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. Apply the knowledge on biochemical and cellular processes to evaluate the scientific validity of articles from the mass 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 required to bring and use a 'clicker' for class participation. 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 by students during tutorials through instructor-led class discussions.

Assessment scheme

Assessment Task	Percentage	Intended Learning Outcomes assessed
Final written exam ^A	30%	1, 2, 3
Mid-term exam ^B	30%	1, 2, 3
Written assignment ^C	20%	1, 2, 3, 5
Preparation for tutorial ^D	15%	1, 2, 4
Tutorial participation ^E	5%	1, 3, 4

A. 1 hour 20 minutes.

B. 1 hour 20 minutes.

C. This individual written assignment is due on **25-Oct-2016**. Students will choose one from a list of scientists and write his/her biography focusing on one significant scientific discovery. The report should be 1 page of text (12 pt font size, Times New Roman, single space, 1-inch page margins, excluding references).

D. This is an individual written assignment. Each student is required to prepare for the tutorial of one module. Three discussion topics (with justification) should be submitted three days before the tutorial, based on an article from the mass media that is given on the first day of each module. The assignment should be no more than 1 page of text (12 pt font size, Times New Roman, single space, 1-inch page margins, excluding references).

E. 'Clicker' type questions will be asked during tutorials. Students are required to respond to these questions in all tutorials to gain full credit.

The Academic Honor Code (<http://tl.ust.hk/integrity/student-1.html>) applies to all assessments.

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.

Additional assessment rubrics will be discussed at the beginning of the course.

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	01-09-2016	Module 1: Seymour Benzer	Lecture	Mak
	06-09-2016	Biological clocks	Lecture	Mak
	08-09-2016		Lecture	Mak
2	13-09-2016		Tutorial	Mak
	15-09-2016	Module 2: Fred Sanger	Lecture	Tye
3	20-09-2016	Protein and DNA sequencing	Lecture	Tye
	22-09-2016		Lecture	Tye
4	27-09-2016		Tutorial	Tye
	29-09-2016	Module 3: Elizabeth Blackburn	Lecture	Tye
5	04-10-2016	Structures of chromosomes	Lecture	Tye
	06-10-2016		Lecture	Tye
6	11-10-2016		Tutorial	Tye
	13-10-2016	Review session		Tye & Mak
7	18-10-2016	Mid-term exam		
	20-10-2016	Module 4: Eugene Kennedy	Lecture	Mak
8	25-10-2016	Fat synthesis	Lecture	Mak
	27-10-2016		Lecture	Mak
9	01-11-2016		Tutorial	Mak
	03-11-2016	Module 5: George Palade	Lecture	Banfield
10	08-11-2016	Secretion and membrane trafficking	Lecture	Banfield
	10-11-2016		Lecture	Banfield
11	15-11-2016		Tutorial	Banfield
	17-11-2016	Module 6: Paul Nurse	Lecture	Banfield
12	22-11-2016	The mechanics of the cell cycle	Lecture	Banfield
	24-11-2016		Lecture	Banfield
13	29-11-2016		Tutorial	Banfield