

Major in Biochemistry

Course Selection Guide

2023/24

Biochemistry Programme

School of Life Sciences

The Chinese University of Hong Kong

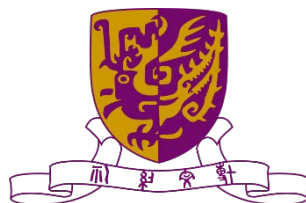
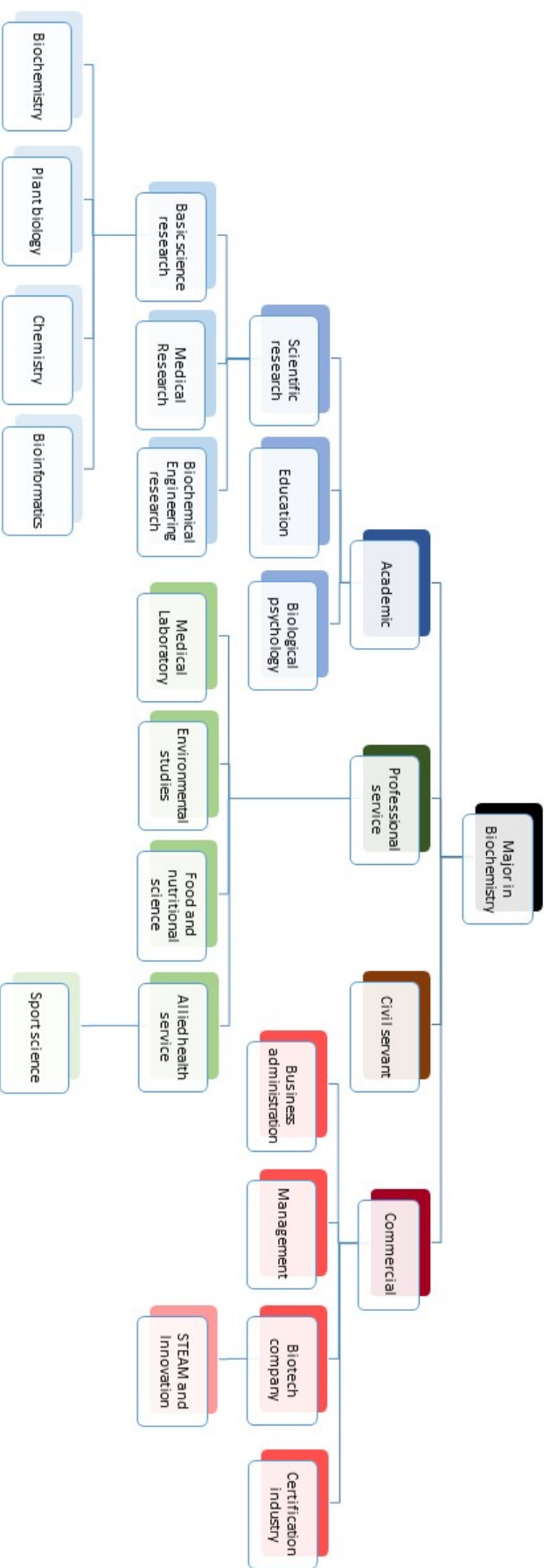




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Study scheme selection guide

Biochemistry Programme

School of Life Sciences

The Chinese University of Hong Kong

This document tries to give our students an overview of the Biochemistry Programme in the School of Life Sciences (SLS) of CUHK. It is composed of (A) Background of the Biochemistry Programme, (B) Course List and Course Outline and (C) Suggested Study Paths for your career development. Hope you enjoy the studies in Biochemistry Programme.

(A) Background of the Biochemistry Programme:

Biochemistry is a branch of science that investigates the chemical compounds and processes occurring in living organisms at molecular level. The knowledge procured from the study in Biochemistry has found extensive applications in medicine and biotechnology that drastically revolutionize our daily life.

Our programme aims to

- 1) provide concepts and mechanisms of biochemical processes, with emphasis on clinical and biomedical sciences;
- 2) provide training on the latest biochemical technology; and
- 3) cultivate the ability of critical thinking, a proactive and responsible attitude and efficient communication skills for high competitiveness in further study and career development.

History:

Biochemistry Department was established in 1971, when the first batch of M.Phil. students was admitted. Prof. Lin MA, the second Vice-President of CUHK, was the Department Head. In 1973, the first batch of M.Phil. students graduated and the Department had admitted the first batch of major undergraduate students via transferring from other departments as United College students. This first batch of undergraduates graduated in 1976. Biochemistry Department is also a founding Department of the Medical School at CUHK. In 2010, Biochemistry Department merged with Biology Department to form the School of Life Sciences under the Faculty of Science.

Study Areas (For more details, please refer to Part C):

Our curriculum emphasizes on current topics in biochemistry and molecular biology that have scientific, medical and social significance. Major study focuses include genetics and cell biology,

protein and enzymes, bioenergetics and metabolism, methods in biochemistry and molecular biology, and biomedical and health sciences. We also provide a wide range of elective courses for students to attain professional knowledge in specialized disciplines such as clinical biochemistry, immunology, endocrinology, neuroscience, forensic sciences and sport sciences, etc. Our curriculum is also designed to provide experiential learning through self-study modules, laboratory practicals and independent research.

Highlights of Biochemistry Programme:

Biochemistry Programme Mission

- Mission 1: To provide multi-disciplinary training on biochemical basis of life processes on human as major model
- Mission 2: To emphasize on experiential learning
- Mission 3: To cultivate the ability of critical thinking, proactive and responsible attitude and efficient communication skills

Biochemistry Programme Learning Outcomes (PLOs)

With the Programme mission, graduates of the Biochemistry Programme are expected to achieve the following PLOs:

- PLO1: Understand the core knowledge in biochemistry covering biomolecules, molecular biology, cellular biochemistry, metabolism, bioinformatics, proteins and enzymes and have the opportunity to specialize in a selected area of biochemistry.
- PLO2: Gain the knowledge of the latest biochemical technology in proteins, cell biology and, molecular biology.
- PLO3: Possess skills in designing experiments to test hypothesis, writing research report, applying their knowledge to daily life and developing self-learning capability.
- PLO4: Become all-round competent including the capability to work in a team.
- PLO5: Think critically and analytically.
- PLO6: Commit to ethical professionalism.

Centralized LE@RNBIOCHEM E-Learning Platform

Biochemistry Programme has established an e-learning platform LE@RNBIOCHEM with eight modules to enhance teaching and learning. Learning materials including videos of laboratory experiment on common biochemistry principles and techniques, each with interactive quizzes for students to evaluate what they have learned from the video. Recently, we further enriched the platform with materials for flipped classroom activities. There is a “Resources Finder” search function for students to find videos on laboratory techniques by courses, keywords or modules.

Website: www.bch.cuhk.edu.hk/learnbiochem



Diverse Curriculum of Biochemistry Education

In addition to courses on general and specialized Biochemistry topics, our Programme also emphasizes experiential and group learning as well as cultivation of generic skills. Relevant courses offered include BCHE2070 Research Internship, BCHE3092 Self-study Modules in Biochemistry and Professional Development and LSCI 4911-4913 Group Research in Life Sciences (I - III).

Level I Academic Advisors

Each student has a level I academic advisor. You can find who your level I advisor is on CUSIS, while their office address, telephone number and email can be found in the School website. Individual meetings at any time initiated by students are welcome. Your level I advisor can help you in the following areas:

- 1) Providing advice and assistance on academic development, study planning and life adjustment
- 2) Referring students to other supporting units in the university for assistance
- 3) Collecting students' feedback to improve curriculum, teaching and learning

Scholarships Offered by Biochemistry Programme

The below scholarships and awards are given to Biochemistry undergraduate students by nomination from Programme in recognition of their outstanding achievements and exceptional performance.

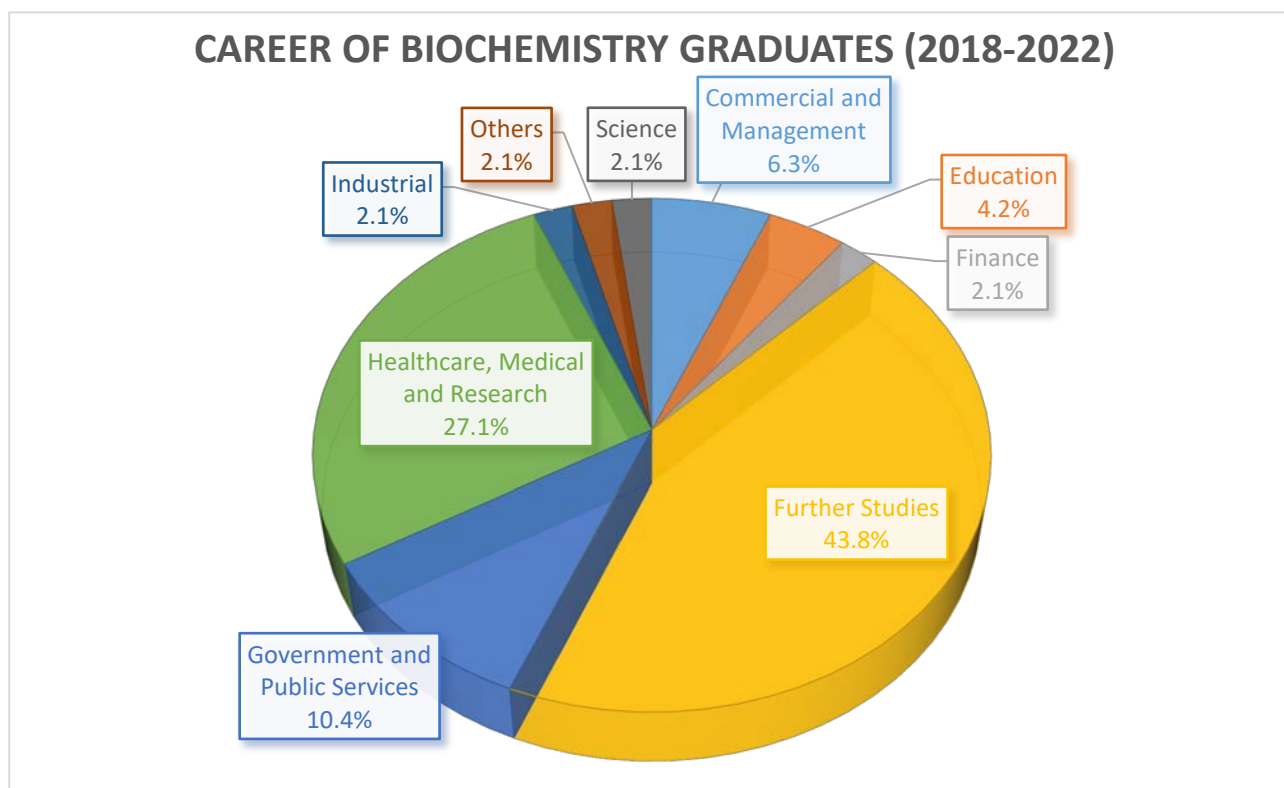
Name of Scholarships / Awards (Amount)	Particular
Prof. C.Y. Lee's Academic Award (HK\$2,000)	For a full-time year one or two undergraduate student majoring in Biochemistry with the highest major GPA during his/her first year of study in major subjects.
Prof. K.K. Ho's Academic Award (HK\$2,000)	For a full-time year two or three undergraduate student majoring in Biochemistry with the highest major GPA during his/her second year of study in major subjects.
Prof. Ma Lin's Academic Award (HK\$2,000)	For a full-time year three or final year undergraduate student majoring in Biochemistry with the highest major GPA during his/her third year of study in major subjects.
Biochemistry Alumni Association Scholarship (HK\$2,000)	A committee member of the Biochemistry Society, CUHK. The student should have the highest GPA during his/her term of service in the committee. (period of the service: from 2 nd term of year 1 to 1 st term of year 2)
Biochemistry Alumni (1977) Award for Distinguished Final Year Research Project (HK\$2,000)	For a full-time final year undergraduate student majoring in Biochemistry with the best final year research project.

Financial subsidy for MPhil and PhD in Biochemistry

Biochemistry major students enjoy generous financial subsidy for their postgraduate studies. Currently, local students in Hong Kong are waived from the tuition fees for their research-based postgraduate studies. Moreover, MPhil and PhD students receive studentship/fellowship (HK\$ 220,320 per year) from CUHK for two and four years respectively. Students are also eligible for application of the prestigious Hong Kong PhD Fellowship Scheme (HK\$331,200 per year).

Career Prospects (For more details, please see Part B):

- Nearly half of our graduates pursue postgraduate studies in local or overseas universities.
- About one fifth of our graduates join the healthcare, medical and research sector.
- Some other graduates enter the education, commercials, industrial and government sectors.



Contact Information

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Tel: 852-3943-6359

Programme Director:

Professor Chan Ho-Yin, Edwin

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Tel: 852-3943-4021

Programme Secretary:

Miss Yeung Chin-Yung

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Tel: 852-3943-6359

(B) Course List and Course Outline

Course List of Biochemistry Programme (BCHE Coded)		
Course Code	Course Title	Unit(s)
BCHE2000	Frontiers in Biochemistry	2
BCHE2030	Fundamentals of Biochemistry	3
BCHE2070	Research Internship	2
BCHE3030	Methods in Biochemistry	3
BCHE3040	Proteins and Enzymes	3
BCHE3050	Molecular Biology	2
BCHE3070	Recombinant DNA Techniques	1
BCHE3080	Bioenergetics and Metabolism	3
BCHE3092	Self-study Modules in Biochemistry and Professional Development	3
BCHE3110	Chemical Biology	3
BCHE3650	Molecular Biology and Recombinant DNA Laboratory	2
BCHE3730	Analytical Biochemistry Laboratory	2
BCHE4030	Clinical Biochemistry	3
BCHE4040	Aspects of Neuroscience	3
BCHE4060	Basic and Applied Immunology	3
BCHE4070	Management and Accreditation of Biochemical Laboratory	3
BCHE4080	Biochemistry for Forensic Sciences	2
BCHE4090	Biochemistry for Sport and Exercise	2
BCHE4130	Molecular Endocrinology	3
BCHE4640	Aspects of Neuroscience Laboratory	2
BCHE4760	Immunology and Haematology Laboratory	2
BCHE4830	Medical Biochemistry Laboratory	2
BCHE4901	Senior Experimental Project I	2
BCHE4902	Senior Experimental Project II	2
BCHE4903	Senior Experimental Project III	2

Suggested study paths with the courses in SLS for different types of career/higher degree studies. This is a recommendation. Students should consider their interest and timetable to choose courses apart from the core requirements. *These paths are for career development and future study planning purposes only. Students are not required to take all courses to specialize in a particular path.*

**Subject to co-/pre-requisites and availability of courses*

Medical Biochemistry study path

BCHE4030	Clinical Biochemistry
BCHE4040	Aspects of Neuroscience
BCHE4060	Basic and Applied Immunology
BCHE4070	Management and Accreditation of Biochemical Laboratory
BCHE4130	Molecular Endocrinology
BCHE4760	Immunology and Haematology Laboratory
BCHE4830	Medical Biochemistry Laboratory
BIOL3410	General Microbiology

BIOL4310	Human Genetics
ENSC3520	Environmental and Biochemical Toxicology
ENSC3820	Environmental and Biochemical Toxicology Laboratory

Environmental Science study path

BCHE2070	Research Internship
BIOL2210	Ecology
BIOL4220	Environmental Biotechnology
BIOL4260	Conservation Biology
ENSC3520	Environmental and Biochemical Toxicology
ENSC3820	Environmental and Biochemical Toxicology Laboratory
ENSC4250	Environmental Health

STEAM and Innovation study path

BCHE2070	Research Internship
BCHE3092	Self-study Modules in Biochemistry and Professional Development
BCHE4070	Management and Accreditation of Biochemical Laboratory
BMEG2001	Introduction to Biomedical Engineering
BMEG3102	Bioinformatics
LSCI3000	Synthetic Biology Workshop
LSCI4911 – 4913	Group Research in Life Sciences I – III
MBTE3000	Business and Social Aspects of Biotechnology
MGNT1010	Introduction to Business
MGNT1020	Principles of Management
SEEM2460	Introduction to Data Science
STAT3003	Survey Methods

Participation more in extra-curricular activities such as iGEM (in School of Life Sciences); iCare (<http://www.icare.cuhk.edu.hk/>) (at CUHK); PI Center (Dare to innovate, Dare to create, <http://www.picentre.cuhk.edu.hk/>) (at CUHK) and the College functions to get more fundings, more exposure, experience and awards to enrich your CV.

Suggested Study Paths through Other Courses

(The proposed courses offered by other departments can be used to fulfill their minor programmes. Please see their programme requirements)

**Subject to co-/pre-requisites and availability of courses*

Bioinformatics

BCHE3050	Molecular Biology
BCHE3070	Recombinant DNA Techniques

BCHE3650	Molecular Biology and Recombinant DNA Laboratory
BBMS5200	Technology in Molecular Biology
BIOL4310	Human Genetics
BIOL2420	Population Genetics
BMEG5790	Bioinformatics
CMBI4201	Genomics and Transcriptomics
CMBI4202	Proteomics
CMBI4203	Metabolomics

Business Administration Path

BCHE2070	Research Internship
BCHE4070	Management and Accreditation of Biochemical Laboratory
DSME1035	Fundamentals of Business Economics
FINA3010	Financial Markets
MBTE3000	Business and Social Aspects of Biotechnology
MGNT1010	Introduction to Business
MGNT1020	Principles of Management
MGNT2510	Introduction to International Business
MKTG3030	Integrated Marketing Communication

CUHK Entrepreneurship and Innovation Minor Programme

https://rgsntl.rgs.cuhk.edu.hk/aqs_prd_applx/public/handbook/document.aspx?id=1802&tv=T&lang=en

Popular courses for Medical Biochemistry Study Path

	Please select the courses below based on your personal interest and timetable
First Year of Attendance	1 st term (maximum 19 units) CHEM1070, ELTU1001 or 1002, LSCI1002, MATH1520, UGFH1000 or UGFN1000
	2 nd term (maximum 19 units) BCHE2000, CHEM1280, CHLT1100, ENGG1003 or 1004, STAT1012, UGFH1000 or UGFN1000
	Summer term (3 units) UGFH1000 or UGFN1000
Second Year of Attendance	1 st term (maximum 18 units) BCHE2030, BIOL2120, LSCI2002, LSCI2003, ELTU2018 or 2019
	2 nd term (maximum 18 units) BCHE2000, 3050, 3070, 3650, BIOL2313, 2410, CHLT1200
Third Year of Attendance	1 st term (maximum 18 units) BCHE3040, 3080, 3092, 4040, 4080, BIOL3630, ELTU3018
	2 nd term (maximum 18 units) BCHE3030, 3730, 4090, 4130, BIOL4310, ENSC3520
	Summer term (2 units) Major Elective(s): BCHE4901 or LSCI4911
Fourth Year of Attendance	1 st term (maximum 18 units) BCHE4060, 4640, 4760, BIOL3410 BCHE4902 or LSCI4912 or LSCI4000
	2 nd term (maximum 18 units) BCHE4030, 4830 BCHE4903 or LSCI4913 or LSCI4000

*In addition to the popular general education courses, students should also take other University General Education (9 units) & College General Education courses (6 units). The total units for General Education are 21 units.

**Students should also take one Physical Education course (1 unit) in both term 1 and term 2 during their first year of attendance. The total units for Physical Education are 2 units.

(C) Course Outlines

BCHE2000 Frontiers in Biochemistry (2022-23, 2nd Term)

Time: Mon 4:30 pm – 6:15 pm

Classroom: Institute of Chinese Studies L1

COURSE DESCRIPTION

This course presents the latest developments and advancements in biochemistry and molecular biology. It aims to alert students to the trends and recent breakthroughs in biochemical and biomedical research. Lecture topics are determined by individual teaching staffs of the course. They vary every year to reflect the latest development in the field of biochemical research. The lecture topics can be briefly classified into three major areas: New Research Areas (e.g. synthetic biology), Cellular Biochemistry (e.g. stem cells), and Biochemistry of Diseases (e.g. cancer).

LEARNING OUTCOME

Students are expected to understand recent developments in research fields related to Biochemistry and Molecular Biology. Basic and novel concepts of various topics and their future developments will be introduced and elaborated by teachers. Students are expected to read the recommended readings provided for each lecture topic, and to search for additional information in the library and online to study on their own.

CLASS SCHEDULE

Wk.	Date	Topic no.	Topic	Teacher
1	Jan. 9	1	Overview of the Course; Introduction to Gene Expression and Synthetic Biology	CKN
2	Jan. 16	2	Biochemistry: Past, Present and Future	PCS
3	Jan. 23	--	Lunar New Year Holiday	-
4	Jan 30	3	Non-coding RNA in Development	HLH
5	Feb. 6	4	Modulation of gene expression: RNAi vs. CRISPR	CKN
6	Feb. 13	5	Stem Cell Research	SYT
7	Feb. 20	--	General Discussion (Topics 1-5)	PCS /HLH/CKN/SYT
8	Feb. 27	--	Mid-term Examination (Topics 1-5)	-
9	Mar. 6	--	Study Week	-
10	Mar. 13	6	Metabolic Disease	HKN
11	Mar. 20	7	Cancer Treatment	WPF
12	Mar 27	8	Introduction to Cryo-EM	CYL
13	Apr. 3	9	Structural Biology and Drug Discovery	WNA
14	Apr. 10	--	Easter Holiday	
14	Apr. 17	10	Depression: Pharmacology, Drug Discovery, and Therapy	Dr. Stephen Wong
15	Apr. 24	--	General Discussion (Topics 6-9)	HKN/WPF/CYL/WNA

TEACHERS' INFORMATION

Teacher Name		Office	Tel.	Email
Prof. Jacky CK NGO (Course coordinator)	CKN	SCE E403	3943 6346	jackyngo@cuhk.edu.hk
Prof. Shannon WN AU	WNA	SC 178	3943 4170	shannon-au@cuhk.edu.hk
Prof. WP FONG	WPF	SCE E411	3943 6868	wpfong@cuhk.edu.hk
Prof. Jerome HL HUI	HLH	MMW 603A	3943 6316	jeromehui@cuhk.edu.hk
Prof. Wilson CY LAU	CYL	SC 184	3943 6253	wcylau@cuhk.edu.hk
Dr. Patrick HK NGAI	HKN	SC G83	3943 4359	hkngai@cuhk.edu.hk
Prof. PC SHAW	PCS	SC 180	3943 1363	pcshaw@cuhk.edu.hk
Prof. Faye SY TSANG	SYT	MMW 607	3943 1020	fayetsang@cuhk.edu.hk
Dr. Stephen Wong				

ASSESSMENT SCHEME (Total: 100 marks)

10 marks **Assignment** – creative multimedia presentation: *Individual student is required to produce a presentation that takes the form of i) IG/Facebook/MeWe post; ii) Powerpoint slides (limited to 5 slides); iii) Blog post/letters to editor (limited to 500 words); iv) video, song, animation (limited to 5 mins); or v) other creative multimedia with the consent of Prof. Jacky Ngo. The presentation must be capable of being uploaded onto the course Blackboard site. The presentation should provide the scientific facts/explanations for a RECENT NEWS STORY/DISCOVERY that is related to one or more of the topics covered in this course. Students will meet with Prof. Jacky Ngo at least once throughout the term to discuss on the design and progress of the presentation.*

Consultation period: TBA

5 marks **On-line exercise: Topic 2**

5 marks **On-line exercise: Topic 3**

5 marks **On-line exercise: Bioethics**

40 marks **Mid-term exam** (MCQs + short Qs): *Closed-book; covering Topics: 1-5*

35 marks **Final exam** (MCQs + short Qs): *Closed-book; covering Topics 6-9*

REFERENCES Reading materials will be given by individual teachers.

GRADE DESCRIPTOR (for reference only)

Grade A :

Demonstrates a deep understanding of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Demonstrate the ability to synthesize and apply the subject matter learnt in the course, to novel situations and/or in novel ways, in a manner that would surpass the normal expectation at this level.

Has the ability to express the synthesis of ideas or application in a clear and cogent manner.

Grade A- :

Demonstrates high level of understanding of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Demonstrate the ability to state and apply the subject matter learnt in the course to familiar and standard situations in a manner that is logical and comprehensive.

Has the ability to express the knowledge or application with clarity.

Grade B :

Demonstrate a competent grasp of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Demonstrates the ability to state and partially apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is usually logically persuasive.

Has the ability to express the knowledge or application in a satisfactory and unambiguous way.

Grade C :

Demonstrate a basic understanding of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Demonstrates the ability to state and apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is not incorrect but is somewhat fragmented.

Has the ability to express the separate pieces of knowledge in an unambiguous way.

Grade D :

Demonstrate a simplistic knowledge of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Demonstrates the ability to state and sometimes apply the subject matter learnt in the course to some simple and familiar situations in a manner that is broadly correct in its essentials.

Has the ability to state the knowledge or application in simple terms.

Grade F:

Demonstrate an incomplete or incorrect knowledge of the latest developments and advancements in biochemistry and molecular biology, in particular their underlying principles and implications in health and diseases.

Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.

IMPORTANT:

Academic honesty and plagiarism

The University adopts a policy of zero tolerance on plagiarism. Information regarding the academic honesty and plagiarism policy in the University is located at <http://www.cuhk.edu.hk/policy/academichonesty/>.

Guideline about plagiarism

Any assignment (i.e., project, essay, or paper) that shows evidence of plagiarism will be marked down severely. In simple terms, plagiarism is copying passages and/or ideas from other sources without referencing those sources. Moreover, when you report someone else's ideas/findings you must put it in your own words and not merely copy full sentences or parts of sentences from the source article. It is your responsibility as a scholar-in-training to cite the ideas and work of others correctly.

If you commit plagiarism in an assignment, and it is your first offence in the course, the penalty will range from a minimum of a single letter grade reduction in score on the assignment to a maximum of failure on the assignment. A second offence within the same course will result in a minimum penalty of a single letter grade reduction in the course grade to a maximum penalty of course failure. The specific penalty applied is up to the discretion of the professor. In all cases of plagiarism, the student's name will be recorded in a central database maintained by the general office. If a student is referred for plagiarism in more than one course, or more than one instance in the same course, the student's case will be forwarded to the university administration for follow-up action.

Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>).

REMINDER: Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available online: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>; please check them out.

BCHE2030 Fundamentals of Biochemistry (2022-23, Term 1)

1. Description

The course introduces the fundamental principles of biochemistry that are needed for all life science disciplines. It will cover the importance of water, structure-function relationships of biomolecules (including amino acids, proteins, carbohydrates, lipids and nucleic acids), the biochemical logic of the metabolic pathways, and an overview of metabolism with emphasis on how biomolecules are interconverting with each other.

2. Contents/Fundamental Concepts

Topic	Contents/Fundamental Concepts
Water – the medium of life	Molecular structure of water Weak interactions in aqueous system Acid/base equilibrium and buffers
Carbohydrates	Monosaccharides Disaccharides and oligosaccharides Polysaccharides Glycoconjugates Biological information and the sugar code
Lipids	Storage lipids Membrane lipids Other lipids
Nucleotide and nucleic acids	Nucleotide Nucleic acids Other functions of nucleotides
Proteins	Amino acids Peptide bonds Primary, secondary, tertiary and quaternary protein structures Protein folding Hemoglobin: an example to illustrate the relationship of protein structure and function
Thermodynamics and enzyme kinetics	Free energy as a measure of a reaction's tendency to proceed spontaneously Concepts of reaction rates, equilibria, activation free energy Concepts of transition-state complementarity Steady-state and Michaelis–Menten equation Chemical reactions in enzyme mechanisms Chymotrypsin: an example to illustrate enzyme-catalyzed reactions Vitamins as co-factors in enzyme catalysis
Bioenergetics and metabolism	Importance of energy changes and energy transfer in metabolism Concepts of 'high-energy' compounds and coupled reactions Role of oxidation and reduction in metabolism

	Oxidation of carbon fuels as a major source of cellular energy ATP as a universal energy currency NAD(P)H/FADH ₂ as universal electron carriers Importance of Coenzyme A in activation of metabolic pathways
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3. Learning Outcomes

- To appreciate the importance of water in living organism.
- To understand the structure-function relationships of different types of biomolecules.
- To understand the chemical logic (thermodynamics, mechanism, and catalysis) behind biochemical reactions.
- To have an overview of metabolic pathways, appreciate how biomolecules are interconverting with each other and their relationship with diseases.

4. Assessment Scheme

Mid-term exam.	30%
Final exam.	50%
In-class quiz	10%
Assignment	5%
Tutorials*	5%

** There will be 5 online tutorials. Active participation will earn 1 mark in each tutorial.*

5. Textbooks

Nelson & Cox, Lehninger Principles of Biochemistry, W.H. Freeman
Berg, Tymoczko & Stryer, Biochemistry, W.H. Freeman
Campbell, Farrell & McDougal, Biochemistry, Cengage

6. Lecturers

Prof. WN Au (course co-ordinator)	SC 178	Tel: 3943 4170	e-mail: shannon-au@cuhk.edu.hk
Prof. KF Lau	SC 291	Tel: 3943 1106	e-mail: kflau@cuhk.edu.hk

7. Course Schedule

Time: Friday 8:30 am – 11:15 am (F1-3)

Wk.	Date	Lecture Topic	Teacher
1	Sept. 9	Introduction	Prof. KF Lau
2	Sept. 16	Water	Prof. KF Lau
3	Sept. 23	Carbohydrates	Prof. KF Lau
4	Sept. 30	Lipids	
5	Oct. 7	Nucleotide and Nucleic Acids	Prof. KF Lau
6	Oct. 14	Protein	Prof. WN Au
7	Oct. 21	Mid-term Examination*	Prof. KF Lau
8	Oct. 28	Protein structure	Prof. WN Au
9	Nov. 4	Protein structure and function	Prof. WN Au
10	Nov. 11	Protein structure and function	Prof. WN Au
11	Nov. 18	Thermodynamics and enzyme kinetics / Quiz I	Prof. WN Au
12	Nov. 25	Thermodynamics and enzyme kinetics	Prof. WN Au
13	Dec. 2	Bioenergetics & Metabolism	Prof. WN Au

8. Posting Course Announcements

Pay attention to your CUHK email account for announcements about this course, teachers will send messages to students via the CUHK Blackboard System (<http://blackboard.cuhk.edu.hk>) and students can view the message automatically in their CU email accounts. The UReply system will be used and multiple choice questions will be discussed to reinforce some basic concepts covered in the lectures.

9. Academic Honesty and plagiarism

The University adopts a policy of zero tolerance to any act of academic dishonesty. Please read the updated *Procedures* at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>). Please note that students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty.

REMINDER: Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on-line:

<http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>; please check them out.

BCHE 2070 Research Internship 2U; STOT

DESCRIPTION

This course is designed to let students gain practical experience in scientific research in a laboratory or biotechnology firm during the summer period or term time. All research or internship projects, locally or overseas, must be approved by the Biochemistry Program, School of Life Sciences.

GUIDELINE

1. All DREAM program, SMART program, summer internship students are welcome to take this course.
2. This course is available in all terms, students carrying out research work during term time or summer period are most welcome to register.
3. All students must have a nomination form signed by a supervisor and approved by the course coordinator to register this course
4. Evaluations: Supervisor (40%), panel member 1 (30%) and panel member 2 (30%).
5. All students taking this course must submit a brief report up to around 30 pages (double spacing) of the research performed for record and evaluation. All report must be submitted with a signed form obtained from the CUHK VeriGuide system.

LEARNING OUTCOME

After completing the course, students should be able to:

- i. carry out an independent research under supervision by a faculty staff;
- ii. design simple experiments and follow protocols to carry out some biochemical analyses;
- iii. obtain data and carry out data analysis with simple statistics, and
- iv. write a brief scientific report or communication.

Objectives for student development:

1. Learn how to integrate basic biochemical techniques to perform some experiments or validate an assay.
2. Learn how to collect and read literature in a specific area of research.
3. Learn how to design simple experiment, in vitro or in vivo, and carry out the experimental procedure independently.
4. Work as a member of the team.
5. Learn how to compile or collect data with accuracy and precision.
6. Learn how to analyze the data obtained and write a short report to summarize the work done.
7. Prepare students to learn time management skills and do independent research for their final year project (Senior Experimental Project)

COURSE SYLLABUS

There is no specific content for this course, which is guided by a supervisor and the project is to be assigned by the supervisor. Summer Interns (including but not limited to DREAM and SMART program in the School of Life Sciences) may take this course but a local supervisor or supervisor from Biochemistry Program must be assigned in addition to the internship supervisor for marking. Title of the project report must be different from other courses.

Duration (study period)

Students taking this course usually start their experiments in July or early at term start in September and complete the project with a report written for marking by the end of the terms. Deadline of submission of report is at term end.

Job nature

Students may hold a project on testing and purification of a biomolecule, cloning of a gene, detection of a gene mutation, performing PCR assay or ELISA assay, purification of a recombinant protein, developing an assay from modified protocols, doing literature search of patents and help filing a patent application in a patent law firm, doing data mining (*In Silico* analyses), genome or RNASEQ sequence analyses, testing of a drug or toxicant, etc.

Report for evaluation

1. The report should include a cover page with the title of the research, followed with a one page abstract (< 250 words), an introduction, materials and methods, results and discussion, acknowledgement, and references.
2. Rationale of the study and background information should be covered in the introduction with some literature review and justification of why you are working on this project (importance of the project). Carefully explain the procedure of the experiments and technical details of how the assay is carried out in the section of materials and methods. After presenting the results and discuss the meaning of the results, explain briefly what could be done next or what could have been done better to obtain better results.
3. Explain the limitations of the present study. At the end, a conclusion has to be made in the discussion part to end the report.
4. Usually, 3-5 figures and tables should be enough for such a short report of around 25-30 pages with word count < 5,000. Students may consider follow the journal format of Biochemical and Biophysical Research Communications.

Note: In the case that face-to-face meetings are deemed not feasible by the university, all meetings and assessments will be conducted online. Students should follow the course announcements on the Course Blackboard as well as university announcements.

GRADE DESCRIPTORS

Grade	Marks	Contents and Writings	Data Presentation
A	>90	Able to identify and address the topic in the research up to a scholastic standard with an excellent review of the research topic	Up to a publication standard of SCI journal with quality data presentation
A-	80-90	Able to identify and address the topic in the research up to a high standard	Up to a publication standard to SCI journal, but errors occur and weak in discussion
B+	75-80	Able to identify and address the topic in the research up to a good standard	Up to a good standard with enough data, but lack of statistical analysis
B	70-75	Able to identify and address the topic in the research up to a good standard, but some minor errors occur	Up to a good standard, but failed to provide sufficient results or citations
B-	65-70	Able to identify and address the topic in the research up to a good standard, but research background not clearly reviewed	Limited data provided, weak in data interpretations or no interpretation at all
C+	60-65	Unable to address the topic in the research	Invalid data presented
C	55-60	Unable to address the topic in the research	Invalid and very limited data presented
C-/D	50-55	Unable to address the topic in the research, basically a review paper	No data presented; research failed but able to submit previous data to explain the project
F	< 50	Plagiarized materials found in the report No report submitted	Failed to present any data in the report

RECOMMENDED READING

Web resources

These websites provide how to write a good scientific report:

https://www.sheffield.ac.uk/polopoly_fs/1.96443!/file/report-writing-06-07.pdf

[Scientific Writing Made Easy: A Step-by-Step Guide to Undergraduate Writing in the Biological Sciences](#)

[11 steps to structuring a science paper editor will take seriously](#)

ENQUIRY

Prof. CHAN Ting Fung (course coordinator); Tel: 3943-6876; Email: tf.chan@cuhk.edu.hk;

Office address: Room 177, Science Centre, CUHK

BCHE 3030 METHODS IN BIOCHEMISTRY
2022-23, 2nd term

Description

This course aims at introducing quantitative analyses of biochemical reactions and subcellular components to students. Methods for purification and studies on biomolecules will be introduced. Techniques including fluorescence spectrophotometry and microscopy, centrifugation, chromatography, electrophoresis and X-ray crystallography will be covered.

Content/Fundamental Concepts

Fluorescence Technology: This block is intended to introduce to students a basic overview of the principles of fluorescence and its applications for biochemistry and cell biology research. Topics include principles of fluorescence, application of fluorescence probes, fluorescence measurements and techniques.

Centrifugation: This session will introduce the basic theory of centrifugation and the mathematical expression of sedimentation rate. We will also discuss the different types of centrifuge and rotor commonly used in biochemical studies. The principles of differential centrifugation and density gradient centrifugation, and their applications will be covered.

Chromatography: This session will introduce the basic principles of chromatography, a partition process in which molecules distribute between two different phases. The various chromatographic techniques particularly useful in protein purification, including ion-exchange chromatography, gel filtration and affinity chromatography, will be discussed.

Electrophoresis: In this block of lectures, particular emphasis will be given to the electrophoretic methods used in studying proteins, namely SDS-polyacrylamide gel electrophoresis and isoelectric focusing. The use of electrophoresis in the study of nucleic acids will be discussed. In addition, the applications of the instrumental technique capillary electrophoresis will also be covered.

X-ray Crystallography: This session will introduce the basic principles of protein crystallography. Different protein crystallization methods and the use of X-ray diffraction to determine the three-dimensional protein structures will be discussed.

Learning Outcome

After completing the course, students should be able to understand both the basic principles and the practical aspects of different methods in biochemical analyses, including fluorescence techniques, centrifugation, chromatography, electrophoresis and X-ray crystallography. The knowledge gained will be useful in their final year experimental research project.

Assessment Scheme

Assignments (total 3): 30%

(10% on fluorescence technology, 10% on centrifugation/chromatography/electrophoresis, 10% on X-ray crystallography)

All the assignments have to be submitted through Blackboard. Submission after the designated deadline will be penalized accordingly; one-day delay will be penalized for 10% of total marks of the assignment, two-day delay for 20%, and so on.

Final Examination: 70 %

(20% on fluorescence technology, 30% on centrifugation/chromatography/electrophoresis, 20% on X-ray crystallography)

Grade Descriptors

Grade	Overall Course
A	Outstanding performance on all learning outcomes
A-	Generally outstanding performance on the majority of learning outcomes
B	High performance on some learning outcomes
C	Satisfactory performance on the majority of learning outcomes
D	Barely satisfactory performance on a number of learning outcomes
F	Unsatisfactory performance on the majority of learning outcomes

Learning Resources

Reference: Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology 8th edition, 2018 Edited by Andreas Hofmann and Samuel Clokie, Cambridge University Press. (online access through the University library system)

Other reading materials (including reference books, journals articles and web sites) will be given by individual teachers.

Course Schedule

T 3-4 10:30 am – 12:15 pm Lady Shaw Building LT6
H 4 11:30 am – 12:15 pm Lady Shaw Building LT6

Week	Date	Hour	Topic	
1	10 Jan (Tue)	2	Introduction to Fluorescence and Fluorescent Probes	Wilson Lau

	12 Jan (Thu)	1	Green Fluorescent Protein	Wilson Lau
2	17 Jan (Tue)	2	Forster Resonance Energy Transfer Real-time Polymerase Chain Reaction	Wilson Lau
	19 Jan (Thu)	1	Flow Cytometry	Wilson Lau
3	24 Jan (Tue)		HOLIDAY: LUNAR NEW YEAR	
	26 Jan (Thu)		HOLIDAY: LUNAR NEW YEAR	
4	31 Jan (Tue)	2	Fluorescence Microscopy Single-molecule Studies	Wilson Lau
	2 Feb (Thu)	1	Microscale Thermophoresis	Wilson Lau
5	7 Feb (Tue)	2	Discussion on Fluorescence Techniques	Wilson Lau
	9 Feb (Thu)	1	General Techniques in Protein Purification	W P Fong
6	14 Feb (Tue)	2	Basic Principles in Centrifugation	W P Fong
	16 Feb (Thu)	1	Different Centrifugation Techniques	W P Fong
7	21 Feb (Tue)	2	Basic Principles in Chromatography	W P Fong
	23 Feb (Thu)	1	Different Chromatographic Systems (I)	W P Fong
8	28 Feb (Tue)	2	Different Chromatographic Systems (II) Chromatography and Protein Purification	W P Fong
	2 Mar (Thu)	1	Basic Principles in Electrophoresis (I)	W P Fong
9	7 Mar (Tue)		READING WEEK	
	9 Mar (Thu)		READING WEEK	
10	14 Mar (Tue)	2	Basic Principles in Electrophoresis (II) Different Types of Protein Electrophoresis (I)	W P Fong
	16 Mar (Thu)	1	Different Types of Protein Electrophoresis (II)	W P Fong
11	21 Mar (Tue)	2	Protein Detection after Electrophoresis Nucleic Acid Electrophoresis	W P Fong
	23 Mar (Thu)	1	Capillary Electrophoresis	W P Fong
12	28 Mar (Tue)	1	Discussion on Centrifugation/Chromatography/ Electrophoresis Techniques	W P Fong
		1	Introduction to Protein X-ray Crystallography	Shannon Au
	30 Mar (Thu)	1	Crystallization Methods	Shannon Au
13	4 Apr (Tue)	2	Crystallization Optimization	Shannon Au
	6 Apr (Thu)	1	Basic Concepts in X-ray Diffraction (I)	Shannon Au
14	11 Apr (Tue)	2	Basic Concepts in X-ray Diffraction (II)	Shannon Au
	13 Apr (Thu)	1	Structure Determination, Model Building and Refinement (I)	Shannon Au
15	18 Apr (Tue)	2	Structure Determination, Model Building and Refinement (II)	Shannon Au
	20 Apr (Thu)	1	Recent Advances in Protein Crystallography	Shannon Au

Teacher's Contact Details

Professor FONG, Wing Ping (coordinator)	SCE 411	39436868	wpfong@cuhk.edu.hk
Professor AU, Shannon W.N.	SC 178	39434170	shannon-au@cuhk.edu.hk
Professor LAU, Wilson C.Y.	SC 184	39436253	wcylau@cuhk.edu.hk

A Facility for Posting Course Announcements

Course announcements and materials will be posted on the Blackboard website at the CU E-Learning system. Powerpoint slides will be uploaded before the lecture.

Academic Honesty and Plagiarism:

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines & procedures applicable to breaches of such policy & regulations. CUHK places very high importance on honesty in academic work submitted by students, and adopts a policy of zero tolerance on cheating and plagiarism. Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>). For each assignment, students are required to attach a signed declaration, showing that they are aware of these policies, regulations, guidelines and procedures ([http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_\(2013-14\)/p10.htm](http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_(2013-14)/p10.htm)). All suspected cases of plagiarism will be sent directly to the disciplinary committee for investigation.

BCHE3040 PROTEINS AND ENZYMES

2022/2023, 1st Term

Description:

Three-dimensional conformations of proteins and protein folding will be discussed with emphasis on structure-function relationships. Enzyme catalysis will be introduced with respect to coenzyme requirements, kinetics, catalytic mechanism and regulation of enzymatic activities.

Contents/Fundamental Concepts:

Protein Structure and Folding: This session will discuss the basic principles governing the structure of protein. As protein molecules are organized in a structural hierarchy, topology diagrams will be used to illustrate the motifs of protein structure. In particular, the alpha-domain structures, beta structures and the alpha/beta structures will be discussed. The key concepts of thermodynamics and kinetics in the process of protein folding and the stabilization of protein structure will be illustrated.

Structure-Function Relationship in Selected Proteins: Chaperone is protein that helps correct protein folding while ubiquitin, together with the proteasome system, is responsible for protein degradation. They will be discussed with respect to their structure-function relationship. Specific examples will be used to illustrate the general structure of membrane proteins. DNA-binding proteins can regulate gene activity. Different DNA binding motifs will be introduced. To improve the properties, protein can be engineered. Methods like DNA shuffling will be discussed.

Protein-Protein Interaction: The different methods for studying protein-protein interaction will be introduced. Among them are qualitative ones like chemical cross linking, co-immunoprecipitation, yeast two hybrid system, fluorescent resonance energy transfer, and also quantitative ones like surface plasmon resonance and isothermal titration calorimetry. The use of mass spectrometry in the identification of protein will also be discussed.

Introduction to Enzymes: The basic characteristics of enzymes as biocatalysts, for example the specificity, ability to be regulated and the catalytic power will be introduced. Ribonucleic acids having catalytic activities will be mentioned. The enzyme nomenclature system and the requirement of coenzymes and metals ions for various enzymatic reactions will also be discussed.

Kinetics, Regulation and Mechanism: Different methods for measuring enzyme activities and the precautions needed when performing enzyme assays will be discussed. Michaelis-Menten enzyme steady state kinetics will be covered, with particular emphasis on the significance of the K_m and k_{cat} values. Different types of enzyme inhibitors, including allosteric ones, will be introduced. The various means by which enzyme activities can be regulated will be mentioned. Examples will be given to illustrate how the different amino acid residues in the active site of the enzyme contribute to the activity of the enzyme.

Clinical and Industrial Enzymology: This session will introduce the use of enzymes in different clinical applications, for example, the serum enzyme activity assay as a diagnostic tool, the use of enzyme as a reagent to measure the concentration of metabolites, the use of enzyme inhibitor as drug and the use of enzyme itself as therapeutic agent. Examples will also be given to illustrate the application of enzymes in different industries, particularly, in pharmaceutical and food industries.

Learning Outcomes:

After completing the course, students should be able to:

- (1) explain the protein structure and the folding process;
- (2) learn the structure and function of some selected proteins, for example, membrane proteins;
- (3) describe the different methods for studying protein-protein interactions;
- (4) know the basic principles in enzymology;
- (5) understand the kinetics, mechanism and regulation of enzyme activity; and
- (6) realize the clinical and industrial applications of enzymes.

Assessment Scheme:

Assignments (total 2): 20% The two assignments have to be submitted through Blackboard. Submission after the designated deadline will be penalized accordingly; one-day delay will be penalized for 10% of total marks of the assignment, two-day delay for 20%, and so on.

Mid-term Examination: 40% Proteins

Final Examination: 40% Enzymes

Grade Descriptors

Grade	Overall Course
A	Outstanding performance on all learning outcomes
A-	Generally outstanding performance on the majority of learning outcomes
B	High performance on some learning outcomes
C	Satisfactory performance on the majority of learning outcomes
D	Barely satisfactory performance on a number of learning outcomes
F	Unsatisfactory performance on the majority of learning outcomes

Learning Resources:

- (1) Lehninger Principles of Biochemistry.
D.L. Nelson and M.M. Cox, W.H. Freeman, 2017. (QU4 N45)
- (2) Biochemistry.
J.M. Berg, J.L. Tymoczko, G.J. Gatto and L. Stryer, W.H. Freeman, 2019. (QU4 S77)
- (3) Proteins: Structure and Function.
D. Whitford, John Wiley & Sons Ltd., 2005. (QU55 W535) online access
- (4) Introduction to Proteins: Structure, Function and Motion.
A. Kessel and N. Ben-Tal, CRC Press, 2011. (QU55 K37) online access
- (5) Protein Folding : An Introduction.
C.M. Gomes and P.F.N. Faísca, Springer 2019. online access
- (6) How Proteins Work.
M. Williamson, Garland Science 2012. (QD431 W536)
- (7) Enzymes: Catalysis, Kinetics and Mechanisms.
N.S. Punekar, Springer 2018. (QU135 P86) online access
- (8) Journal of Visualized Experiments (jove.com) online access

Course Schedule:

M1 8:30 am - 9:15 am

Lady Shaw Building LT4

W1-2 8:30 am - 10:15 am

Lady Shaw Building LT3

Week	Date	Hour(s)	Topic
1	5 Sep (Mon)	0	UNIVERSITY INAUGURATION CEREMONY
	7 Sep (Wed)	2	Introduction to “BCHE3040 Proteins and Enzymes” Hierarchy of Protein Structure (I)
2	12 Sep (Mon)	0	PUBLIC HOLIDAY
	14 Sep (Wed)	2	Hierarchy of Protein Structure (II) Protein Functions
3	19 Sep (Mon)	1	Determination of Protein Structure
	21 Sep (Wed)	2	Protein Folding Proteins in Folding and Degradation
4	26 Sep (Mon)	1	Protein Folding Diseases
	28 Sep (Wed)	2	Membrane Protein
5	3 Oct (Mon)	1	Protein-Protein Interaction (I)
	5 Oct (Wed)	2	Protein-Protein Interaction (II) Protein-DNA Interaction (I)
6	10 Oct (Mon)	1	Protein-DNA Interaction (II)
	12 Oct (Wed)	2	Protein Identification by Mass Spectrometry
7	17 Oct (Mon)	1	Protein Engineering
	19 Oct (Wed)	2	Introduction to Enzymes RNA as Biocatalyst
8	24 Oct (Mon)	1	Cofactor Requirement
	26 Oct (Wed)	2	MID-TERM EXAMINATION
9	31 Oct (Mon)	1	Determination of Enzyme Activity
	2 Oct (Wed)	2	Michaelis–Menten Kinetics
10	7 Nov (Mon)	1	Bi-substrate Reaction
	9 Nov (Wed)	2	Enzyme Inhibitors
11	14 Nov (Mon)	1	Allosteric and Multimeric Enzyme
	16 Nov (Wed)	2	Regulation of Enzyme Activity
12	21 Nov (Mon)	1	Enzyme Catalysis
	23 Nov (Wed)	2	Examples of Enzyme Mechanism
13	28 Nov (Mon)	1	Industrial Enzymology
	30 Nov (Wed)	2	Clinical Enzymology
Total:		37	

Teacher's Contact Details:

Professor FONG WING-PING SCE 411 39436868 wpfong@cuhk.edu.hk

A Facility for Posting Course Announcements:

Course announcements and materials will be posted on the Course Blackboard. The powerpoint slides used will be uploaded before the lecture.

Academic Honesty and Plagiarism:

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BCHE3050 Molecular Biology
Schedule and Assessment Scheme 2022-23 Term 2

Week	Date	Topic
1	9 Jan	Introduction to course, characteristics of DNA
2	16 Jan	Genome and elements, Organization and packaging of genome, DNA replication
3	23 Jan	Lunar New Year
	30 Jan	DNA replication
4	6 Feb	Transcription and RNA processing Tutorial
5	13 Feb	Transcriptional regulation
7	20 Feb	60 min test
8	27 Feb	DNA mutation and recombination
9	6 Mar	Reading week
10	13 Mar	DNA repair
11	20 Mar	Translation
12	27 Mar	Translation
13	3 Apr	Translational control
14	10 Apr	Easter holiday
15	17 Apr	Proteins after translation

School Term: 9 Jan – 22 Apr 2021

Class Period: 9:30AM - 11:15AM (Monday), LSK LT3

Course description:

This course discusses basic areas of molecular biology. Topics include: DNA and genome, DNA replication, transcription, translation, gene regulation, DNA mutation, recombination and repair.

References:

J.M. Berg, J.L. Tymoczko, L. Stryer (2011) Biochemistry. 7th Edition, or 2015 8th Edition.
D.L. Nelson, M.M. Cox (2012) Lehninger Principles of Biochemistry 6th Edition, or 2017 7th Edition.
T.M. Devlin ed. (2011) Textbook of biochemistry: with clinical correlations, 7th Edition.

One online exercise – 10% **Deadline: 23:59, 8 February 2023**

Mid-term test – 45%

Final examination – 45%

BCHE3070 Recombinant DNA Techniques
Schedule and Assessment Scheme 2022-23 Term 2

Week	Date	Topic
1	12 Jan	Restriction and modification enzymes
2	29 Jan	Restriction and modification enzymes
3	26 Jan	Chinese New Year Holiday
4	2 Feb	Separation and joining of DNA, purification of DNA
5	9 Feb	Prokaryotic vectors and their introduction to cells, Short exercise 1
6	16 Feb	Prokaryotic vectors and their introduction to cells
7	23 Feb	Polymerase chain reaction, Submit exercise 1
8	2 Mar	Polymerase chain reaction, DNA sequencing and applications
9	9 Mar	Reading week
10	16 Mar	DNA sequencing and applications, Discussion on exercise 1, Short exercise 2
11	23 Mar	Eukaryotic vectors and their introduction to cells
12	30 Mar	To obtain clones of a specific gene, Submit exercise 2
13	6 Apr	Production of protein from cloned gene
14	13 Apr	Studying gene expression and function, Discussion on exercise 2
15	20 Apr	Studying gene expression and function

Class Period: 10:30AM - 11:15AM (Thursday), MMWLT1

Course description:

This course covers the basic concepts of common recombinant DNA techniques, including restriction and modification enzymes and their applications in recombinant DNA techniques, analyses of nucleic acids, insertion of DNA fragment into vectors and transformation of model organisms, expression of recombinant proteins, polymerase chain reaction, DNA and genome sequencing

Course objectives:

- (1) know the basic common techniques for DNA manipulation and analyses,
- (2) apply the knowledge acquired on given cases.

Students can ask senior student helpers questions through a webform.

A tutorial session will be set up for students to consult senior student helpers

Reference:

Brown, T.A. (2016/2021) Gene cloning and DNA analysis. An introduction. 7th/8th Edition.

Two Exercises: 20% each, 1 hour open book examination: 60%

BCHE3080 Bioenergetics and Metabolism (2022-2023, 1st Term)

Course Outline

<u>Teacher</u>	Office	Tel.	E-mail
Dr. Ngai Hung-Kui, Patrick	SCG83	3943 4359	hkngai@cuhk.edu.hk

Meeting Information

Tuesday 2:30 - 5:15 PM LSB LT4

Course Description

This course covers basic concepts of how biological organisms obtain energy and perform metabolism to build different biomolecules. The following biochemical processes underlying energy transformation in living organisms will be discussed: photosynthesis, glycolysis, citric acid cycle, electron transport, oxidative phosphorylation, fatty acid oxidation. Biosynthesis of carbohydrates, lipids, nucleic acids, and proteins will be provided. The integration of metabolic pathways will also be discussed. Students are advised to take BCHE2030 before taking this course. (*Refer to Appendix I for the Grade Descriptors of this course*)

Assessment Scheme[#]

Mid-Term Examination	30%
Final Examination	60%
Term Paper (~600 words)	10%

[#]In the event that face-to-face teaching and examinations cannot be arranged due to the pandemic, the mode of teaching and the format of assessments may be revised according to the guidelines of the School of Life Sciences. The details will be announced in due course.

Recommended Textbooks

1. David L. Nelson, Michael M. Cox. (2021). **Lehninger Principles of Biochemistry** (8th ed.). New York: Macmillan International Higher Education.
[[Online Access](#) ; UL: QU4 .N45 2017]
2. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr., Lubert Stryer. (2019). **Biochemistry** (9th ed.) New York: Macmillan International Higher Education.
[[Online Access](#); UL: QU4 .S77 2015]
3. John W. Baynes & Marek H. Dominiczak. (2019). **Medical biochemistry** (5th ed.). Edinburgh: Saunders Elsevier. [[Online Access](#); UL: QU4 .B39 2019]
4. Donald Voet, Judith G. Voet, & Charlotte W. Pratt. (2013). **Principles of biochemistry** (4th ed., International student version edition). Hoboken, N.J.: Chichester: Wiley; John Wiley.
[UL: QP514.2 .V643 2013]

Electronic Resources (E-Books)

1. Panini. (2021). Medical biochemistry: an essential textbook (2nd ed.). Thieme. [[Online Access](#): ISBN: 9781626237452]
2. Ferrier. (2017). Biochemistry (7th ed.). Philadelphia: Wolters Kluwer. [[Online Access](#): ISBN: 1496344499]
3. Koolman, Röhm, K.-H., & Wirth, J. (2013). Color atlas of biochemistry (3rd ed., rev. and updated.). Thieme. [[Online Access](#): ISBN 9783131696939]
4. Cammack, R. (2006). **Oxford dictionary of biochemistry and molecular biology** (Rev. ed.). Oxford; New York: Oxford University Press. [[Online Access](#): ISBN 0198529171]

Electronic Resources (E-Journals)

1. **Journal of Biological Chemistry**
American Society for Biochemistry Molecular Biology [[Online Access](#) ISSN 1083-351X]
2. **Cell Metabolism**
Cambridge, MA: Cell Press [[Online Access](#): ISSN 1932-7420]
3. **Trends in Endocrinology and Metabolism**
Amsterdam, the Netherlands: Elsevier Science Pub. Co. [[Online Access](#): ISSN 1879-3061]
4. **Diabetes, Obesity & Metabolism**
England: John Wiley & Sons Ltd. [[Online Access](#): ISSN 1463-1326]
5. **Journal of inborn errors of metabolism and screening**
Thousand Oaks, CA : Sage Publications [[Online Access](#): ISSN 2326-4594]

Immersive Learning Resources (Mobile Apps)

The mobile apps are developed by the Biochemistry Programme (CUHK) and can be freely downloaded in Play Store / Apple Store / Blackboard.

1. Virtual Reality – ‘Mitochon VR’ & ‘Mitochon VR II’
2. Augmented Reality – ‘ATP Synthase’

Honesty in Academic Work

Every assignment handed-in should be accompanied by a signed declaration. The form can be downloaded via the following website. Assignments without the properly signed declaration will not be graded. (*Refer to Appendix II for more information about Academic Honesty*)

[http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_\(2013-14\)/p10.htm](http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_(2013-14)/p10.htm)

CU eLearning System (Blackboard)

Visit the website of the CU eLearning System (<https://blackboard.cuhk.edu.hk/>) and login using your Student-ID@link.cuhk.edu.hk and OnePass Password.

Course Schedule

Wk.	Date	Modules
1	Sept. 6	Module 1 Overview of Bioenergetics and Metabolism
2	Sept. 13	Module 2 Glycolysis and the Catabolism of Hexoses <ul style="list-style-type: none"> • Glycolysis: a central pathway of glucose metabolism • Utilization of other sugars as metabolic fuels • Pentose phosphate pathway
3	Sept. 20	Module 3 Citric Acid Cycle and Oxidative Phosphorylation <ul style="list-style-type: none"> • Common pathway for oxidation of acetyl group • Regulation and amphibolic nature of TCA cycle • Electron transport chain and the mechanism of ATP synthesis
4	Sept. 27	Module 4 Photophosphorylation <ul style="list-style-type: none"> • Structure of photosynthesis apparatus • The generation of ATP and the Calvin cycle
5	Oct. 4	<i>No class - Public Holiday (Chung Yeung Festival)</i>
6	Oct. 11	Module 5 Oxidation of Fatty Acids and Ethanol <ul style="list-style-type: none"> • Fatty acids as metabolic fuels and formation of ketone bodies • Oxidation of dietary ethanol and the metabolic fate of acetate • Toxic effects of ethanol metabolism
7	Oct. 18	Mid-term Examination (Modules 1- 4)
8	Oct. 25	Module 6 Oxidation of Amino Acids <ul style="list-style-type: none"> • Amino acid degradation & metabolic fates of amino groups • Nitrogen excretion and the urea cycle
9	Nov. 1	Module 7 Biosynthesis of Carbohydrates <ul style="list-style-type: none"> • Gluconeogenesis • Biosynthesis of glycogen and other carbohydrates
10	Nov. 8	Module 8 Biosynthesis of Lipids <ul style="list-style-type: none"> • Biosynthesis of fatty acids and triacylglycerol • Biosynthesis of phospholipids, cholesterol, steroids and isoprenoids
11	Nov. 15	Module 9 Biosynthesis of Amino Acids <ul style="list-style-type: none"> • Biosynthesis of amino acids • Molecules derived from amino acids
12	Nov. 22	Module 10 Integration of Fuel Metabolism
13	Nov. 29	Module 11 Nucleotide Metabolism <ul style="list-style-type: none"> • Biosynthesis and degradation of nucleotides • Inhibitors of DNA synthesis

Optional academic consultation sessions may be arranged. Details of the arrangement will be announced in due course via the Blackboard system.

Appendix I Grade Descriptors

Grade	Descriptors of overall course
A/A-	Demonstrates the ability to apply the learned principles of bioenergetics and metabolism to novel situations and/or in novel ways. Shows the ability to design scientific methods to investigate a biochemical problem in a creative manner that would substantially surpass the normal expectation at this level and typical of standards that may be common at higher levels of study or research. Shows evidence of critical evaluation of different approaches to solving a problem. Demonstrates the ability to articulate the synthesis of new ideas or applications in a clear and cogent manner.
B	Demonstrates the ability to apply some learned principles of bioenergetics and metabolism to familiar and standard situations in a manner that is usually logically persuasive. Shows the ability to explain some biochemical phenomena in a manner that would meet the normal expectation at this level. Shows evidence of logical analysis of simple biochemical problems. Demonstrate the ability to articulate scientific concepts or applications in a logical and coherent way.
C	Demonstrates the ability to apply certain learned principles of bioenergetics and metabolism to familiar and standard situations in a manner that is partially correct or is somewhat fragmented. Shows the ability to articulate scientific concepts in a concise way.
D	Demonstrates the ability to apply certain learned principles of bioenergetics and metabolism to simple situations in a manner that is broadly correct in its essentials or is somewhat ambiguous. Shows the ability to explain certain scientific concepts or applications in simple terms. Demonstrate the ability to recall biochemical equations or definitions.
F	Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.

Appendix II Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>.

With each assignment, students will be required to submit a signed declaration that they are aware of these policies, regulations, guidelines and procedures.

- In the case of group projects, all members of the group should be asked to sign the declaration, each of whom is responsible and liable to disciplinary actions, irrespective of whether he/she has signed the declaration and whether he/she has contributed, directly or indirectly, to the problematic contents.
- For assignments in the form of a computer-generated document that is principally text-based and submitted via VeriGuide, the statement, in the form of a receipt, will be issued by the system upon students' uploading of the soft copy of the assignment.

Assignments without the properly signed [declaration](#) will not be graded by teachers.

Only the final version of the assignment should be submitted via VeriGuide.

The submission of a piece of work, or a part of a piece of work, for more than one purpose (e.g. to satisfy the requirements in two different courses) without declaration to this effect shall be regarded as having committed undeclared multiple submissions. It is common and acceptable to reuse a turn of phrase or a sentence or two from one's own work; but wholesale reuse is problematic. In any case, agreement from the course teacher(s) concerned should be obtained prior to the submission of the piece of work.

[End of Course Outline]

THE CHINESE UNIVERSITY OF HONG KONG
School of Life Sciences
Biochemistry Programme

BCHE3092 Self-Study Modules in Biochemistry and Professional Development
(2022-23 / 1st Term)

Teachers	Office	Tel.	E-mail
Prof. Shannon W.N. Au (Coordinator)	SC 178	3943 4170	shannon-au@cuhk.edu.hk
Prof. M.K. Chan	MMW 603B	3943 1487	michaelkchan88@cuhk.edu.hk
Prof. T.F. Chan	SC 177	3943 6876	tf.chan@cuhk.edu.hk
Dr. F.H. Lo	SC G83	3943 5019	lofaihang@cuhk.edu.hk
Dr. Patrick H.K. Ngai	SC G83	3943 4359	hkngai@cuhk.edu.hk
Prof. Jacky C.K. Ngo	SCE E403	3943 6346	jackyngo@cuhk.edu.hk
Prof. P.C. Shaw	SC 180	3943 1363	pcshaw@cuhk.edu.hk

COURSE OBJECTIVES

This course aims to enhance students' abilities and competence in information search, critical reading and analysis, and communication in biochemistry. In addition, helping students to develop their professional mindset, strategies and tactics in order to launch a sustainable career is one of the objectives of this course. Through different course activities, students should also be able to develop their generic skills in effective communication, collaborative teamwork, problem solving, and career planning and development.

COURSE OPERATION

This course includes lectures on reading and presenting a scientific paper. Sessions for oral presentations and discussion will be arranged in small groups. A set of scientific papers on various biochemistry topics will be assigned to students to obtain a wide scope of biochemistry knowledge. This course will also include a workshop series on career entry and trajectory development. Case studies and examples on developing transferable skills in local/regional/global career development will be covered. The course content will also be supplemented with e-learning resources (www.bch.cuhk.edu.hk/learnbiochem).

ASSESSMENT SCHEME

1. On-line quizzes on M6a-b 5%
2. Group oral presentation
 - Presentation outline 5%
 - PowerPoint draft 10%
 - Presentation 30% (20% Teacher assessment, 5% Peer assessment, 5% Q&A)
3. Individual written report 35% (5% outline; 30% report)
4. Workshops on professional development
 - Exercises W1-3 15%

**BCHE3092 Self-Study Modules in Biochemistry and Professional Development
(2022-23 / 1st Term)**

Schedule for Group A- G

TUESDAY (10:30am-12:15pm)

Week	Date	Topic	Teacher / Venue	Remarks
1	6 Sep	Introduction / How to read a scientific paper	WNA / LSK306	Review Module 6 in <i>LearnBiochem</i>
2	13 Sep	How to present a scientific paper	WNA / LSK306	
3	20 Sep	How to prepare a PowerPoint presentation	CKN / LSK306	
4	27 Sep	How to writing a scientific paper	CKN / LSK306	
5	4 Oct	Self-study – Public Holiday		<ul style="list-style-type: none"> Complete Quiz M6ab by 4 Oct, 2022 Submit the presentation outline by 4 Oct, 2022
6	11 Oct	Discussion with group teacher	Group A: PCS Group B: MKC Group C: TFC Group D: FHL Group E: CKN Group F: HKN Group G: WNA	Submit the draft ppt by 9 Oct, 2022
7	18 Oct	Self-study		
8	25 Oct	Group oral presentation	Group A: PCS / LSK308 Group B: MKC / BMS1 Group C: TFC / LHC106 Group D: FHL / LSK306 Group E: CKN / MMW704 Group F: HKN / SC139 Group G: WNA / LSK210	Submit the presentation file by 23 Oct, 2022
9	1 Nov	Workshop on professional development - I	Guest speaker: Prof. CM Lee / LSK306	Complete Exercise W1 by 7 Nov, 2022
10	8 Nov	Workshop on professional development - II	Guest speakers: Prof. CM Lee / LSK306	Complete Exercise W2 by 14 Nov, 2022
11	15 Nov	Workshop on professional development - III	Guest speakers: Prof. CM Lee / LSK306	Complete Exercise W3 by 21 Nov, 2022
12	22 Nov	Discussion with group teacher	Group A: MKC Group B: TFC Group C: FHL Group D: CKN Group E: HKN Group F: WNA Group G: PCS	Submit the report outline by 20 Nov, 2022
13	29 Nov	Self-study		Submit an individual written report by 4 Dec, 2022

Remarks:

BMS1 – Basic Medical Science Building Room 1
LHC – Y. C. Liang Hall

LSK – Lee Shau Kei Building
SC – Science Center

The Chinese University of Hong Kong
School of Life Sciences 2020 – 2021
BCHE 3110 Chemical Biology

Time and Venue: Mondays, 2:30 PM – 4:15 PM (Mong Man Wai 715)
and Wednesdays, 1:30 PM – 2:15 PM (Mong Man Wai 715)

Instructor

Professor Michael K Chan

Office: MMW603B

Phone: 3943 1487 Email: michaelkchan88@cuhk.edu.hk

Course Description

The discipline of chemical biology is focused on the application of chemical principles, particularly organic chemistry, to the study and manipulation of biological systems. Two major focus areas include the development of chemical tools to proteins and cells, and in the identification and creation of novel compounds as therapeutics for the treatment of human disease. The course will begin with a brief review of introductory chemistry and organic chemistry fundamentals and bio-orthogonal ligand reactions. It will then cover case studies to illustrate the power of chemical biology to solve important problems at the chemistry-biology interface.

Format

The course will be based on the lecture materials and associated readings. Additionally, each student will give oral presentation during the last two weeks of the class.

Assessment

Midterm Examination 1 (25%): A midterm examination will be given during week 4 and will cover the foundation chemistry portion of the class up through week 2. The questions will be short answer and will be based on the lectures and readings.

Midterm Examination 2 (25%): A midterm examination will be given during week 10 and will cover the organic chemistry portion of the class up from week 5 to week 8 (up to in vitro protein translation). The questions will be short answer and will be based on the lectures and readings.

Midterm Examination 3 (25%): A final examination will be given during the RES final examination period as a date to be determined. The questions will be short answer and will be based on the lectures and readings.

Presentation (25%): Each person will be asked to give a 25-minute presentation +10 minutes Q&A on a topic in the area of chemical biology (must use small molecules (chemical/peptide) to study a biological system).

Course Schedule

Dates	Topics
Week 1 Jan 9, 11	Foundation Chemistry (Chemical Properties, Chemical Bonding, and Chemical Geometry) 1. Atomic orbitals 2. Periodic properties (atomic and ionic radii, electron affinity, ionization energy, electronegativity) 3. Lewis Theory (predicting chemical reactivity) 4. VSEPR theory 5. Hybrid orbitals
Week 2 Jan 16, 18	Organic Chemistry Basics 1. Acid-base Chemistry 2. Stereochemistry 3. Nucleophiles and electrophiles 4. Nucleophilic substitution reactions (SN1 and SN2)
Week 3	Chinese New Year Holiday
Week 4	Organic Reactions 1. Chemical synthesis based on nucleophilic substitution reactions

Feb 1	2. Aldehydes and ketones
Week 5 Feb 6, 8	Carbonyl Compounds 1. Carboxylic acids and their derivatives 2. Chemical reactions on carbonyl groups Midterm #1 (Feb 8 - on topics of weeks 1-5)
Week 6 Feb 13, 15	Chemical synthesis of peptides 1. Mechanism and thermodynamics of peptide bond formation 2. Protecting groups 3. Solid phase peptide synthesis 4. Native chemical ligation 5. Expressed Protein ligation
Week 7 Feb 20, 22	Biological protein synthesis and genomic expansion 1. Non-ribosomal protein synthesis 2. Protein translation 3. In vitro protein translation for production of proteins with unnatural amino acids (UAAs) 4. Enzyme evolution
Week 8 Feb 27 & Mar 1	In vivo production of proteins with UAAs 1. Evolution of tRNA synthetases for incorporation of UAAs 2. Discovery of pyrrolysine 3. Use of the pyrrolysine tRNA/tRNA synthetase for UAA incorporation 4. Application of UAA incorporation for biological and biotechnological studies
Week 9	Reading Week
Week 10 Mar 13, 15	Chemical biology applications 1. Chemical modification of proteins Midterm #2 (Mar 15 on topics from week 5 to week 8)
Week 11 Mar 20, 22	Chemical biology for chemical synthesis 1. Designer chemical synthesis 2. Catalytic antibodies and molecular imprinting
Week 12 Mar 27, 29	Chemical biology and cells 1. Peptide and protein delivery to cells 2. Cell penetrating peptides 3. Organelle targeting sequences 4. Chemical genetics
Week 13 Apr 3	Special Topics/Easter Holiday 1. TBA (Chemical Biology of Carbohydrates)
Week 14 Apr 12	Midterm #3 (Apr 12 on topics from weeks 10 to 13)
Week 15 Apr 17, 19, 21	Oral Presentations

General Reference Materials

1. <https://www.masterorganicchemistry.com>
2. Bruce Averill, General Chemistry: Principles, Patterns, and Applications, Saylor Foundation, 2011
https://saylordotorg.github.io/text_general-chemistry-principles-patterns-and-applications-v1.0/
3. <https://www.khanacademy.org/science/chemistry>
4. Timothy Soderberg, Organic Chemistry with a Biological Emphasis Volume I, Chemistry Publications, 2019. <https://open.umn.edu/opentextbooks/textbooks/472>
5. William Reusch, Virtual Text of Organic Chemistry 1999
<https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/introl.htm>

Academic Honesty

Read the University's policies on plagiarism carefully and do not plagiarize! CUHK has adopted a policy of zero tolerance for plagiarism. Instructors will send all suspected cases of plagiarism directly to the disciplinary committee for investigation. In the case of group report, plagiarism will affect all partners! Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated *Procedures* are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>). Students please note the aforementioned academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>

Grade Descriptors

Grade Descriptors

Grade	Overall Course
A	An outstanding level of attainment of the learning outcomes of the course, i.e., (1) to demonstrate a keen understanding of the key concepts in chemical biology; and (2) to be able to use that knowledge to design strategies to solve biological problems. Grade A is awarded to students with outstanding performance on all learning outcomes, i.e. have the ability to express the synthesis of ideas or application in a clear and cogent manner in the quiz/assignments and final examination
A-	A superior level of attainment of the learning outcomes of the course as listed above. Grade A- is awarded to students with generally outstanding performance on all (or almost all) learning outcomes, i.e., have the ability to express the ideas and knowledge with clarity in the quiz/assignments and final examinations.
B	A high level of attainment of the learning outcomes of the course as listed above. Grade B is awarded to students with substantial performance on all learning outcomes, OR high performance on some learning outcomes which compensates for less satisfactory performance on others, resulting in overall substantial performance, i.e. have the ability to express the knowledge in a satisfactory and unambiguous way in the quiz/assignments and final examination.
C	A satisfactory level of attainment of the learning outcomes of the course as listed above. Grade C is awarded to students with satisfactory performance on the majority of learning outcomes, possibly with a few weaknesses, i.e. have the ability to express the knowledge in an unambiguous way in the quiz/assignments and final examinations.
D	A fair level of attainment of the learning outcomes of the course as listed above. Grade D is awarded to students with barely satisfactory performance on a number of learning outcomes, i.e. have the ability to state the knowledge in simple terms in the quiz/assignments and final examinations.
F	An unsatisfactory level of attainment of the learning outcomes of the course as listed above OR failure to meet specified assessment requirements. Failed to give correct answers to most if not all questions in the quiz/assignments and final examinations.

Updated January 18, 2023

**The Chinese University of Hong Kong
School of Life Sciences Biochemistry Programme**

BCHE 3650

Molecular Biol. & Recombinant DNA Laboratory

2023

Periods: Thursday (2:30pm, pre-lab talk, video and lab report question will be released from Blackboard)

Web page: <https://elearn.cuhk.edu.hk/webapps/login>

Course coordinator

Prof. PC Shaw SC180 39436803 pcshaw@cuhk.edu.hk

Technical staff

Chau Dik Long (Dennis) SC291A 39438034 diklongchau@cuhk.edu.hk

Demonstrators:

Name		Lab.	Email	Tel.
Lui Shu Nga	雷舒雅	SC294	1155136083@link.cuhk.edu.hk	39438073
Ngai Hiu Lam	倪曉林	SC151	1155050039@link.cuhk.edu.hk	39438027
Wang Fan	王帆	SC151	1155156170@link.cuhk.edu.hk	39438027
Ling Lu	凌露	2/F, Simon F.S. Li Marine Science Laboratory	1155186097@link.cuhk.edu.hk	60405049
Yeung Ka Yee	楊嘉儀	MMW509	1155049064@link.cuhk.edu.hk	39438032
Luan Yehui	栾业辉	MMWB619	demosflute@outlook.com	39436115
Yau Ming Yin	尤銘賢	SC377	kenyau0422@link.cuhk.edu.hk	39431307

Marking Scheme

Lab reports	30%
Pre-class exercise	10%
Pre-lab quiz	10%
Lab performance	10%
Examination	40%

Experiment Schedule 2023 for Student

Date	Experiment	Content	Demonstrator(s)) in charge
Jan. 12		Check in	All
Feb. 2	1	DNA Extraction and Polymerase chain reaction	Ngai Hiu Lam
Feb. 9	2	Recombinant DNA construction	Lui Shu Nga
Feb. 16	3	DNA transformation into E. coli.	Ling Lu
Feb. 23	4	Plasmid preparation	Yau Ming Yin
Mar. 2	5	DNA Sequencing and Blast Search	Yeung Ka Yee
Mar. 16	6	Gene Expression study by Real Time PCR	Wang Fan
Mar. 23	7	Transcriptomics analysis using Galaxy server	Luan Yehui
Mar. 30		Lab Discussion	All
Apr. 13		Lab Exam	All

The Chinese University of Hong Kong
School of Life Sciences Biochemistry Programme
BCHE 3730 Analytical Biochemistry Laboratory
2022 - 2023 (Second Term)

Course Outline

Course Supervisors:

Prof. W.P. FONG	SCE 411	3943-6868	wpfong@cuhk.edu.hk
Prof. S. AU	SC 178	3943-4170	shannon-au@cuhk.edu.hk
Prof. C.Y.W. LAU	SC 184	3943-6253	wcylau@cuhk.edu.hk

Course Coordinator:

Anita YIU	SCE 412A	3943-6881	anita-garcia@cuhk.edu.hk
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Demonstrators:

<u>Expt</u>	<u>Name</u>	<u>Office</u>	<u>Phone</u>	<u>E-mail</u>
1	Ho Man Ip Flora 何敏燁	RRSSB LG105	3943-8039	1155093103@link.cuhk.edu.hk
1	Li Yuxuan 李宇軒	MMWB 611	3943-6162	1155128424@link.cuhk.edu.hk
2	Yan Mingqi 閻明琪	MMW 509A	3943-8032	1155151915@link.cuhk.edu.hk
3	Lau Oi Yan Maggie 劉靄茵	RRSSB 118	3943-1349	1155094057@link.cuhk.edu.hk
4	Chow Jessica 鄒藝怡	SC 293	3943-6119	1155151917@link.cuhk.edu.hk
4	Mok Chin Yu Yuko 莫展如	SC 193	3943-6118	1155079160@link.cuhk.edu.hk
5	Yeung Chun Wai Henry 楊俊威	SC 193	3943-6118	1155108749@link.cuhk.edu.hk

Lab Location:

SC E 402

Lab Time Slot:

2:30 – 6:15 p.m. on WED

Experiment Schedule

		Expt	Content
Jan	11		course introduction / check-in
	18		self-study
	25		Lunar New Year
Feb	1	1A	Fluorescence Techniques: (A) The use of Fura-2 for measurement of free calcium ion concentration; (B) Cell death analysis by flow cytometry; and (C) Cell death analysis by fluorescence microscopy
	8	1B	Fluorescence Techniques: (A) The use of Fura-2 for measurement of free calcium ion concentration; (B) Cell death analysis by flow cytometry; and (C) Cell death analysis by fluorescence microscopy
	15		self-study
	22	2	Separation of sub-cellular components by differential centrifugation
Mar	1		self-study
	8		reading week
	15	3	Ion exchange chromatography
	22	4	Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) (follow-up on 23 March)
	29		discussion
April	5		Ching Ming Festival
	12	5	Protein Crystallization (follow-up on 13 April)
	19		course exam (venue T.B.A)

Grading:

Lab Report:	50%
Pre-Lab Quiz:	10%
Participation:	10%
Exam:	30%

Lab Report (50%)

Students are required to submit soft copy of each report to the course's site on Blackboard (<https://blackboard.cuhk.edu.hk/>).

Reports are in write-up form format and have to be submitted along with an **Academic Honesty Declaration form**, before 5 pm on the following Wednesday. Marks will be deducted for overdue reports (10% per day). Without prior approval from the course coordinator, no assignment can be submitted if he/she fails to attend a lab session.

The Academic Honesty Declaration form can be downloaded at the website: [http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_\(2013-14\)/declaration_en.doc](http://www.cuhk.edu.hk/policy/academichonesty/Eng_hm_files_(2013-14)/declaration_en.doc)

Pre-Lab Quiz (10%)

Students will be given a short 5-minute quiz at 2:30 pm on each experimental day. The material covered will be those in the laboratory manual and designated videos.

Participation (10%)

Every student is required to attend all lab sessions. No make-up laboratory session will be arranged in the course. Absence will lead to a zero mark for participation for the missed experiment. Students have to notify the course coordinator at least one week in advance to apply for leave. Proof, such as medical certificates, is required for successful leave application.

Students must follow instructions given by the course coordinator and the demonstrators during lab sessions. Violation of safety guidelines or improper handling of equipment may lead to a -1% of penalty mark to the assessment of participation.

Exam (30%)

A closed-book exam will be held, covering all 5 experiments. Duration of the exam will be 1.5 hours.

REMINDER: Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>

Grade Descriptors:

Grade	Overall Course
A	<ul style="list-style-type: none">• Demonstration of excellent understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of excellent understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of excellent laboratory skills;• Demonstration of excellent ability in data analysis and interpretation of experimental results.
A-	<ul style="list-style-type: none">• Demonstration of very good understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of excellent understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of very good laboratory skills;• Demonstration of excellent ability in data analysis and interpretation of experimental results.
B	<ul style="list-style-type: none">• Demonstration of good understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of good understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of good laboratory skills;• Demonstration of good ability in data analysis and interpretation of experimental results.
C	<ul style="list-style-type: none">• Demonstration of satisfactory understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of good understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of satisfactory laboratory skills;• Demonstration of satisfactory ability in data analysis and interpretation of experimental results.
D	<ul style="list-style-type: none">• Demonstration of minimal understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of fair understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of minimal laboratory skills;• Demonstration of minimal ability in data analysis and interpretation of experimental results.
F	<ul style="list-style-type: none">• Demonstration of poor understanding of the strategies and design of experiments in the analysis of biochemical molecules;• Demonstration of poor understanding of the utilization of analytical equipment in the analysis of biochemical samples;• Demonstration of poor laboratory skills;• Demonstration of poor ability in data analysis and interpretation of experimental results.

**BCHE4030 Clinical Biochemistry
2022-23**

Course Code: BCHE4030 (3 Units, Second Term)
Period: M5 (12:30pm – 1:15pm); W1-2 (8:30am - 10:15am)
Venue: MMW LT2
Medium of Instruction: English

Teachers:

FH Lo (Coordinator) SC Rm G83, Tel: 3943-5019, e-mail: lofaihang@cuhk.edu.hk
SK Kong MMWB Rm 622B, Tel: 3943-6799, e-mail: skkong@cuhk.edu.hk

Objectives:

This course presents the basic principles of clinical biochemistry and its methodology. Test of functions, biochemical profiles involved in the pathogenesis, diagnosis, and management of some diseases will be described.

Learning Outcomes:

After completing the course, students should be able to:

- Acquire core knowledge of clinical biochemistry,
- Understand the relationship of biochemistry to clinical problems;
- Appreciate the applications of biochemistry to modern medicine;
- Applying knowledge of clinical chemistry for diseases diagnosis;
- Develop generic skills such as critical thinking, writing & life-long learning skills and team spirit.

References:

George J. Netto, Rana D. Saad, Peter A. Dysert, II. [Diagnostic molecular pathology: current techniques and clinical applications, part I](https://pubmed.ncbi.nlm.nih.gov/2003/10/16/379-383/). Proc (Bayl Univ Med Cent) 2003 October; 16(4): 379–383.
(<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1214554/>)

Other reference materials will be provided by teachers.

Textbooks: (All are reserved in the Library)

- Herbert Waldmann & Petra Janning. Concepts and case studies in chemical biology. (online)
- John W Baynes & Marek H Dominiczak. Medical Biochemistry, 5th ed. (online)
- Lela Buckingham & Maribeth L. Flaws. Molecular Diagnostics: Fundamentals, Methods, & Clinical Applications. (online)
- Michael Lieberman et al. Marks' basic medical biochemistry: a clinical approach, 4th ed. (online)
- Victor Hoffbrand & Paul Moss. Essential Haematology, 6th ed. (online)
- William J Marshall & Stephen K Bangert. Clinical Chemistry, 6th ed. (online)
- Michael Laposata. Laboratory Medicine The Diagnosis of Disease in the Clinical Laboratory, 2nd ed. (UL QY25 .L285 2014)
- Nessar Ahmed. Clinical Biochemistry. (QU4 .C55 2011) (Medical Library)
- Philip D. Mayne. Clinical Chemistry in Diagnosis and Treatment, 6th ed. (QY90.Z54 1994)
- Shauna C. Anderson & Susan Cockayne. Clinical Chemistry: Concepts and Application. (UL Oversize QY90 .C6423 2007)

Assessment:

Mid-term examination: Short Questions 30% final mark

In-class Quiz I: 10% final mark (SKK materials) (To be held on 27 Mar 2023, 12:30-12:50 pm sharp)

In-class Quiz II: 10% final mark (SKK materials) (To be held on 17 April 2023, 12:30-12:50 pm sharp)

Quiz Format: 5 MCQs + 1 Very Short Essay Question (Quiz time: 20 min)

Final examination: 50% final mark (20% LFH materials, MCQs), (30% SKK materials, Open-notes exam: Two A4 pages all you can write and print.)

Quality Assurance Policies for Course Assessment:

Revised Schedule:

Wk	Date/2023 *: Quiz	Hr.	Topics	Teacher
eAdd-Drop: 16-22 Jan 2023				
1	Jan 9 (M)	1	• Introduction to Clinical Biochemistry	LFH (20)
	Jan 11 (W)	2		
2	Jan 16 (M)	1	• Biochemical Endocrinology	
	Jan 18 (W)	2	• Principles of Endocrine Disorders	
	Jan 23 (M)		No-Class/Chinese New Year Holiday	
	Jan 25 (W)			
3	Jan 30 (M)	1	• Laboratory Investigations of Endocrine Disorders	
	1 Feb (W)	2	• Metabolic Aspects of Malignant Diseases	
4	Feb 6 (M)	1	• Liver Functions Liver Diseases and Biochemical Investigations	
	Feb 8 (W)	2	• Blood cells, Plasma Proteins and Enzymes	
5	Feb 13 (M)	1	• Haemostasis and Thrombosis	
	Feb 15 (W)	2	• Blood Disorders and Tests	
6	Feb 20 (W)	1	• Renal Functions and Bone Profile	
	Feb 22 (W)	2	• Iron Profile, Lipid Profile, and Cardiac Markers	
7	Feb 27 (M)	1	• Development of New Clinical Biochemistry Assays	SKK (16)
	Mar 1 (W)	2	• Mid Term Examination	
	Mar 6 (M)	1	No-Class/Reading Week	
	Mar 8 (W)	2		
8	Mar 13 (M)	1	• Development of New Clinical Biochemistry Assays	
	Mar 15 (W)	2	• Development of New Clinical Biochemistry Assays	
9	Mar 20 (M)	1	• Electrolytes and Water Balance	
	Mar 22 (W)	2	• Electrolytes and Water Balance	
10	Mar 27 (M)	1*	• Disorders of Electrolytes and Water Balance (Quiz-1)	
	Mar 29 (W)	2	• Disorders of Electrolytes and Water Balance	
11	Apr 3 (M)	4	• Acid-Base Regulation (Class Cancellation – No Class)	
	Apr 5 (W)	2	No-Class/Easter Holiday	
	Apr 10 (M)	1		
	Apr 12 (W)	2		
12	Apr 17 (M)	1*	• Acid-Base Regulation (Quiz-2)	
	Apr 19 (W)	2	• Disorders of Acid-Base Balance	
Class Make-up	Apr 24 (M)	1	• Disorders of Acid-Base Balance	

1. The course assessment procedures are under the supervision of the Examination Committees of the Biochemistry Programme and the School of Life Sciences.
2. The turnaround time for each assignment will be completed within the academic term.
3. All students are given access to their examination scripts.

Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>. For ALL written assignment, students will have to submit a statement that they are aware of these policies, regulations, guidelines and procedures. **Warning: plagiarism could lead to serious consequences!**

Grade Descriptor

Grade	Overall Course
A	<ul style="list-style-type: none">• Outstanding achievement of all the stated learning outcomes;• Demonstration of excellent understanding of biochemistry knowledge for solving clinical problems;• Demonstration of excellent understanding of the social impact of biochemistry on modern medicine;• Demonstration of excellent knowledge of clinical chemistry for diagnosis;• Demonstration of excellent generic skills;
A-	<ul style="list-style-type: none">• Outstanding achievement of all the stated learning outcomes;• Demonstration of excellent understanding of biochemistry knowledge for solving clinical problems;• Demonstration of excellent understanding of the social impact of biochemistry on modern medicine;• Demonstration of excellent knowledge of clinical chemistry for diagnosis;• Demonstration of very good generic skills;
B	<ul style="list-style-type: none">• Good achievement of all the stated learning outcomes;• Demonstration of excellent understanding of biochemistry knowledge for solving clinical problems;• Demonstration of very good understanding of the social impact of biochemistry on modern medicine;• Demonstration of very good knowledge of clinical chemistry for diagnosis;• Demonstration of very good generic skills;
C	<ul style="list-style-type: none">• Satisfactory achievement of all the stated learning outcomes;• Demonstration of satisfactory to good understanding of biochemistry knowledge for solving clinical problems;• Demonstration of good understanding of the social impact of biochemistry on modern medicine;• Demonstration of satisfactory to good knowledge of clinical chemistry for diagnosis;• Demonstration of satisfactory generic skills;
D	<ul style="list-style-type: none">• Fair achievement of all the stated learning outcomes;• Demonstration of minimal understanding of biochemistry knowledge for solving clinical problems;• Demonstration of fair to satisfactory understanding of the social impact of biochemistry on modern medicine;• Demonstration of minimal knowledge of clinical chemistry for diagnosis;• Demonstration of minimal generic skills;
F	<ul style="list-style-type: none">• Poor achievement of all the stated learning outcomes;• Demonstration of poor understanding of biochemistry knowledge for solving clinical problems;• Demonstration of poor to fair understanding of the social impact of biochemistry on modern medicine;• Demonstration of poor to good knowledge of clinical chemistry for diagnosis;• Demonstration of poor generic skills;

BCHE4040 Aspects of Neuroscience 2022-23, 1st Term

Course Description

This course will discuss the structure and components of nervous tissue in relation to its functions. Aspects of metabolism special to the nerve and brain will be examined. These include energy metabolism, water and electrolyte balance, exchanges between blood and brain, and between brain and cerebrospinal fluid, neurotransmitters and modulators, nutrition and development of the nervous system, neuroendocrinology and the biochemistry of mental diseases. Students are advised to take BCHE2030 or equivalent before taking this course.

Contents/Fundamental Concepts

1. Structure and function of the central nervous system
2. Cells of the nervous system
3. Myelin:
 - a. Structure and function
 - b. Biosynthesis and genes regulating its biosynthesis
 - c. Diseases related to myelin dysfunction, eg, multiple sclerosis
4. Biochemistry, physiology and pharmacology of transport system:
 - a. Blood-brain-CSF barriers
 - b. Cellular (Membrane) transport
 - c. Axoplasmic transport
5. Ion channels, potentials and signal conduction
6. Metabolism:
 - a. Brief review of brain metabolism
 - b. Some inherited neurological diseases related to metabolic disorders
 - c. Nutrition and brain function
7. Biochemistry, physiology and pharmacology of synaptic transmission:
 - a. Classification of neurotransmitters
 - b. Biosynthesis of transmitters and their regulation
 - c. Termination of neurotransmission
 - d. Properties and molecular biology of receptors
 - e. 2nd messengers and signal transduction
 - f. Modulation of signal transmission
8. Biochemistry and molecular biology of neurological and psychiatric disorders:
 - a. Myasthenia gravis
 - b. Parkinson's disease
 - c. Alzheimer's disease
 - d. Huntington's disease

Learning Outcomes

After reading this course, students are expected be able to:

- Outline the special features of the nervous system and its components.
- Describe the functions of the nervous system both at the cellular and molecular levels.
- Explain how neurons communicate with each other in cellular and molecular terms.
- Explain the pathophysiology of certain neurological and neuropsychiatric disorders, and the biochemical basis of treating them.

BCHE4040 Aspects of Neuroscience
2022-23, 1st Term

Assessment Scheme

Mid-term Exam 45%

Final Exam 45%

Assignment 10% (will be announced on 10 Oct 2022)

Grade Descriptors

Grade	Overall course
A	Demonstrates a deep understanding of the structure and components of nervous tissue in relation to its functions, neurotransmitters, development of the nervous system and the biochemistry of mental diseases. Demonstrate the ability to apply the concepts to solve most neuroscience issues in particular in the area of neuro-diseases that would substantially surpass the normal expectation at this level and typical of standards that may be common at higher levels of study. Demonstrates the ability to articulate the synthesis of new ideas or applications in a clear and cogent manner.
A-	Demonstrates high level of the structure and components of nervous tissue in relation to its functions, neurotransmitters, development of the nervous system and the biochemistry of mental diseases. Demonstrate the ability to apply the concepts to solve some neuroscience issues in particular in the area of neuro-diseases. Demonstrates the ability to articulate the synthesis of new ideas or applications in a clear and cogent manner.
B	Demonstrate a competent grasp of the key concepts in the structure and components of nervous tissue in relation to its functions, neurotransmitters, development of the nervous system and the biochemistry of mental diseases. Demonstrates the ability to state and partially apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is usually logically persuasive. Demonstrate the ability to articulate neuroscience concepts or applications in a logical and coherent way.
C	Demonstrate a basic understanding of the structure and components of nervous tissue in relation to its functions, neurotransmitters, development of the nervous system and the biochemistry of mental diseases. Demonstrates the ability to state and apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is not incorrect but is somewhat fragmented. Shows the ability to articulate scientific concepts in a concise way.
D	Demonstrate the ability to apply certain concepts learnt from the course to simple situations in a manner that is broadly correct in its essentials or is somewhat ambiguous. Demonstrates the ability to state and sometimes apply the subject matter learnt in the course to some simple and familiar situations in a manner that is broadly correct in its essentials.
F	Demonstrate an incomplete or incorrect neuroscience concepts. Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.

Recommended Readings

- Neuroscience : exploring the brain / Mark F. Bear, Barry W. Connors, Michael A. Paradiso (WL300 .B425 2007).
- Neuroscience / edited by Dale Purves ... [et al.]. (WL102 .N487 2008).
- Neuroscience at a glance / Roger A. Barker, Stephen Barasi ; and neuropharmacology by Michael J. Neal. (WL102 .B326 2008).
- Articles recommended by teachers.

BCHE4040 Aspects of Neuroscience
2022-23, 1st Term

Teachers

Prof. KF Lau (Course Coordinator)

Prof. Kim Chow

Office

SC 291

MMW 604

Tel.

3943 1106

3943 1530

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heimanchow@cuhk.edu.hk

Course Schedule

M4 (Mon 11:30 a.m. – 12:15 pm) & H3-4 (Thu 10:30 am – 12:15 pm)

Venue: MMW703

Wk.	Date	Hr.	Topic	Teacher
1	Sept. 5*(M)	1	• Structure and function of the central nervous system	Prof. Kim Chow
	Sept. 8 (H)	2	• Cells of the nervous system: neuron, Schwann cells and astrocytes	
2	Sept. 12 (M)	0	• Myelin	
	Sept. 15 (H)	2	• Biochemistry, physiology and pharmacology of transport system:	
3	Sept. 19 (M)	1	a. Blood-Brain-CSF Barrier	
	Sept. 22 (H)	2	b. Cellular (Membrane) transport	
4	Sept. 26 (M)	1	c. Axoplasmic transport	
	Sept. 29 (H)	2	• Ion channels, potentials and signal conduction	
5	Oct. 3 (M)	1		
	Oct. 6 (H)	2	Mid-term Exam	
6	Oct. 10 (M)	1		Prof. KF Lau
	Oct. 13 (H)	2		
7	Oct. 17 (M)	1	• Biochemistry, physiology and pharmacology of synaptic transmission	
	Oct. 20 (H)	2	• Classification of neurotransmitters	
8	Oct. 24 (M)	1	• Biosynthesis of transmitters and their regulation	
	Oct. 27 (H)	2	• Termination of neurotransmission	
9	Oct. 31 (M)	1	• Properties and molecular biology of receptors	
	Nov. 3 (H)	2	• Second messenger and signal transduction	
10	Nov. 7 (M)	1	• Modulation of signal transmission	
	Nov. 10 (H)	2	• Biochemistry and molecular biology of neurological disorders	
11	Nov. 14 (M)	1		
	Nov. 17 (H)	2		
12	Nov. 21 (M)	1		
	Nov. 24 (H)	2		
13	Nov. 28 (M)	1		
	Dec. 1 (H)	2		
	Total:			

- *: Class suspension

- Sept. 12 – Public Holiday – The second day following the Chinese Mid-Autumn Festival

Reminders:

Academic Honesty: According to University regulations, students must submit an electronic version of their assignment to VeriGuide system for the purpose of checking for possible plagiarism. Read the University's policies on plagiarism carefully and do not plagiarise! CUHK has adopted a policy of zero tolerance for plagiarism. Instructors will send all suspected cases of plagiarism directly to the disciplinary committee for investigation. In the case of group report, plagiarism will affect all partners! Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>). Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available online: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>

BCHE4060 BASIC AND APPLIED IMMUNOLOGY
The Chinese University of Hong Kong
2022 – 2023

Course Code: BCHE4060 (3 Units, First Term)
Period: W3-4 (Wed 10:30 am – 12:15 pm); F3 (Fri 10:30 am – 11:15 am)
Medium of Instruction: English
Venue: MMW 703 (for both Wed & Fri lectures)

Teachers:

Prof. Siu Kai KONG	Office: MMWB 621	Tel: 3943-6799	Email: skkong@cuhk.edu.hk
Dr. Alex C. KOON	Office: SC 138	Tel: 3943-1393	Email: alexkoon@cuhk.edu.hk

Objectives:

BCHE4060 is an upper-level course that aims at providing students with the essential concepts of immunology and its applications. Topics to be covered include architecture and development of the immune system, antigens and antibodies, immunoglobulin-genes and -diversity, the major histocompatibility system and T cell receptors, tolerance and autoimmunity, and integration of immune responses. The effector mechanisms of the immune system will be introduced, with special emphasis on the role of innate and acquired immunity in health and disease. The relationship of immunology to clinical problems such as infectious diseases and the application of immunology to medicine and biotechnology such as vaccination will also be covered.

Learning Outcomes:

After completing the course, students should be able to:

- Have in-depth knowledge of the key features of the immune system (Generic Skill 1 (please see the next page));
- Comprehend the integrated nature of the immune system (Generic Skill 1);
- Understand the molecular and cellular basis for the generation of antibody diversity, activation of an immune response and its regulation, and maintenance of self-tolerance (Generic Skill 1);
- Define the immunological mechanisms underlying the process of inflammation in states of health and disease (Generic Skill 1);
- Appreciate the relevance of the immune system to our daily lives and its application in advancing biomedical research and biotechnology (Generic Skills 1 & 3);
- Develop competencies in finding, reading, and critically evaluating relevant scientific literature (Generic Skills 3 & 4);
- Develop generic skills such as critical thinking, writing and lifelong learning skills (Generic Skills 2 & 5).

Reference Textbooks:

- Some textbooks are reserved at the University Library
 - Access to E-resources off-campus requires CUHK log-in (<https://www.lib.cuhk.edu.hk/en/use/off-campus>)
1. Punt, Stranford, Jones & Owen (2018) Kuby Immunology (8th Ed) Macmillan (QW504 .K83 2019)
 2. Owen, Punt & Stranford (2013) Kuby Immunology (7th Ed) Macmillan (QW504.K83 2013)
 3. Murphy et al. (2017) Janeway's Immunobiology (9th Ed) Garland Science. (QW504.J37 2017)
 4. Abbas, Lichtman, and Pillai (2022) Cellular and Molecular Immunology (10th Ed) Elsevier
Full text available online via ClinicalKey Books through CUHK Library
<https://www.clinicalkey.com/-/browse/book/3-s2.0-C20190004463>
 5. Coico & Sunshine (2009) Immunology: A Short Course (6th Ed) Wiley-Blackwell (QW504.B35 2009)
(7th Ed) Full text available online via ProQuest Ebook Central through CUHK library
<https://ebookcentral.proquest.com/lib/cuhk-ebooks/detail.action?docID=1936429>
 6. Male, Brostoff, Roth & Roitt (2013) Immunology, (8th Ed) Mosby. (QW504.R65 2013)
(9th Ed) Full text available online via ClinicalKey Books through CUHK Library
<https://www-clinicalkey-com.easyaccess2.lib.cuhk.edu.hk/-/browse/book/3-s2.0-C20170023029>
 7. Doan et al. (2013) Immunology (2nd Ed) Lippincott Williams & Wilkins
Full text available online via LWW Health Library through CUHK Library
<https://meded-lwwhealthlibrary-com.easyaccess2.lib.cuhk.edu.hk/book.aspx?bookid=777>

Generic Skills Covered:

Adapted from the HKQF (Hong Kong Qualifications Framework (香港資歷架構) Level 5) and the OBA (Outcomes-based Approach) document of CUHK.

1) Core Knowledge

- Demonstrate and work with in-depth specialized technical or theoretical knowledge of a field of study.
- Use a wide range of specialized intellectual skills in support of established practices in a subject/discipline.

2) Communication

- Participate constructively in group discussions and make formal and informal presentations to a range of audiences on standard topics in a subject/discipline.
- Use some advanced and specialized skills in support of established practices in a subject/discipline.

3) Critical Thinking

- Apply knowledge and skills in a range of technical, professional, or management activities.
- Critically analyze, evaluate and synthesize concepts, information, and issues drawn from a wide range of sources to generate ideas.

4) Problem Solving and Analysis

- Interpret, use and evaluate numerical and graphical data to set and achieve goals.
- Identify and analyze both routine and abstract technical/professional problems and issues, and formulate evidence-based responses.
- Use some advanced features of ICT (information and communications technology) applications to support and enhance work.

5) Self-Awareness, Teamwork, and Development

- Accept responsibility and accountability within broad parameters, for determining and achieving personal and group outcomes.
- Work under the mentoring of senior qualified practitioners.

6) Value and Attitude

- Exercise appropriate judgment in planning, design, technical and management functions related to products, services, operations, or processes.
- Deal with ethical issues, seeking the guidance of others where appropriate.
- Honesty and integrity are important components of the academic process. Students are expected to be honest and ethical at all times in their pursuit of academic goals.

(Source: http://www.cuhk.edu.hk/aqs/AQSHomepageIndex/assessment_policy.pdf)

E-Learning Materials:

- Panopto videos through CUHK Blackboard eLearning system

Micromodules on various immunology topics related to this course are accessible through the course's Blackboard eLearning platform.

- Nature Immunology - Immunology of the skin: <https://vimeo.com/87645793>

A number of immunocytes and their functions can be seen in this 7-min animation.

- Nature Immunology - Immunology of the Gut Mucosa: <https://vimeo.com/59633140>

In this 7-min animation, you can see how dendritic cells start an immune response in gut or keep the response at a quiescent state. With bacterial invasion, you can see how neutrophils use special weapon to destroy the bacteria too.

- Nature Immunology - Immunology Wars: <https://vimeo.com/215319937>

In this 3-min video, you will see how the monoclonal antibodies provide protections to destroy cancer cells with T-lymphocytes.

- Nature Immunology - Innate lymphoid cells: <https://youtu.be/CXz6FVqPqHw>

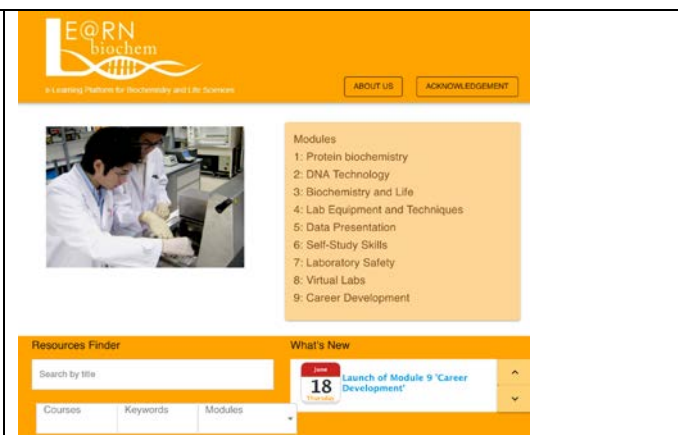
In this 4.5-min video, you will see how different types of immune cells including Innate lymphoid cells (ILCs), a recently found immunocyte population, work together using interleukins to provide barrier, tolerance, pathogen clearance and chronic inflammation functions in our gut.

- Videos for laboratory techniques (5-10 minutes each):

Biochemistry is a practical science. Learning the laboratory techniques and skills is an important element in the biochemistry curriculum. Laboratory techniques (e.g., ELISA), skills for data presentation and self-study skills are available at

<http://www.bch.cuhk.edu.hk/learnbiochem/>

(Login: elearnbch1; Password: learn@slsbch!).



Assessment Scheme:

Quizzes [3 total (close-book)]	15% final mark
Micromodules & online questions	5% final mark
Poster assignment	5% final mark
Mid-term examination (open-book examination)	35% final mark
Final examination (open-book examination)	40% final mark

Notes:

- ❖ In case face-to-face teaching and assessment are deemed not feasible by the University, all lectures, quizzes, and examinations will be conducted online. Students should follow the course announcements on Blackboard as well as the official university announcements closely.

Quizzes (15% total marks)

There are 3 quizzes for this course (5% final mark each). The quizzes are part of the learning process. The questions are set to help you think about the important issues raised by the course materials and help you pin down the key items to be learned. Answers will be discussed when the quiz is marked. This feedback arrangement hopefully can correct the misunderstanding of the concept as early as possible.

Micromodules & online questions (5% total marks)

Micromodules on various immunology topics are posted on the course's Blackboard eLearning website via the Panopto video platform. You can view the videos anytime and as many times as you preferred starting in September. However, **full marks will only be given upon successful completion of the full length of the video from start to finish before the deadline.** For example, if the video lasts for 10 minutes, full marks will **NOT** be given if you have accessed the video 10 times, but each time consisting of only 1 min. **If you miss the deadlines, partial credits will be given as long as you finish watching the micromodules by the last day of the course (by 23:59 on Dec 2nd 2022) in Term 1.**

Micromodule Topic (% Marks)		Deadline for Watching
1	The Complement System (1.5%)	November 1 st (Tue), 2022 by 23:59
2	Hypersensitivity Reactions (1%)	November 8 th (Tue), 2022 by 23:59
3	Vaccine Strategies (1.5%)	November 17 th (Thu), 2022 by 23:59
4	Primary Immunodeficiency (1%)	December 1 st (Thu), 2022 by 23:59

Prepare a Poster in a PowerPoint slide for the following case:

Your brother Jack, aged 19, was diagnosed with liver cancer at an early stage 10 months ago and his left lobe of the liver was surgically removed. Now he had a persistent high fever ($>39.5^{\circ}\text{C}$), jaundice and sudden pain in the upper right portion of abdomen for more than 7 days. Your family worried about him very much.

Jack was subsequently admitted to a private hospital to check for any possibility of cancer recurrence. The medical doctor in the hospital suggested lowering down Jack's fever first using antibiotics for 2 reasons. First, fever may affect the results of PET-CT (positron emission tomography-computed tomography) Scan. Second, use of fever reducer acetaminophen may damage the liver. Unfortunately, Jack is allergic to antibiotics and your parents forgot the drug name that led to Jack's allergy.

Data in the following table were the blood test results from Jack after staying in the hospital for one day. Also, gallstones in the bile duct were seen in the ultrasound scan. As a science student in an Immunology course, what preliminary conclusions you will make based on the clinical data? What will be your points that you are going to share with your parents and Jack, before discussing with the medical consultant?

Blood Test	Results (H: High; L: Low)	Normal Range
Hepatitis B Surface Antigen	Negative	-
Anti-HBc Ab (Total Hepatitis B Core Antibody)	Negative	-
HCV Ab (Anti-Hepatitis C Virus Antibody)	Negative	-
Serum CEA (Carcinoembryonic Antigen)	2.5 ng/mL	< 3 ng/mL
Serum CA 19.9 (Carbohydrate Antigen 19.9)	19 U/mL	< 35 U/mL
AFP (Alpha-fetoprotein)	3 ng/mL	< 10 ng/mL
CRP (C-reactive Protein)	73.7 mg/L (H)	< 10 mg/L
PCT (Pro-calcitonin)	0.51 ng/mL (H)	< 0.25 ng/mL
Soluble CD14	4,000 ng/mL (H)	1,500-2,500 ng/mL
ALP (Alkaline Phosphatase), Total	287 U/L (H)	43-105 U/L
ALT (Alanine Aminotransferase), Total	161 U/L (H)	< 53 U/L
Bilirubin, Total	52 $\mu\text{mol/L}$ (H)	5-27 $\mu\text{mol/L}$
Cholesterol	7.1 mmol/L (H)	< 5.2 mmol/L
LDL-Cholesterol (Calculated)	4.1 mmol/L (H)	< 2.6 mmol/L
Albumin	30 g/L (L)	33-48 g/L
Albumin/Globulin Ratio	2.5	1.5-2.5
White Cell Count	$10.1 \times 10^9/\text{L}$ (H)	$3.7-9.2 \times 10^9/\text{L}$
Lymphocytes	$3.5 \times 10^9/\text{L}$ (H)	$1.0-3.1 \times 10^9/\text{L}$
Neutrophils	$6.2 \times 10^9/\text{L}$ (H)	$1.7-5.8 \times 10^9/\text{L}$
Monocytes	$0.1 \times 10^9/\text{L}$	$0.1-0.8 \times 10^9/\text{L}$
Hematocrit	0.41 L/L	0.4-0.5 L/L
ESR (Erythrocyte Sedimentation Rate)	87 mm/h (H)	0-17 mm/h
Blood Culture for Bacteria	Negative	-

The following points may help you to dissect the problems in the case.

1) What do the abnormal blood results mean?

Blood Test	What do the abnormal blood results mean?
Hepatitis B Surface Antigen	
Anti-HBc Ab (Total Hepatitis B Core Antibody)	
HCV Ab (Anti-Hepatitis C Virus Antibody)	
Serum CEA (Carcinoembryonic Antigen)	
Serum CA 19.9 (Carbohydrate Antigen 19.9)	
AFP (Alpha-fetoprotein)	
CRP (C-reactive Protein)	
PCT (Pro-calcitonin)	
Soluble CD14	
ALP (Alkaline Phosphatase), Total	

ALT (Alanine Aminotransferase), Total	
Bilirubin, Total	
Cholesterol	
LDL-Cholesterol (Calculated)	
Albumin	
Albumin/Globulin Ratio	
White Cell Count	
Lymphocytes	
Neutrophils	
Monocytes	
Hematocrit	
ESR (Erythrocyte Sedimentation Rate)	
Blood Culture for Bacteria	

- 2) What is the etiology (what causes a disease) and pathogenesis (the biological mechanism of a disease) of the disease/symptoms in Jack's case (liver cancer, fever, jaundice, abdominal pain, gallstone and allergy)?
- 3) What are the impacts of fever of unknown origin (FUO) on the PET-CT Scan?
- 4) Based on the results of the blood tests, give a logical thinking and structural reasoning for Jack's health problems.
- 5) What suggestions do you have for your family?
- 6) What are the questions you are going to ask the medical consultant?

e-Poster Guidelines:

To train your teamwork spirit, Three students are grouped in One Team to prepare an e-Poster (40" Tall x 30" Wide in pptx format). Any group with <3 students without prior permission will get 1 final mark deduction. (Generic Skill 5)

You are required to report to our office (chinyungyeung@cuhk.edu.hk) your team information (student name, student ID, student e-mail address) after the e-add-drop deadline (20 Sep 2022). If you cannot form a team on your own after the deadline, our office will randomly assign you to a team.

In the bottom right corner of your poster, put down (1) your Name & Student ID, (2) Role & % of Contribution of each student in the team (Members in one group may get different marks) & (3) a statement for Academic Honesty (Please see below).

Upload your e-Poster to Blackboard on or before 5:00 pm, 2 Nov 2022 (Late submission: mark deduction: 1 final mark/day).

Assessment is based on the concepts that you are going to use, logical thinking of your approach, and quality of diagrams for illustrations, including informative figure legends and relevant academic references. More marks will be given to the poster with sound original innovations, nice illustrations, & clear presentation. You can use Slidesgo or the trial version of BioRender (a professional illustration app (<https://biorender.com/>)).

Academic Honesty: Attention is drawn to the University's policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at http://www.cuhk.edu.hk/policy/academic_honesty/. With each assignment, students will be required to submit a statement that they are aware of these policies, regulations, guidelines and procedures. (Generic Skill 6)

Weekly Schedule:

Week	Date	Hrs	Topics	Teacher
1	Sept 7 (Wed)	2	Overview of Our Immune System (2 L)	Prof. SK Kong (20 Lectures)
	Sept 9 (Fri)	1	Nature of Antigens & Immunogens (1 L)	
2	Sept 14 (Wed)	2	Nature of Antigens & Immunogens (1 L) Lymphoid Tissues & Immunocytes (1 L)	
	Sept 16 (Fri)	1	Lymphoid Tissues & Immunocytes (1 L) e-Add-Drop deadline (19 Sep 2022 (Mon))	
3	Sept 21 (Wed)	1	Lymphoid Tissues & Immunocytes (1 L)	
	Sept 23 (Fri)	1	Immunoglobulin Structure & Functions (1 L)	
4	Sept 28 (Wed)*	2	Immunoglobulin Structure & Functions (1 L) Antibody Diversity (1 L)	
	Sept 30 (Fri)	1	Antibody Diversity (1 L)	
5	Oct 5 (Wed)	2	The Major Histocompatibility Complex (2 L)	
	Oct 7 (Fri)	1	T Cells & T Cell Receptors (1 L)	
6	Oct 12 (Wed)	2	T Cells & T Cell Receptors (1 L) Integration of Immune Responses (1 L)	
	Oct 14 (Fri)	1	Integration of Immune Responses (1 L)	
7	Oct 19 (Wed)*	2	Integration of Immune Responses (1 L) Immunological Tolerance (1 L)	
	Oct 21 (Fri)	1	Immunological Tolerance (1 L)	
8	Oct 26 (Wed)	2	Mid-term Examination	
	Oct 28 (Fri)	1	Host Defense Part 1 (1 L) (Watch micromodule #1 by Nov 1)	Dr. Alex KOON (16 Lectures)
9	Nov 2 (Wed)	2	The Complement System (2 L)	
	Nov 4 (Fri)	1	Host Defense Part 2 (1 L)	
10	Nov 9 (Wed)	2	Allergies & Hypersensitivity Reactions (2 L) (Watch micromodule #2 by Nov 8)	
	Nov 11 (Fri)	1	Allergies & Hypersensitivity Reactions (1 L)	
11	Nov 16 (Wed)	2	Emerging Infectious Diseases & Vaccine Strategies (2 L) (Watch micromodule #3 by Nov 17)	
	Nov 18 (Fri)	1	Emerging Infectious Diseases & Vaccine Strategies (1 L)	
12	Nov 23 (Wed)*	2	Immunodeficiency & AIDS (2 L)	
	Nov 25 (Fri)	1	Immunodeficiency & AIDS (1 L)	
13	Nov 30 (Wed)	2	Transplant Immunology & Immunity to tumors (2 L) (Watch micromodule #4 by Dec 1)	
	Dec 2 (Fri)	1	Transplant Immunology & Immunity to tumors (1 L)	

(*Quiz, 5% final mark each; Format: MCQ, T/F and/or Short Qs, etc.)

Feedback and Evaluation:

Students are welcome to express feedbacks on course contents and learning experience to the course teachers. A standard course evaluation questionnaire will be used to collect feedbacks from students at the end of the course.

Posting of Course Contents and Announcements:

Course materials including lectures notes are all provided in the course's Blackboard eLearning platform (<https://elearn.cuhk.edu.hk/>). Students can access the materials using their student username and password.

Tutorials:

Tutorial 1 & 2 (optional): Time & Venue to be announced.

Grade Descriptors:

Grade	Overall Course Expectations
A	<ul style="list-style-type: none"> Consistently excellent performance on all learning outcomes Be able to apply concepts learnt in class to tackle challenging immunology problems in a manner that exceeds normal standards expected for the majority of students in an upper-level undergraduate science course Demonstrates the ability to identify relationships and synthesize new ideas that connect the immunological principles introduced in class Has the ability to integrate knowledge of the different components of the immune system to understand their holistic contribution to immunity and disease
A-	<ul style="list-style-type: none"> Excellent performance on almost all learning outcomes Demonstrates the ability to express, clarify and analyze immunological concepts and their applications logically and comprehensively Be able to apply concepts learnt in class in a way that not only fulfills the normal expectations, but occasionally goes beyond the normal expectations
B	<ul style="list-style-type: none"> Substantial performance on all or almost all learning outcomes Demonstrates the ability to recall, describe and analyze immunological concepts and their applications in an unambiguous manner Be able to apply concepts learned in class to tackle standard immunology problems logically and in a way that fully meet the expectation for the majority of students in an upper-level undergraduate science course
C	<ul style="list-style-type: none"> Satisfactory performance on the majority of learning outcomes Demonstrates the ability to recall and state most (but not all) immunological concepts and their applications in a satisfactory manner Be able to express and apply separate or fragmented pieces of immunology knowledge learned in class to solve familiar immunological problems
D	<ul style="list-style-type: none"> Barely satisfactory performance on a number of learning outcomes Demonstrates the ability to recall and state immunology principles in simple terms Be able to occasionally apply concepts learned in class to solve familiar immunological problems in a way that is broadly (but not always) correct
F	<ul style="list-style-type: none"> Unsatisfactory performance on a number of learning outcomes; <u>OR</u> Failure to meet the specified assessment requirements

Penalty

Guidelines of the University's Procedures for Handling Cases of Academic Dishonesty:

Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>).

REMINER: Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>; please check them out.

- End -

**BCHE4070 /BBMS6300 Management and Accreditation of Biochemical Laboratory
2022-2023 2nd Term**

Time : Saturday, 2:30 pm - 5:30 pm
Venue : Lecture Theatre 7, Yasumoto International Academic Park (YIA LT7)
Medium of Instruction : English
Unit : 3
Minimal Passing Grade : D

Course Outline:

The aims of this course are to introduce basic concepts and adequate skills of laboratory management, safety and quality assurance in biochemical laboratories. Special topics such as biochemical testing and manufacturing process, good laboratory practice, laboratory accreditation, genetic testing and experimental protocols and method validation etc, will be discussed.

No.	Date	Title of the Lecture	Teacher
1	14 Jan	Accreditation Program of AAALAC International for Care and Use of Laboratory Animals (1)	Dr. Benson YEUNG ¹
	21 Jan	No class (Lunar New Year Vacation)	
2	28 Jan	Accreditation Program of AAALAC International for Care and Use of Laboratory Animals (2)	Dr. Benson YEUNG ¹
3	4 Feb	Good Manufacturing Practice (GMP)	Dr. Ken YEUNG ³
4	11 Feb	Clinical Laboratory Sciences and Practice	Dr. William CHO ²
5	18 Feb	Quality Assurance in Clinical Laboratory	Dr. William CHO ²
6	25 Feb	Intellectual Property Rights Relevant to Biotechnology	Dr. Alice WONG ⁴
7	4 Mar	Enforcement of IPRs, Agreement Basics and Licensing	Dr. Alice WONG ⁴
	11 Mar	No class (Reading Week)	
8	18 Mar	Preparation for Establishing a Biotech Start-up	Dr. CHOI Pui Wah ⁵
9	25 Mar	Management of R&D: from People to Lab	Dr. CM LEE
10	1 Apr	Management of R&D: from Lab to Portfolio	Dr. CM LEE
	8Apr	No class (Public Holiday)	
11	15 Apr	Establishment and Management of a Biotech Start-up + Presentation #	Dr. CHOI Pui Wah ⁵
-	22 Apr	Final Test (2:30 pm – 4:00 pm) Venue: TBC	

The arrangement and guideline for the presentation (lecture 11) will be posted on Blackboard in late January.

UG Reading Week : 6 Mar 2023 (Mon) – 11 March 2023 (Sat)
 UG Exam Period : 26 Apr 2023 (Wed) – 13 May 2023 (Sat)

- ¹ Technology Transfer Office, The University of Hong Kong
² Queen Elizabeth Hospital
³ Office of Research and Knowledge Transfer Services, CUHK
⁴ Associate at Loeb & Loeb LLP
⁵ Founder of WomenX Biotech Limited

Assessments:

Term paper	: 20%
Group Presentation	: 20% (Lectures 8 & 11)
Final Test	: 60% (Lectures 1-7 & 9-10)

Term Paper Guidelines:

(For details, please go to http://www.bch.cuhk.edu.hk/msc-temp/How_to_write_a_Term_Paper.pdf)

- Write a term paper on a topic taught in BBMS6300/BCHE4070. Suggested term paper topics will be uploaded to CU eLearning System. The topic and content of your term paper should be something that you are interested in and want to explore more. You may discuss your term paper with a teacher in your class.
- Not more than 4 pages including figures, references, font-size 10, single-line spacing.
- **Deadline:** Please submit the term paper via CU eLearning System on or before **11:55 pm, 29 April 2023 (Saturday)**.
- **Academic Honesty:** Attention is drawn to University policy and regulations on **honesty in academic work**, and to the disciplinary guidelines & procedures applicable to breaches of such policy & regulations. CUHK places very high importance on honesty in academic work submitted by students, and adopts a policy of zero tolerance on cheating and plagiarism. Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated *Procedures* are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>).
- **All assignments must FIRST be submitted to VeriGuide** (https://academic.veriguide.org/academic/login_CUHK.aspx) **for checking of plagiarism.** A VeriGuide receipt will be issued by the VeriGuide system upon students' uploading of the soft copy of the assignment online.
- Please attach the SIGNED VeriGuide receipt (sign electronically or scan the signed hardcopy) on the first page of your assignment and **submit it through CU eLearning System** (<https://blackboard.cuhk.edu.hk/ultra/stream>) **for marking.**
- **Submission through other means or assignment without VeriGuide receipt will NOT be marked.**
- Term papers submitted after the designated deadline will be penalized accordingly; one-day delay will be penalized for 5% of total marks of the term paper, two-day delay will be penalized for 10% of the total marks, and so on.
- **General organization:** The following sections should be included in your term paper.
 - (a) **Title:** Give an informative and concise title.
 - (b) **Summary:** Give your findings and a summary.
 - (c) **Introduction:** Give background information and relate the problem(s) you found with the current information.
 - (d) **Main body:** Present your ideas in a systematic and concise manner. When necessary, supply figures, diagrams and tables with legends, and source of information.
 - (e) **Discussion and conclusion:** Give a summary of your ideas, and provide thoughtful discussion about the implications of your suggestions.
 - (f) **References:** Make sure you provide accurate citations with the following format. List references alphabetically. Journal: Yoshida H, Kawane K, Koike M, Mori Y, Uchiyama Y, Nagata S. Phosphatidylserine-dependent engulfment by macrophages of nuclei from erythroid precursor cells. *Nature*, 2005, 437:754-8. Internet: [http://www](http://www....) (Date of access: XX. month year).

Test Format:

- Closed-note examination (MCQ / T/F)

M.Sc. Attributes Table

Graduate Skills	Teaching & Learning	Practice	Assessment
Effective communication (written, oral, interpersonal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Core knowledge literacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Problem solving	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Critical thinking and evaluation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Work autonomously	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Work in teams (with classmate, supervisor & RA etc)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Creativity and innovation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Information technology (IT) literacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lifelong learning skills	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ethical behaviours in social/professional/work environment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Responsible, effective citizenship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Grade Descriptor

Grade	Overall course
A	Demonstrates the ability to synthesize and apply the principles or subject matter learnt in the course, to novel situations and/or in novel ways, in a manner that would surpass the normal expectation at this level, and typical of standards that may be common at higher levels of study or research. Has the ability to express the synthesis of ideas or application in a clear and cogent manner.
A-	Demonstrates the ability to state and apply the principles or subject matter learnt in the course to familiar and standard situations in a manner that is logical and comprehensive. Has the ability to express the knowledge or application with clarity.
B	Demonstrates the ability to state and partially apply the principles or subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is usually logically persuasive. Has the ability to express the knowledge or application in a satisfactory and unambiguous way.
C	Demonstrates the ability to state and apply the principles or subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is not incorrect but is somewhat fragmented. Has the ability to express the separate pieces of knowledge in an unambiguous way.
D	Demonstrates the ability to state and sometimes apply the principles or subject matter learnt in the course to some simple and familiar situations in a manner that is broadly correct in its essentials. Has the ability to state the knowledge or application in simple terms.
F	Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.

REMINDER: Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>; please check them out.

BCHE4080 Biochemistry for Forensic Sciences 2022-23, 1st Term

Course Description

This course aims at introducing various biochemical principles and techniques for forensic analysis to the students. Students will learn how to observe, collect, analyze and evaluate evidence found at crime scenes. The first part addresses the identification of biological fluids such as blood, semen, and saliva from crime scene. The emphasis will be on the biochemical technologies used in the presumptive and confirmatory tests. The second part covers DNA analysis using RFLP and PCR-STR typing methods, interpretation of DNA typing results, and court presentation of such biological evidence. Mitochondrial DNA typing and Y chromosome DNA typing will also be discussed. It is anticipated that students will apply the biochemistry knowledge they have acquired in junior years in the course.

Learning Outcomes

After finishing the course, students will be able to:

- 1) Develop an understanding of the concept and theory of forensic analysis.
- 2) Understand the analytical techniques involved.
- 3) Discuss the application of forensic science to crime detection.

Assessment Scheme

Mid-term exam : 40% (Lecture 1-5)
Final exam : 60% (Lecture 6-12)

Grade Descriptors

Grade	Overall course
A	Demonstrates a deep understanding of various biochemical principles and techniques for forensic analysis, and how to observe, collect, analyze and evaluate evidence found at crime scenes. Demonstrate the ability to apply different presumptive and confirmatory forensic tests for various samples and novel situations that would substantially surpass the normal expectation at this level and typical of standards that may be common at higher levels of study. Shows evidence of critical evaluation of different approaches to solving forensic problems. Demonstrates the ability to articulate the synthesis of new ideas or applications in a clear and cogent manner.
A-	Demonstrates high level of understanding of various biochemical principles and techniques for forensic analysis, and how to observe, collect, analyze and evaluate evidence found at crime scenes. Demonstrate the ability apply different presumptive and confirmatory tests for some novel samples and situations. Shows evidence of logical analysis of simple forensic problems. Demonstrates the ability to articulate the synthesis of new ideas or applications in a clear and cogent manner.
B	Demonstrate a competent grasp of the key concepts in various biochemical principles and techniques for forensic analysis, and how to observe, collect, analyze and evaluate evidence found at crime scenes. Demonstrates the ability to state and partially apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is usually logically persuasive. Demonstrate the ability to articulate scientific concepts or applications in a logical and coherent way.

C	<p>Demonstrate a basic understanding of various biochemical principles and techniques for forensic analysis, and how to observe, collect, analyze and evaluate evidence found at crime scenes.</p> <p>Demonstrates the ability to state and apply the subject matter learnt in the course to most (but not all) familiar and standard situations in a manner that is not incorrect but is somewhat fragmented.</p> <p>Shows the ability to articulate scientific concepts in a concise way.</p>
D	<p>Demonstrate the ability to apply certain learnt forensic biochemistry principles to simple situations in a manner that is broadly correct in its essentials or is somewhat ambiguous</p> <p>Demonstrates the ability to state and sometimes apply the subject matter learnt in the course to some simple and familiar situations in a manner that is broadly correct in its essentials.</p>
F	<p>Demonstrate an incomplete or incorrect biochemical principles and techniques for forensic analysis, and how to observe, collect, analyze and evaluate evidence found at crime scenes.</p> <p>Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.</p>

Recommended Readings

- (1) Forensic Science: From the Crime Scene to the Crime Lab. Richard Saferstein. Pearson 2013 [HV 8073 S214]
- (2) Forensic Science: An Introduction. Richard Saferstein. Prentice Hall 2011 [HV 8073 S214]
- (3) Forensic Biology. Richard Li, CRC press, Taylor and Francis Group 2008 [QH 313.5 F67 L5]
- (4) Advanced Topics in Forensic DNA Typing: Methodology. John M. Butler. Elsevier Academic Press 2012 [electronic resource]
- (5) Fundamentals of Forensic DNA Typing. John M. Butler. Academic Press 2010
- (6) Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers. John M. Butler. Academic Press 2005 [electronic resource]

BCHE4080 Biochemistry for Forensic Sciences

2022-23, 1st Term

Teachers	Office	Tel.	Email
Prof. KF Lau (Course Coordinator)	SC 291	3943 1106	kflau@cuhk.edu.hk
Prof. PC Shaw	SC 180	3943 1363	pcshaw@cuhk.edu.hk
Dr. Otis Lam	SC 333A	3943 5978	otislam@cuhk.edu.hk
Mr. Hong Teng Tsui			

Course Schedule:

Time : Friday, 6:30 pm - 9:15 pm

Venue : Lecture Theatre 3, Yasumoto International Academic Park (YIA LT3)

For 23 Sep 2022, the venue is changed to Lecture Theatre 7, Lee Shau Kee Building (LSK LT7)

No.	Date	Topic	Teacher
1	Sep 9	Introduction to Forensic Sciences	Prof. KF Lau
2	Sep 16	Forensic Serology & Blood Analysis	Prof. KF Lau
3	Sep 23	Detection of Saliva, Semen & Other Bodily Fluids	Prof. KF Lau
4	Sep 30	Forensic Toxicology &	Prof. KF Lau
5	Oct 7	Current Approaches to Authenticate Chinese Medicinal Material	Prof. PC Shaw
6	Oct 14	Mid-term Examination (Venue: TBC)	
7	Oct 21	Sample Collection, DNA Extraction & Quantitation	Dr. Otis Lam
8	Oct 28	DNA Typing: Restriction Fragment Length Polymorphism (RFLP)	Dr. Otis Lam
9	Nov 4	DNA Typing: Short Tandem Repeat (STP) Markers - Part 1	Dr. Otis Lam
10	Nov 11	DNA Typing: Short Tandem Repeat (STP) Markers - Part 2	Dr. Otis Lam
11	Nov 18	Y Chromosome Testing & Mitochondrial DNA Analysis	Dr. Otis Lam
12	Nov 25	Forensic Issues and Result Interpretation	Mr. HT Tsui [#]
13	Dec 2	Reporting, Court Testimony, Quality Requirements, DNA Database, & New Development	Mr. HT Tsui [#]

A Facility for Posting Course Announcements:

Course announcements and materials will be posted on the Blackboard course website. The powerpoint slides used will be posted on the Blackboard course website before the lecture. NO hard copies will be distributed in the class.

Reminders:

Academic Honesty: According to University regulations, students must submit an electronic version of their assignment to VeriGuide system for the purpose of checking for possible plagiarism. Read the University's policies on plagiarism carefully and do not plagiarise! CUHK has adopted a policy of zero tolerance for plagiarism. Instructors will send all suspected cases of plagiarism directly to the disciplinary committee for investigation. In the case of group report, plagiarism will affect all partners! Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>). Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>

Course code: BCHE4090
Course title: Biochemistry for Sport and Exercise
Venue: MMW 704
Unit: 2
Term: 2
Period: 9:30 – 11:15, Friday
Instructor: FH Lo
Office: SC G83
Email: lofaihang@cuhk.edu.hk
Telephone: 39435019

Course Objectives:

This course aims at introducing various biochemical aspects of sport and physical activities to the students. The course is designed to cover some basic anatomy, energy utilization, cardiac functions, injury mechanisms, sports therapeutic principles, endocrine effects on physical activities, nutrition for sports, physical activities in extreme conditions, and physical activities for the diseased population. The course welcomes students with basic knowledge in biological science, where various in-class activities are integrated so as to let the students apply, analyze, and evaluate the academic knowledge in daily life. The training of students' creativity, question asking, critical thinking, goal-setting, self-learning, and decision making skills will also be emphasized: students are encouraged to participate in the self-reflective activities, workshop, and group activities. Throughout the learning process, it is anticipated that the students will not only acquire the academic knowledge, they will also consolidate their learning and acquire useful skills for both personal and professional aspects.

Learning Outcomes:

- Master the fundamental knowledge of physiology and anatomy of the skeletomuscular system;
- Comprehend the basic knowledge of the selected topics of sports biochemistry;
- Experience and apply the knowledge of sports biochemistry in every-day-life scenarios;
- Identify, analyze, and comment on the relationship between biochemistry and physical activities;
- Develop practical skills in goal-setting, problem-solving, team-work, and communication skills;
- Gain learning methodologies that promote life-long learning in biochemistry and other related disciplines.

Textbooks:

- ACSM's advanced exercise physiology (Farrell et al); [WE103 .A83 2012]
- ACSM's guidelines for exercise testing and prescription (Thompson et al); [WE103 .A45 2010]
- Biological psychology (James W Kalat); [WL102 .K33 2013]
- Essential haematology (Hoffbrand & Moss); [available online]
- Exercise physiology : nutrition, energy, and human performance (McArdle et al); [QT260 .M375 2010]
- Managing sports injuries (Christopher M Norris); [available online]
- Marks' basic medical biochemistry : a clinical approach (Lieberman et al); [available online]
- Medical biochemistry (Baynes & Dominiczak); [available online]
- Principles of anatomy & physiology (Tortora & Derrickson); [QS4 .T67 2012]
- Principles of athletic training (Arnheim & Prentice); [QT260 .A76 1995]
- Robbins and Cotran pathologic basis of disease (Robbins et al); [available online]
- Sports and exercise nutrition (McArdle et al); [TX361.A8 M38 2013]
- Wilderness medicine (Paul S Auerbach); [available online]

Course Assessment

Classwork	20%
<i>Mind-map*</i>	10%
<i>In-class activities**</i>	10%
Written assignment	30%
<i>Group written assignment⁺</i>	25%
<i>Individual written assignment[#]</i>	5%
Quiz and exam	50%
<i>Quiz</i>	10%
<i>Final exam (T/F, MCQ, and SQ)</i>	40%
Total	100%

*The mind-map of each student is assessed by the whole class in terms of the creativity;

**Any FIVE of the class activities I to VII account for 10% of the total marks of the course (2% each);

⁺Group written assignment requires each group to discuss and reflect on the group activity in either week 13 or 14. Each group, with at least three students, is required to present 1) what did you learn from the course (5%), 2) what was the most interesting academic knowledge to you (5%), 3) how did you integrate what you learnt in the course to analyze the situation presented to you during the group activity (5%), 4) what judgment did you make in the situation (5%), and 5) what did you plan to do in the situation (5%) in the written assignment;

[#]Individual written assignment requires each student to reflect on what did they learn from all the class activities.

Grade Descriptors

Grade	Overall Course
A	<ul style="list-style-type: none"> • Excellent achievement of all the stated learning outcomes; • Demonstration of excellent understanding of the core knowledge; • Excellent ability to apply the knowledge for problem solving; • Demonstration of excellent analytical skills for making judgement; • Excellent participation of in-class activities and group-project.
A-	<ul style="list-style-type: none"> • Excellent achievement of all the stated learning outcomes; • Demonstration of excellent understanding of the core knowledge; • Very good ability to apply the knowledge for problem solving; • Demonstration of very good analytical skills for making judgement; • Excellent participation of in-class activities and group-project.
B	<ul style="list-style-type: none"> • Very good achievement of all the stated learning outcomes; • Demonstration of very good understanding of the core knowledge; • Good ability to apply the knowledge for problem solving; • Demonstration of good analytical skills for making judgement; • Very good participation of in-class activities and group-project.
C	<ul style="list-style-type: none"> • Satisfactory achievement of all the stated learning outcomes; • Demonstration of good understanding of the core knowledge; • Satisfactory ability to apply the knowledge for problem solving; • Demonstration of satisfactory analytical skills for making judgement; • Good participation of in-class activities and group-project.
D	<ul style="list-style-type: none"> • Fair achievement of all the stated learning outcomes; • Demonstration of fair to satisfactory understanding of the core knowledge; • Fair ability to apply the knowledge for problem solving; • Demonstration of fair analytical skills for making judgement; • Fair to satisfactory participation of in-class activities and group-project.
F	<ul style="list-style-type: none"> • Poor achievement of all the stated learning outcomes; • Demonstration of poor understanding of the core knowledge; • Poor ability to apply the knowledge for problem solving; • Demonstration of poor analytical skills for making judgement; • Poor participation of in-class activities and group-project.

Schedule

Week	Date	Contents
1	13 Jan	<ul style="list-style-type: none"> - Course introduction - Skeletal system
2	20 Jan	<ul style="list-style-type: none"> - Muscular and nervous system - Class activity I: body posture
	27 Jan	- Chinese New Year Holiday
3	3 Feb	<ul style="list-style-type: none"> - Neuromuscular control - Muscle contraction and synthesis - Bone synthesis and soft tissue biochemistry - Class activity II: balancing the body
4	10 Feb	<ul style="list-style-type: none"> - Energy utilization at rest and during physical activities I - Class activity III: estimation of basal metabolic rate
5	17 Feb	<ul style="list-style-type: none"> - Blood - Cardiac functions for physical activities - Cardiovascular system during physical activities - Class activities IV: blood pressure measurement
6	24 Feb	<ul style="list-style-type: none"> - Quiz: skeletomuscular system - Molecular mechanism of cellular injury and recovery - Ischemia, inflammation, and spasm - Fatigue and rest
7	3 Mar	<ul style="list-style-type: none"> - Adaptation mechanisms to extreme environments - Class activity V: mind-map drawing
	10 Mar	- Reading Week
8	17 Mar	<ul style="list-style-type: none"> - Endocrine effect on physical activities - Biochemical principles of training and doping - Class activity VI: how fit you are?
9	24 Mar	<ul style="list-style-type: none"> - Nutrition for sports - Fat cell biology - Class activity VII: measurement of body fat composition
10	31 Mar	<ul style="list-style-type: none"> - Physical activities in extreme conditions - Class activity VIII: measurement of blood O₂ saturation
	7 Apr	- Easter Holiday
11	14 Apr	<ul style="list-style-type: none"> - Stress and pain - Biochemical principles of sports therapeutics - Class activity IV: how stressed you are?
12	21 Apr	<ul style="list-style-type: none"> - Creative workshop - Critique on mind-map

Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>. For ALL written assignment, students will have to submit a statement that they are aware of these policies, regulations, guidelines and procedures.

For reference only

BCHE4130 Molecular Endocrinology

2022-23 Second Term

Time: T9-10 (4:30 Pm to 6:15 pm) and H6 (1:30 pm to 2:15 pm)

Venue: LHC 101 (T9-10) and ERB 712 (H6)

This course describes the chemical structures and biological functions of hormones. The organization and operation of different hypothalamus- pituitary- peripheral endocrine gland axes will be discussed. The structural and mechanistic aspects of endocrine action through hormone secretion and interactions with their specific receptors and downstream signaling pathways in target cells to elicit specific functions will be explored.

Textbooks:

Hadley, ME & Levine, JE (2007). **Endocrinology**, 6th Ed. Upper Saddle River, N.J., 500 p.
(WK100. H17 2007; UL reserved)

Molina, PE (2013). **Endocrine Physiology**, 4th Ed., McGraw Hill
(<http://accessmedicine.mhmedical.com/book.aspx?bookid=507>)

Nussey, SS & Whitehead, SA (2001). **Endocrinology, An Integrated Approach**, BIOS, 359p.
<http://www.ncbi.nlm.nih.gov/books/NBK22/> (NCBI Textbook On-line)

Outline and Teaching Schedule:

Week	Date	Topic (Text Chapters in Hadley and Levine, 2007)	Teachers
1	Jan 10 (2 h) Jan 12 (1 h)	The Molecular Basis of Hormones and Signal Transductions	Wilson Lau SC184 Tel: 3943-6253 Email: wcylau@cuhk.edu.hk
2	Jan 17 (2 h) Jan 19 (1 h)	The Hypothalamus and Anterior Pituitary Gland	
3	Jan 31 (2 h) Feb 2 (1 h)	The Thyroid Gland	
4	Feb 7 (2 h) Feb 9 (1 h)	The Adrenal Glands	
5	Feb 14 (2 h) Feb 16 (1 h)	The Islets of Langerhans, Diabetes Mellitus	
6	Feb 21 (2 h) Feb 23 (1 h)	The Gonads	
7	Feb 28 (2 h) Mar 2 (1 h)	The Hypothalamus and Posterior Pituitary Gland, Diseases of the Pituitary Gland	
8	Mar 14 (2 h) Mar 16 (1 h)	Presentation on Structural Biology of Endocrine Signaling ^{\$}	
9	Mar 21 (2 h) Mar 23 (1 h)	Presentation on Structural Biology of Endocrine Signaling ^{\$} and Quiz [#]	
10	Mar 28 (2 h) Mar 30 (1 h)	Reproduction, Sex Hormones and Contraceptives	FH Lo (Coordinator) SC G83 Tel: 3943-4359 Email: lofaihang@cuhk.edu.hk
11	Apr 4 (2 h) Apr 6 (1 h)	Steroid hormones and their actions	
12	Apr 11 (1 h) Apr 13 (2 h)	Gastrointestinal (GI) Hormones	
13	Apr 18 (2 h) Apr 20 (1 h)	Calcium Homeostasis and Bone Metabolism	

Evaluations:

1. \$ Presentation (group) (30%): 15% based on oral presentation, 10% based on slides submitted as group project, 5% on class participation
2. \$ Quiz (in-class) (1hr) (30%): covering all topics taught from Week 1 to 7.
3. *FINAL EXAMINATION (40%): covering all topics taught from Week 1 to 13, date to be confirmed.

Oral Presentation: students in a group of 3-4 students should deliver a 20-30 min presentation (depending on the number of students enrolled) on published research papers or reviews. Power point slides should be submitted one day ahead of presentation.

Quiz and Final Examination (closed-book examination): the quiz and exam consist of mainly multiple choice and/or short-answer questions.

Expected learning outcomes

After completing the course, students should be able to:

1. Describe the homeostatic controls in our body using the endocrine system;
2. Explain the concepts of hormonal control via feedback mechanisms and structural and mechanistic aspects of endocrine signaling
3. Understand the etiology and diagnosis of diseases from hormone defects, such as gigantism and Cushing Syndrome.

By the end of the course, students will be able to understand and appreciate about the complexity of hormonal control of growth, metabolism, reproduction and development.

Course code:	BCHE4760
Course title:	Immunology and Haematology laboratory
Venue:	Course introduction: LHC G06 Oral presentation: LHC G06 Lab examination: LHC G06 Practical sessions: Science Centre Room 188, 190
Unit:	2
Term	1
Period:	2:30 – 6:15 pm, Thursday

Course descriptions:

This course focuses on the practical work in the field of immunology and haematology; where students will participate in five practical sessions specialized in specific themes of immunology and haematology, such as innate immunity, humoral immunity, haematological specimens, red blood cells (RBCs), white blood cells (WBCs), and immunological assays. The practice of 'flipped classroom' allows students to do self-study of the e-learning courseware to get adequately prepared for each class. In other words, the laboratory is a place for the students to practise, to experience, to solve problems, and to discuss with autonomy. During each practical session, discussion time will be available to facilitate in-depth learning. Towards the end of the course, students will be giving presentations related to topics they are interested in for learning consolidation. In the course, impact of the academic knowledge on the society as well as other important generic skills, such as team building, self-learning, problem-solving, teamwork, and scientific communication skills, are emphasized. Throughout the various learning processes, it is anticipated that the students will not only acquire the academic knowledge and laboratory skills in immunology and haematology, they will also consolidate their learning and acquire other generic skills for future career development as well as applications in the society.

Learning goals:

- Comprehend the core knowledge and relevant laboratory skills in immunology and haematology;
- Develop generic skills in scientific communication and working in a team through diverse types of learning activities;
- Appreciate the applications and societal impact of the academic knowledge acquired from the course;
- Gain learning methodologies that promote life-long learning in immunology, haematology, and other life science-related discipline.

Textbooks:

- Refer to lecture course (BCHE4060 Basic and Applied Immunology and BCHE4030 Clinical Biochemistry)

Supplementary References:

- Practical Immunology (Hay & Westwood)
[available online];
- Laboratory Hematology Practice (Kottke-Marchant & Davis)
[available online];
- Laboratory Diagnosis of Infectious Diseases: Essentials of Diagnostic Microbiology (Engelkirk & Duben-Engelkirk)
QW25 .E54 (2008);
- Diagnostic Techniques in Hematological Malignancies (Erber WN, ed)
WH525 .D53 (2010);

Staff Correspondence

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Course Assessment

¹ Performance & participation	10%
² Pre-lab quiz	10%
³ Individual data presentation	10%
⁴ Group written assignment	10%
⁵ Individual written assignment	10%
Presentation	25%
Preparation	4%
Coordinators	10%
Demonstrators	5%
⁶ Peers	6%
Lab Exam	25%
Total	100%

¹Each student has to sign in (at 2:30 pm) and sign out (before 5:15 pm) for all the 5 practical sessions;

²There is a pre-lab quiz before each practical session to ensure students to have adequate preparation in advance. Each pre-lab quiz carries 2% of the total mark of the course;

³Each student has to present his/her raw data obtained in each practical session and have it submitted onto *Blackboard* on or before the due date. Each student has to work out the most appropriate way to present their raw data. The data presentation of each practical session accounts for 2% of the total mark of the course. The assessment is based on how the raw data is being presented; in case a group is unable to obtain their own raw data, they can use the model data provided to them;

⁴There is a set of critical thinking questions for each practical session (refer to the pre-lab write up form). Each group is required to complete the questions before each practical session; the students should print out the pre-lab write up form containing their answers and have discussion with the coordinator during class. The groups have to apply what they have learnt in *BCHE3092 Self Study Modules in Biochemistry and Professional Development* to search for a paper in the field of immunology or haematology using a method stated in the write up form. With reference to the context of the paper selected, the students shall answer the same set of critical thinking questions according to the same logic as described in write up form. After finishing each practical, the hard copies of the completed write up form shall be submitted;

⁵Each student has to reflect on the experience or knowledge of each practical session and write up a reflective writing.

⁶Five marks will be allocated for the quality of the presentations and a maximum of 1 mark will be awarded to good teams nominated by peers.

Schedule

Week	Date	Experiment	Venue	Staff
1	8 Sept	- Lab Check-In/student consultation - Grouping/presentation topic selection	LHC G06	LFH
2	15 Sept	- Preparation of oral presentation	SC	
3	22 Sept	- Assay for Innate Immunity - Assay for Humoral Immunity (I)	188/190	Anita & demonstrators
4	29 Sept	- Assay for Humoral Immunity (II)		
5	6 Oct			
6	13 Oct	- Preparation of oral presentation		
7	20 Oct			
8	27 Oct	- Assays of Haematological Specimens	SC 188/190	Anita & demonstrators
9	3 Nov	- Oral presentation	LHC G06	All
10	10 Nov	- Assays of Red Blood Cells (RBCs)	SC 188/190	Anita & demonstrators
11	17 Nov	- Flow Cytometric Analysis and Immunological Assay		
12	24 Nov	- University Ceremony		
13	1 Dec	- Lab examination	LHC G06	All

Generic skill descriptors

Items	Assessment methods	Remarks
Core factual knowledge	Pre-lab quiz and lab examination	Acquisition of core factual knowledge as required
	Oral presentation	Ability to describe the technique(s) presented
Procedural knowledge	Practical Work	Understand the procedure and design of experiment
	Oral presentation	Ability to present the procedure of the technique(s) and understanding of the importance of 'correct sequence of steps'
Application knowledge	Group written assignment	Ability to answer 'when is technique needed?' and 'who needs the technique?'
Technical skills	Data accuracy	Produce accurate data as required
Analytical skills	Individual written assignment	Reflection of the experience gained in class
	Group written assignment and oral presentation	Understanding and analysis of the 'WHs' questions as required
Scientific judgment	Group written assignment and oral presentation	Personal opinion on the application of the test
		Ability to judge a relevant technique in a specific context
Communication skills	Group written assignment	General usage of English language
	Oral presentation	Ability to present effectively
Teamwork and leadership	Team building activity and group sharing	Ability of group to reflect on their collaborative work
Self-learning skills	Individual/group written assignment and delivery of oral presentation	Ability to search for relevant knowledge independently
Self-learning skills Societal impact	Individual written assignment and oral presentation	Ability to search for relevant knowledge independently
		Understand the impact of immunology, haematology, life science & new technologies on the society
Societal impact	Demonstration of personal moral standards and	Understand the impact of immunology, haematology, life science & new technologies on the society
Disciplinary training	professionalism through the observance of rules	Mark deduction upon violations of course rules

The descriptors are based on Hong Kong Qualification Framework (HKQF).

Reference: https://www.hkqf.gov.hk/filemanager/en/content_13/HKQF_GLD_e.pdf

Flipped classroom

In this laboratory course, students are requested to view the pre-lab videos broadcasted on *Blackboard* and get thoroughly prepared before they attend the laboratory. When each practical session starts, the demonstrator in charge of the day will provide basic guidance of the experiment(s)/methods involved; then the students are expected to work independently from an empty bench, with minimal interference by the demonstrator team. All experiments will **terminate at 5:30 pm**; where from 5:30 to 6:15 pm is a dedicated discussion session.

Critical thinking questions

Pre-lab write up form

Students will have to submit the answers of the critical thinking questions in the format of a group pre-lab write-up form before each practical session. The answers should be discussed with the course coordinator during class. In the pre-lab write-up form, students have to answer i) when is the method needed? (0.5%) ii) who needs the method? (0.5%) iii) why this method is needed? (0.5%) 4) your opinion on the application of the method (0.5%). Students are advised to take BCHE4060 Basic and Applied Immunology and/or BCHE4030 Clinical Biochemistry. It is assumed that students have the background understanding of the context of the methods being used.

Individual data presentation

Raw data obtained during each practical session should be presented properly according to the references available, such as textbooks and scientific papers. In case a group is unable to obtain their own raw data, they can use the model data provided. Each student has to submit their data presentation onto *Blackboard* before the due date.

Individual reflective writing

Each student is required to experience the reflective learning cycle after the practical sessions. The details are available separately on *Blackboard*.

Presentation topics

The general topic of the group oral presentation is 'new technologies and immunological techniques'.

Students have to form a group of four; each group has to decide on their topics and present precisely 1) how is the immunological techniques performed? In this regard, the detailed bench-top procedures will have to be explained, whereas the potential problem(s) of wrong sequence of steps will have to be discussed. As a result, the audience will be benefited from the presentations and learn something about the immunoassay selected by the groups. In the meantime, the group will also have to 2) elaborate the use of new technologies related to the technique(s) chosen and to 3) evaluate the impact on the society.

Popular immunological techniques

- Plaque forming assay
- Phage display for antibody production
- Assay for tissue histocompatibility
- Assay for autoimmune disease
- Assay for allergic disease
- Animal immunization for antibody production
- Chemotactic assay
- Assay for NK cell cytotoxicity
- Immunological detection of viral infections
- Immunological detection of Rhesus (Rh) incompatibility
- Production of monoclonal antibodies
- Isolation of T cell clones
- Bioinformatics and immunology
- **Or, any other proposed techniques**

Each group has to confirm a presentation topic on or before week 3. The groups will have to rehearse their presentations with the course coordinator before the presentation. After the rehearsal, all the members of the group will together complete an in-depth team-building activity;

The groups will have to submit their presentation slides onto *Blackboard* before the presentations. The preparation of the presentation will be assessed (4% of the total mark). Student presentations (21% of the total mark) will be assessed by the course coordinator, the demonstrators, and by other students according to the assessment form on page 11;

Group sharing

To enhance students' *interpersonal communication skills* to work in a team, each group will be invited to share with the class their 1) weaknesses and 2) strengths; the group will also share about 3) what is an ideal group for them and 4) how can they transform themselves to that ideal group.

Important notes

- Course announcements and materials will be posted on the *Blackboard* course website;
- Students will have to work in groups of two students during each practical session;
- Students are recommended to refer to the supplementary references (above) to prepare for the presentations;
- All written assignments will have to be sent to *VeriGuide* before submission;
- Each write-up form will have to be submitted onto *Blackboard* within one week of the corresponding practical session;

Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>. With each assignment, students will be required to submit a statement that they are aware of these policies, regulations, guidelines and procedures.

Grade descriptors

Grade	Overall course
A	<ul style="list-style-type: none">• Outstanding achievement of all the stated learning outcomes;• Demonstration of excellent conceptual, procedural, and application knowledge;• Demonstration of excellent practical skills in terms of data accuracy;• Demonstration of excellent generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills;• Demonstration of excellent teamwork, leadership, and professionalism;• Excellent understanding of the social impact of immunology;
A-	<ul style="list-style-type: none">• Outstanding achievement of all the stated learning outcomes;• Demonstration of excellent conceptual, procedural, and application knowledge;• Demonstration of very good practical skills in terms of data accuracy;• Demonstration of excellent generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills;

	<ul style="list-style-type: none"> • Demonstration of excellent teamwork, leadership, and professionalism; • Excellent understanding of the social impact of immunology;
B	<ul style="list-style-type: none"> • Substantial achievement of all the stated learning outcomes; • Demonstration of very good conceptual, procedural, and application knowledge; • Demonstration of satisfactory to very good practical skills in terms of data accuracy; • Demonstration of good to very good generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills; • Demonstration of good to very good teamwork, leadership, and professionalism; • Good to very good understanding of the social impact of immunology;
C	<ul style="list-style-type: none"> • Satisfactory achievement of all the stated learning outcomes; • Demonstration of satisfactory conceptual, procedural, and application knowledge; • Demonstration of fair to satisfactory practical skills in terms of data accuracy; • Demonstration of satisfactory generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills; • Demonstration of satisfactory teamwork, leadership, and professionalism; • Satisfactory understanding of the social impact of immunology;
D	<ul style="list-style-type: none"> • Minimal achievement of all the stated learning outcomes; • Demonstration of fair conceptual, procedural, and application knowledge; • Demonstration of minimum practical skills in terms of data accuracy; • Demonstration of fair generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills; • Demonstration of fair teamwork, leadership, and professionalism; • Fair understanding of the social impact of immunology;
F	<ul style="list-style-type: none"> • Poor achievement of all the stated learning outcomes; • Demonstration of poor conceptual, procedural, and application knowledge; • Demonstration of poor practical skills in terms of data accuracy; • Demonstration of poor generic skills, such as making scientific judgement, conducting self-learning, analytical and communication skills; • Demonstration of poor teamwork, leadership, and professionalism; • Poor understanding of the social impact of immunology;

Course code: BCHE4830
Course title: Medical biochemistry laboratory
Venue: Classrooms: to be assigned
Laboratory: Science Centre East Block Room 408-411
Unit: 2
Term: 2
Period: 2:30 – 6:15 pm, Monday

Course Objectives:

In this course, students will be introduced to a series of practical sessions specialized in representative themes, such as the analysis of diabetes mellitus, liver function, endocrine function, tumour marker, which supplements the knowledge acquired from BCHE4030 Clinical Biochemistry/BCHE4130 Molecular Endocrinology and provides an experiential learning opportunities of the practical skills. In addition to the academic knowledge and laboratory techniques, other learning activities are also integrated into the course to equip our students for the professional and daily life scenarios they may encounter in the future; the holistic training of students' self-learning, problem-solving, team work, and communication skills will be emphasized: all students are required to work on self-reflection about the impact of medical biochemistry on our society. The students will participate class activity together to apply their knowledge in real life situations. They will also be encouraged to form groups and explore specific topics interesting to them, as well as to visit sites out of the campus. Throughout the diversified learning experiences in the course, it is anticipated that the students will not only acquire the academic knowledge and laboratory techniques in medical biochemistry, but also develop useful generic skills, apply their learning in real life scenarios, and equip themselves for their further studies and career development.

Learning Outcomes:

- Comprehend and apply the basic knowledge and laboratory skills in medical biochemistry;
- Recognize, analyze, and comment on the importance, as well as the scientific and social issues of medical biochemistry in clinical practice;
- Develop practical skills in goal-setting, self-learning, critical thinking, problem-solving, team-work, and communication skills through the various types of learning activities offered by the course;
- Gain learning methodologies that promote life-long learning in medical biochemistry and other life science-related discipline.

Textbook:

- Clinical Chemistry (Marshall & angert)
(available online)
- Medical Biochemistry (Baynes & Dominiczak)
(available online)
- Henry's Clinical Diagnosis and Management by Laboratory Methods (McPherson & Pincus)
(available online)

References:

- Tietz textbook of clinical chemistry and molecular diagnostics (Carl A. Burtis et al)
(available online);

Schedule

Week	Date	Activity/Experiment	Venue	Staff
1	9 Jan	- Lab Check-In/Grouping - Course introduction	SC 297	LFH
2	16 Jan	- Sway report preparation		
3	23 Jan	- Chinese New Year		
4	30 Jan	- Part One (a & b)	SC E408-411	Anita and Demonstrators
5	6 Feb	- Sway report preparation		
6	13 Feb	- Part Two (a & b)	SC E408-411	Anita and Demonstrators
7	20 Feb	- Sway report preparation		
8	27 Feb	- Part Two (b & c)	SC E408-411	Anita and Demonstrators
9	6 Mar	- Reading week		
10	13 Mar	- Part Three (a & b)	SC E408-411	Anita and Demonstrators
11	20 Mar	- Sway report preparation		
12	27 Mar	- Part 4	SC	Anita and
	28 Mar	- Part 4 follow-up	E408-411	Demonstrators
13	3 Apr	- Sway report assessment	TBA	All
14	10 Apr	- Easter		
15	17 Apr	- Lab Exam	TBA	All

Course Assessment

¹ Performance & participation	10%
² Pre-lab quiz	20%
Data	20%
³ Raw data	10%
⁴ Presentable data	10%
Written assignment	30%
⁵ Pre-lab exercise	10%
⁶ Reflective writing	10%
Sway report	10%
Lab exam	20%
Total	100%

¹Each student has to sign in (at 2:30 pm) and sign out (before 5:15 pm) for all the 5 practical sessions;

²There is a pre-lab quiz before each practical session to ensure students to have adequate preparation in advance;

³Each group has to write down all of the raw data after each practical session for assessment in terms of the quality/accuracy of the data obtained. The raw data of each practical session accounts for 2% of the total mark of the course;

⁴Each student has to present their raw data and submit on *Blackboard*. Each student has to work out the most appropriate way to present their raw data. The presentable data of each practical session accounts for 2% of the total mark of the course. The assessment is based on how the raw data is being presented;

⁵There is a set of critical thinking questions for each practical session (refer to the pre-lab exercise). Each group is required to complete the questions before each practical session; the students should print out the pre-lab exercise containing their answers and have discussion with the coordinator in class. The groups have to apply what they have learnt in *BCHE3092 Self Study Modules in Biochemistry and Professional Development* to search for a paper in the field of medical biochemistry using a method stated in the write up form. With reference to the context of the paper selected, the students shall answer the same set of critical thinking questions according to the same logic as described in write up form. After finishing each practical, the hard copies of the completed write up form shall be submitted;

⁶Each student has to reflect on the experience or knowledge of each practical session and write up a reflective writing.

Staff Correspondence

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Course coordinators			
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YIU, Anita	SC E412A	3943-6881	anita-garcia@cuhk.edu.hk

Flipped classroom

In this laboratory course, students are requested to view the pre-lab videos broadcasted on *Blackboard* and get thoroughly prepared before they attend the laboratory. When each practical session starts, the demonstrator in charge of the day will provide basic guidance of the experiment(s)/methods involved; then the students are expected to work independently from an empty bench, with minimal interference by the demonstrator team. All experiments will terminate at 5:30 pm; where from 5:30 to 6:15 pm is a dedicated discussion session.

Presentable data

Each student shall present his/her raw data professionally. Students have to apply what they learnt from BCHE3090 Self Study Modules in Biochemistry to study how scientists presented their raw data in their research papers. Raw data and presentable data of each practical session are assessed independently: the assessment criteria of raw data and presentable data are data accuracy and the effectiveness of data handling/presentation, respectively. Each student has to submit his/her presentable data onto *Blackboard* after each practical session.

Critical thinking questions

Each group has to submit the answers of the critical thinking questions in the format of a group pre-lab exercise before each practical session. The answers should be discussed with the course coordinator in class. Students are expected to apply the research skills they have learnt in *BCHE3092 Self Study Modules in Biochemistry and Professional Development* to search for a scientific paper in the field of medical biochemistry. The paper had to use the same method covered by each practical session, for example, if one practical session covers HPLC, a paper using HPLC can be selected; then, please refer to the use of HPLC of the paper selected and answer the critical thinking questions accordingly. Please note that each

method shall be used once only. There are six questions in the pre-lab exercise, 1) When was the method used in the paper? (0.25%)? 2) Who was/were the target user(s) of the method? (0.25%)? 3) What kind of raw data was collected through the method? (0.25%)? 4) What did the method answer? (0.25%)? 5) Why was this method selected for the hypothesis? (0.5%)? 6) Suggest an alternative method that serves the same function(s) of the method from 3. to 5. (0.5%)? Students are advised to take BCHE4030 Clinical Biochemistry and/or BCHE4130 Molecular Endocrinology. It is assumed that students have the background understanding of the context of the methods being used.

Individual reflective writing

Each student is required to experience the reflective learning cycle after the practical sessions. The details are available separately on Blackboard.

Sway report

Students will have to work in group (4 to 5 students) to prepare a newsletter report, which will be published online, by Sway (sway.com) of Office365 subscribed by CUHK. Each group has to identify a global or regional social issue related to Biochemistry, and write a report on that issue. The Sway report will account for 10% of the total mark of the course, where the assessment criteria are based on the social impact of the topic (2%), insights of the group (2%), presentation effectiveness (2%), design of the report (2%), and peer assessment (2%) during the Sway report peer assessment session, in which the groups can promote their report to their peers and discussion of the topics are allowed. The Sway report should contain no more than 2,000 words, which should be saved in a separate Word file to be submitted to the VeriGuide system. A signed *VeriGuide* statement has to be submitted onto Blackboard.

Useful examples

① BBC

Website: <https://www.newscientist.com/subject/health/>

② New Scientist

Website: <https://www.newscientist.com/subject/health/>

③ Scientific American

Website: <https://www.scientificamerican.com/health/>

Generic skill table

Items	Assessment methods	Remarks
Core factual knowledge	Critical thinking questions	Ability to answer 'What did the method answer?'
	Pre-lab quizzes and lab exam	Ability to understand the core factual knowledge as required
Application knowledge	Critical thinking questions	Ability to answer 'When was the method used in the paper?', 'Who was/were the target user(s) of the method?', and to propose a justified alternative method
	Sway report	Ability to apply core factual knowledge as required
Technical skills	Data accuracy and participation	Produce accurate data as required
Analytical skills	Critical thinking questions	Understanding and analysis of the 'WHs' questions as required
	Data presentation	Ability to analyze data as required
	Sway report	Ability to analyze the topics as required
Scientific judgment	Critical thinking questions	Ability to answer 'Why was this method selected for the hypothesis?' and to propose a justified alternative method
	Sway report	Ability to propose original ideas and make decisions
Problem-solving skills	Practical sessions	Ability to solve problems encountered during the experimental work
	Critical thinking questions	Ability to answer the 'WHs' questions as required
	Sway report	Ability to identify the potential problems with proposed solutions
Written communication skills	Sway report	English grammar and writing skills/style
Oral communication skills		Ability to communicate orally
Scientific communication skills	Data presentation	Ability to communicate raw data scientifically
Teamwork and leadership	Practical sessions	Ability to work in group
	Group written assignment and Sway report	

Innovation and design	Critical thinking questions	Ability to propose a justified alternative method
	Sway report	Ability to apply creativity and innovative problem solving skills
IT literacy	Sway report	Ability to search online specific information or handle information with computer software
Self-learning skills	Flipped classroom	Ability to manage self-study
Personal motivation	Flipped classroom and Multi-dimensional development modules	Self-motivated study and participation
Social participation and social enterprisingness	Sway report	Ability to relate individual to the society
Disciplinary training	Demonstration of personal moral standards and professionalism through the observance of rules	Mark deduction upon violations of course rules

The skills are described with reference to Hong Kong Qualification Framework (HKQF)..

Reference: https://www.hkqf.gov.hk/filemanager/en/content_13/HKQF_GLD_e.pdf

Academic Honesty

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at <http://www.cuhk.edu.hk/policy/academichonesty/>. With each assignment, students will be required to submit a statement that they are aware of these policies, regulations, guidelines and procedures.

Grade descriptors

Grade	Overall course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent conceptual, procedural, and application knowledge; Demonstration of excellent practical skills in terms of data accuracy; Demonstration of excellent generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of excellent teamwork, leadership, and professionalism; Excellent understanding of the social impact of medical biochemistry.
A-	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent conceptual, procedural, and application knowledge; Demonstration of very good practical skills in terms of data accuracy; Demonstration of excellent generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of excellent teamwork, leadership, and professionalism; Excellent understanding of the social impact of medical biochemistry.
B	<ul style="list-style-type: none"> Substantial achievement of all the stated learning outcomes; Demonstration of very good conceptual, procedural, and application knowledge; Demonstration of satisfactory to very good practical skills in terms of data accuracy; Demonstration of good to very good generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of good to very good teamwork, leadership, and professionalism; Good to very good understanding of the social impact of medical biochemistry.
C	<ul style="list-style-type: none"> Satisfactory achievement of all the stated learning outcomes; Demonstration of satisfactory conceptual, procedural, and application knowledge; Demonstration of fair to satisfactory practical skills in terms of data accuracy; Demonstration of satisfactory generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of satisfactory teamwork, leadership, and professionalism; Satisfactory understanding of the social impact of medical biochemistry.
D	<ul style="list-style-type: none"> Minimal achievement of all the stated learning outcomes; Demonstration of fair conceptual, procedural, and application knowledge; Demonstration of minimum practical skills in terms of data accuracy; Demonstration of fair generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of fair teamwork, leadership, and professionalism; Fair understanding of the social impact of medical biochemistry.
F	<ul style="list-style-type: none"> Poor achievement of all the stated learning outcomes; Demonstration of poor conceptual, procedural, and application knowledge; Demonstration of poor practical skills in terms of data accuracy; Demonstration of poor generic skills, such as making scientific judgement, conducting self learning, analytical and communication skills; Demonstration of poor teamwork, leadership, and professionalism; Poor understanding of the social impact of medical biochemistry.

SCHOOL OF LIFE SCIENCES SENIOR EXPERIMENTAL PROJECT GUIDELINES

Course Code	Term	Course Description
4901 Senior Experimental Project I	Summer Session (2 units)	Students carry out an independent research project provided by supervisor. To fulfill the course requirements, students are required to discuss their progress with their supervisors regularly and submit and present a research proposal with some preliminary data.
4902 Senior Experimental Project II	1st Term (2 units)	Students carry out an independent research project provided by supervisor. Students are required to discuss their progress with their supervisor(s) regularly and submit a revised proposal and progress report towards the end of the term. The progress report should highlight the goals of the project and the achievements accomplished. If difficulties are encountered, the progress report should suggest how to tackle the problems.
4903 Senior Experimental Project III	2nd Term (2 units)	Students continue to work on and complete the research project from 4902. Student should discuss with their supervisor(s), analyze relevant data, compare the data obtained with other similar experiments, and formulate conclusion. Students should submit a final report in the form of a manuscript and give an oral presentation before the end of the term.

LEARNING OUTCOMES

- Integrate both knowledge and skills learnt previously in other major courses.
- Survey scientific literature relevant to their research project.
- Read scientific literature critically to identify the scientific questions or problems and formulate a working hypothesis.
- Design independent research experiments to address the scientific questions.
- Acquire hands-on and bench-top research techniques in conducting experiments.
- Improve problem-solving and independent research abilities.
- Analyze and interpret data in a logical, professional and scientific way.
- Foster their skills in scientific writing and oral presentation.
- Improve their sense of responsibility and team spirit.

COURSE ARRANGEMENT

Three courses are one-to-one basis STOT courses. School will provide a list of experimental final year project for students' selection at the end of February. The students are required to approach the professor(s) on the projects that you are interested and submit a selection form indicating a maximum of three project titles, in order of priority, and the results will be released in mid-April. Students are required to submit a brief literature review (~ 5-10 pages) on the background of your

research topic and identify the scientific questions you want to address. With the guidance of your supervisor, you will design a few experiments of different approaches to address the scientific questions. If you enroll in 4901, you will have to submit or present a research proposal by late August with some preliminary data. In the first term, you will have to submit the progress report (4902) in early December. In the end of second term, you will conduct an oral presentation and submit the final report (4903).

COURSE ASSESSMENT OF 4901

WORK PERFORMANCE (60%) - BY SUPERVISOR

Students are expected to meet their supervisor(s) regularly to discuss the progress of the project. The supervisors will grade the students according to their attitude and performance in the project.

PROJECT PROPOSAL (40%) - BY 2 MARKERS INCLUDING SUPERVISOR

The proposal together with a signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the “course assignment” in blackboard site of LSCI 4901 before a deadline in August (**12 August 2022 (Friday) 5:00 pm**). The files should be in PDF format. The documents should NOT be locked or protected. One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
Week 1 to 2	<input type="checkbox"/> Has the student discussed the experimental research topic with you? <input type="checkbox"/> Was the student well prepared for the discussion with you? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 3 to 4	<input type="checkbox"/> Has the student discussed the plan of the experimental research project with you? <input type="checkbox"/> Has the student adequate literature research for the experimental research project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 5 to 6	<input type="checkbox"/> Has the student reasonably acquired new research skills relevant to the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 7 to 8	<input type="checkbox"/> Has the student demonstrated any problem solving skills throughout the project? <input type="checkbox"/> Has the student reasonably worked out any useful results for the project? <input type="checkbox"/> Others comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 9 to 10	<input type="checkbox"/> Has the student reasonably demonstrated any project management skills? <input type="checkbox"/> Has the student demonstrated a good attitude and perseverance throughout the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

ASSESSMENT SCHEME

	Criteria including	Marks
Project objective(s) and long-term impact, including abstract	<ul style="list-style-type: none"> • Clear title showing the main theme of this project • Well-defined objectives • Informative abstract • Comprehensible to a non-specialist 	

Background of research	<ul style="list-style-type: none"> • Relevant literature review • Capability to integrate proposed research with existing knowledge • Elaborate any unpublished work done before hand here 	
Research plan and methodology	<ul style="list-style-type: none"> • Whether the proposed research adequately address the objectives • Proper hypothesis and prediction • Adequate and precise data analysis • Suggestion of alternative methods if problems encountered • Include a project milestone-plan in the research plan 	
Organization, style and format	<ul style="list-style-type: none"> • Correct format, (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing) • Grammar & word usage • Conciseness and clarity • Proper use of tables, figures and legends (if applicable) • Proper citations in correct style 	

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> • Outstanding achievement of all the stated learning outcomes; • Demonstration of excellent research skills; • Demonstration of excellent research attitude; • Demonstration of excellent research plan and/or outcome;
A-	<ul style="list-style-type: none"> • Outstanding achievement of most of the stated learning outcomes; • Demonstration of very good research skills; • Demonstration of excellent research attitude; • Demonstration of very good research plan and/or outcome;
B	<ul style="list-style-type: none"> • Substantial achievement of the stated learning outcomes; • Demonstration of good research skills; • Demonstration of good research attitude; • Demonstration of good research plan and/or outcome;
C	<ul style="list-style-type: none"> • Fair to satisfactory achievement of the stated learning outcomes; • Demonstration of satisfactory or fair research skills; • Demonstration of satisfactory or fair research attitude; • Demonstration of satisfactory or fair research plan and/or outcome;
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Demonstration of little research skills; • Demonstration of little research attitude; • Demonstration of satisfactory research plan and/or outcome;
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of poor research plan and/or outcome; • Plagiarized materials found.

INSTRUCTIONS FOR PROPOSAL

<20 A4 pages (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing)

Title page

The title should identify the content of the report. Your name, student number, programme affiliation and the date of submitting the report are placed below the title. Please specify the total number of words in your proposal.

Abstract

Briefly state your project, background and justification (or significance), your preliminary results and on-going work, in 250 words, with several key words.

Project objectives and long-term impact (maximum 1 A-4 page)

State the purpose of the proposed investigation, identify the key issues and problems being addressed, and state the possible outcome of the research project in terms of its relevance, significance and value. You can use point form where appropriate.

Background of research (maximum 4 A-4 pages, including references)

Summarize and provide key references on related work, including previous and alternative approaches to the problem. State the working hypothesis clearly to justify the aims of the project.

Research plan and methodology (maximum 3 A-4 pages, including key references)

Describe your research plan and the special techniques that you will be used in your study. There is no need to state the details of the procedures, but references are needed.

Figures or tables

A maximum of three non-text pages of attached diagrams, photos, charts, and table etc., if any. Captions are inserted together with the figure and table. Figures must be properly labelled, with figure title and legends at bottom. Table titles are on top of the table. Flow chart showing the graphical abstract of the project would be useful but not a must.

References (maximum 3 A-4 pages)

This is the list of references actually cited in your proposal. It is not a "bibliography," or enumeration of the literature on a topic. References should be cited according to the format used in the examples below and arranged in alphabetical order. Be consistent with the format of the references: The names and initials of the author(s), the year, the full title, the abbreviated name of the journal, followed by the volume and page numbers.

Format for article references

France, S.C., Tachino, N., Duda, T.F., Jr., Shleser, R.A., and Palumbi, S.R. 1999. Intraspecific genetic diversity in the marine shrimp *Penaeus vannamei*: multiple polymorphic elongation factor-1 α loci revealed by intron sequencing. *Marine Biotechnology* 1: 261-268.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. Year. Article title in full. *Full Name of the Journal* Volume: pages.] (Remark: issue number of a volume is not required)

Format for book section references

Dent, D.R. 1993. The use of *Bacillus thuringiensis* as an insecticide. In Jones, D.G. (ed.) *Exploitation of Microorganisms*, pp. 19-37. Chapman and Hall, London.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. Year. Article title in full. In Editor1, F.M. and Editor2, F.M. (eds.) *Book Name in Full (edition if any)*. pages. Publisher, City.]

Format for whole book references

Simpson, B.B. and Ogorzaly, M.C. 1995. *Plants in Our World (2nd ed.)*. McGraw-Hill, New York.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. (eds. to specify editors) Year. *Book Name in Full (edition if any)*. pages. Publisher, City.]

The proposal will be graded according to Abstract and Objective (5%); Background of Research (10%); Design and Quality of the Research (10%); Conclusion/Interpretation of Results (10%); Presentation Skill (5%). **NOT TOTALLY MATCHED WITH THE MARKING SCHEME**

COURSE ASSESSMENT OF 4902

WORK PERFORMANCE (60%) - BY SUPERVISOR

THE STUDENTS ARE REQUIRED TO MEET WITH THE SUPERVISOR REGULARLY TO REPORT THE PROGRESS ON A REGULAR BASIS. STUDENTS SHOULD SUMMARIZE THEIR DATA OBTAIN TO SHOE TO THEIR SUPERVISOR, SHOWING ORIGINAL DATA WOULD BE USEFUL, SUGGESTING THE WAY FORWARD WOULD BE IMPORTANT.

PROGRESS REPORT (40%) - 2 MARKERS EXCLUDING SUPERVISOR

The progress report together with the signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the course assignment in 4902 on or before **25 November 2022 (Friday), 5:00 pm**. *One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.*

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
September	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
October	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
November	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
December	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

ASSESSMENT SCHEME

	Criteria including	Marks
Project objective(s) and long-term impact, including abstract	<ul style="list-style-type: none"> Well-defined objectives Significance of the proposed research Abstract informative with background, justification, experiments, results obtained, and perspectives Writings comprehensible to a non-specialist 	
Background of research	<ul style="list-style-type: none"> Relevant up-to-date literature review Citations with other related research Capability to integrate proposed research with existing knowledge Elaborate any unpublished or collaborative work done here 	
Research plan and methodology	<ul style="list-style-type: none"> Whether the proposed research adequately address the objectives Proper working hypothesis and prediction Adequate and precise data analysis Suggestion of alternative methods if problems encountered Please include a project milestone-plan in the research plan 	
Organization, style and format	<ul style="list-style-type: none"> Conciseness and clarity Use of tables, figures and legends (if applicable) Citations and references in correct style Correct format, i.e., font size in 12, double-line spacing and top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm Grammar & usage including punctuation, spelling, correct grammar, word usage, etc. 	

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent research skills; Demonstration of excellent research attitude; Demonstration of excellent research plan and/or outcome; Excellent ability of problem solving; Able to show quantitative analyses of the data obtained; Quality similar to a brief communication style of research paper
A-	<ul style="list-style-type: none"> Outstanding achievement of most of the stated learning outcomes; Demonstration of very good research skills; Demonstration of excellent research attitude; Demonstration of very good research plan and/or outcome; Able to show quantitative analyses of the data obtained; Very good ability of problem solving;
B	<ul style="list-style-type: none"> Substantial achievement of the stated learning outcomes; Demonstration of good research skills; Demonstration of good research attitude; Demonstration of good research plan and/or outcome; Able to show quantitative analyses of the data obtained; Good ability of problem solving;

C	<ul style="list-style-type: none"> • Fair to satisfactory achievement of the stated learning outcomes; • Demonstration of satisfactory or fair research skills; • Demonstration of satisfactory or fair research attitude; • Demonstration of satisfactory or fair research plan and/or outcome; • Satisfactory ability of problem solving;
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of satisfactory research plan and/or outcome; • Fair ability of problem solving;
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of poor research plan and/or outcome; • Poor ability of problem solving; • Plagiarized materials found in the report submitted.

INSTRUCTIONS FOR PROGRESS REPORT

<30 A4 pages (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing)

Title page

The title should identify the content of the report. Your name, student number and the date of submitting the report are placed below the title. Please specify the total number of words in your report.

Abstract

Briefly state your project background, rationale, your results and on-going work, in no more than 400 words. Five key words should be included.

Introduction (maximum 3 A-4 pages)

Post your questions and state the issues being addressed and give a brief resume of past information bearing on your work. Background of your research should provide up-dated literatures. Explained what have been done before and state the significance of your project. A statement of specific objectives and working hypothesis of your project will be very useful.

Materials and Methods (maximum 3 A-4 pages)

Describe your general approach and any special techniques used in your study. Many students tend to put far too much into this section; restrict it to basic methodology with relevant citations. If you used a standard instrument (such as a thermocycler), it suffices merely to say so, but if you have devised a new and special method, describe it adequately. The key is to ensure that other scientists can repeat your data using the same materials and methods described in your report.

Results (maximum 3 A-4 pages)

State concisely what you did in individual experiments, each followed by its results. The amount of detail you include should be consonant with and 'directed by' the aim of your project, which should

be kept in mind at all times. In this section, be sure to include only your own experimental results. Suggest alternative ways to solve existing problems.

Leave comments on the results for the Discussion. In general, past tense should be used to describe the actual procedures done and data obtained.

Please highlight the achievements you have made in the table of your research milestone-plan.

Discussion and On-going work (maximum 3 A-4 pages, including key references)

Here you discuss the implications, speculations and significance of your results. Be sure to distinguish between speculations and your factual observations. If the results obtained are not as anticipated, explain why and propose alternatives to solve existing problems.

In general, past tense should be used when citing experimental data and present tense should be used when you describe a fact or a general concept. You will need to state specifically the work you are performing or planning to do and the results you anticipate in the second term to achieve the objectives of your proposed study.

References (maximum 3 A-4 pages)

Format similar to the proposal, but the numbers of references are expected to be doubled, as you need to discuss some of your preliminary data, and update your literature review on the research topic chosen.

Assessments:

The progress report will be graded according to Abstract and Objective (5%); Background of the Research (10%); Design and Quality of the Research (10%); Conclusion/Interpretation of Results (10%); Presentation or writing Skill (5%).

COURSE ASSESSMENT OF 4903

WORK PERFORMANCE (15%) - BY SUPERVISOR

FINAL REPORT (40%) - BY TWO MARKERS EXCL. SUPERVISOR

Date of submission: **28 April 2023 (Friday), 5:00 pm**

The final report together with your signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the course assignment in 4903. One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

The manuscript will be graded according to Hypothesis and Objective (5%); Design and Quality of the Research (10%); Conclusion/Interpretation of Results (10%); Presentation Skill (5%); Discussion (10%)

ORAL PRESENTATION (40%)- BY TWO MARKERS EXCL. SUPERVISOR

Tentatively, the oral presentation will be held on the last Saturday in 2nd term or the make-up class days; the exact date and time will be confirmed later.

* ATTENDANCE OF 3 SEMINARS ORGANIZED BY SCHOOL OF LIFE SCIENCES (5 %)

Students must be punctual and attend the entire section of the seminar to earn the marks.

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
January	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
February	<input type="checkbox"/> Has the student demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the student demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the student made reasonable progress in the project? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
March/April	<input type="checkbox"/> Has the student discussed the manuscript with you? <input type="checkbox"/> Has the student gone through any sample manuscripts of your former students? <input type="checkbox"/> Has the student let you preview the manuscript? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
April	<input type="checkbox"/> Has the student let you preview the abstract of the oral presentation? <input type="checkbox"/> Has the student rehearsed the oral presentation with you? <input type="checkbox"/> Others, please specify	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

MANUSCRIPT ASSESSMENT SCHEME

	Criteria including	Marks
Title, Abstract and Objectives (10%)	<ul style="list-style-type: none"> • Clear title showing the main theme of your research • Well-defined objectives • Informative abstract • Comprehensible to a non-specialist 	
Content (15%)	<ul style="list-style-type: none"> • Proper research plan and methodology • Sound hypothesis • Capable of carrying out independent research • Reasonable data with relevant statistical analysis • Relevant literature reference • Elaborate any work done by others in collaboration or unpublished data done by others here 	
Organization, style and format (15%)	<ul style="list-style-type: none"> • Correct format, i.e., font size in 12, Times New Roman, single-line spacing and 1 inch in margin • Grammar & word usage • Conciseness and clarity • Proper use of punctuation, tables, figures and legends • Proper citations in correct style 	

ORAL PRESENTATION ASSESSMENT SCHEME

Criteria	Comments to Student	Marks
Content (15%)		
<ul style="list-style-type: none"> ✓ Hypothesis and objective ✓ Logical concept and argument ✓ Design and quality of the research ✓ Findings interpretation and conclusions ✓ Appropriate for audience with no or limited background knowledge of the presented topic 		
Organization (15%)		
<ul style="list-style-type: none"> ✓ Suitable pace and tone ✓ Effective use of visual aids ✓ Structure and organization (Beginning, middle and end) 		
Communication (10%)		
<ul style="list-style-type: none"> ✓ Confidence in presentation ✓ Fluency in use of English ✓ Appropriate body language, i.e., eye contact ✓ Interaction with audience ✓ Discussion ✓ Response to the question raised 		

INSTRUCTIONS FOR FINAL REPORT WRITING

The students should describe their research in a concise manner, and the manuscript should generally be **within 6,000 – 8,000 words** (12 pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing).

You should read the “Author Guidelines” for the PLoS One (<http://www.plosone.org/static/guidelines.action>) and sample (http://journals.plos.org/plosone/s/file?id=wjVg/PLOOne_formatting_sample_main_body.pdf) for reference.

Title page

The title should identify the content of the report. Your name, student number and the date of submitting the report are placed below the title. Please specify the total number of words in your report.

Abstract

Describe the background and main objective(s) of your study, explain how the study done and summarize the results, conclusions and their significance, in no more than 400 words

Introduction (around 5 pages)

In this section you should provide background information and state the problem being addressed and explain the importance. A statement of specific objectives and hypothesis of your project will be very useful.

Materials and Methods

Describe your general approach and any special techniques and/or protocols used in your study. You should provide enough details (but not showing any procedures in point forms) to allow other scientists can repeat your data using the same materials and methods described in your report. Relevant citations are important.

Results

State concisely what you did in individual experiments, each followed by its results. The amount of detail you include should be consonant with and 'directed by' the aim of your project, which should be kept in mind at all times. In this section, be sure to include only the experimental results obtained on your own, with relevant statistical analyses.

Leave comments on the results for the Discussion. In general, past sense should be used to describe the actual procedures done and data obtained.

Discussion

Here you compare your work with that of previous workers, and bring out any implications, speculations and significance about your project. Be sure to distinguish between speculations and your factual observations. In general, past tense should be used when citing experimental data and present tense should be used when you describe a fact or a general concept.

Conclusion (optional)

Acknowledgements

Supporting information- Figures and tables with legends

References (maximum 3 A-4 pages)

GUIDELINES FOR ORAL PRESENTATION

Students will present their research findings in an oral presentation. Each student will have **15 minutes** for presentation, including **3-5 minutes** for discussion. The oral presentation will be graded according to the following criteria:

- (1) **Hypothesis and Objective** (5%): How well the students define and explain the significance of their scientific questions they want to address in their research?
- (2) **Design and Quality of the Research** (10%): Did the research methodology used by the students adequately address the scientific questions? Did the students include the appropriate control experiments? Are the results technically sound? Did the students perform the research well?
- (3) **Conclusions/Interpretation of Results** (10%): Do the results support the conclusion? Are there any problems of misinterpretation? Did the students consider any alternative interpretation of their results?
- (4) **Presentation Skill** (5%) Is the presentation clear and well organized with a logical flow?
- (5) **Discussion** (10%): How well the students discuss the research findings of related study? Can the students respond well to the questions raised, and demonstrate that they have a thorough understanding of their research topic?
- (6) **Time management**: Did the presentation finish in 15 minutes? One mark will be deducted for each minute of overrun.
- (7) **Participation in Q&A (bonus)**: In each Q&A section, the students are encouraged to ask questions.
- (8) **Attendance**: Students are required to attend a minimum number of presentations (to be specified later) of the other students.

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent research and critical thinking skills; Demonstration of excellent research attitude; Demonstration of excellent research planning and problem-solving skills; Demonstration of excellent understanding of research methodologies and quantitative data analysis; Demonstration of excellent scientific communication skills; Excellent research output; the quality is up to a standard of a research paper manuscript
A-	<ul style="list-style-type: none"> Outstanding achievement of most of the stated learning outcomes; Demonstration of excellent research and critical thinking skills; Demonstration of excellent research attitude; Demonstration of excellent research planning and problem-solving skills; Demonstration of excellent understanding of research methodologies and quantitative data analysis; Demonstration of excellent scientific communication skills; Very good research output;

B	<ul style="list-style-type: none"> • Substantial achievement of the stated learning outcomes; • Demonstration of very good research and critical thinking skills; • Demonstration of very good research attitude; • Demonstration of good to very good research planning and problem-solving skills; • Demonstration of good to very good understanding of research methodologies and sufficient data analysis; • Demonstration of very good scientific communication skills; • Good to very good research output;
C	<ul style="list-style-type: none"> • Fair to satisfactory achievement of the stated learning outcomes; • Demonstration of satisfactory to good research and critical thinking skills; • Demonstration of good research attitude; • Demonstration of satisfactory or fair to good research planning and problem-solving skills; • Demonstration of satisfactory or fair to good understanding of research methodologies and data analysis; • Demonstration of good scientific communication skills; • Satisfactory to good research output;
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Demonstration of fair to satisfactory research and critical thinking skills; • Demonstration of fair research attitude; • Demonstration of fair to satisfactory research planning and problem-solving skills; • Demonstration of fair to satisfactory understanding of research methodologies and data analysis; • Demonstration of little scientific communication skills; • Minimal research output;
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Demonstration of poor research and critical thinking skills; • Demonstration of poor research attitude; • Demonstration of poor to fair research planning and problem solving skills; • Demonstration of poor understanding of research methodologies and data analysis; • Demonstration of poor scientific communication skills; • Poor research output; plagiarized materials found in the report. • Plagiarized materials found.

ACADEMIC HONESTY:

According to University regulations, students must submit an electronic version of their assignment to VeriGuide system for the purpose of checking for possible plagiarism. Read the University's policies on plagiarism carefully and do not plagiarize! CUHK has adopted a policy of zero tolerance for plagiarism. Instructors will send all suspected cases of plagiarism directly to the disciplinary committee for investigation. In the case of group report, plagiarism will affect all partners! Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>).

Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available on line: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>. Work or writings done by others could not be used as your work or writings in the report, otherwise it is considered as scientific fraud and not acceptable.

Guidelines for LSCI4000 (Literature Research in Life Sciences)

生命科學文獻專題研究

Course Description:

Students, with the help of the supervisor, will find an interesting research topic in life sciences to perform a literature research, and critically assess the scientific basis of the conclusions drawn. Students will discuss regularly with a supervisor, summarize the research findings in an oral presentation and a written report.

學生將會在導師的指導下，找一個有關於生命科學的課題進行文獻研究，從以了解論文所得之結論的科學依據。學生須定期與導師討論，並將研究總結作口頭簡報及提交論文。

Course Syllabus:

Students, with the help of the supervisor, will find an interesting research topic in life sciences to perform a literature research. The students will first search for the relevant scientific literatures using online databases such as PubMed (www.pubmed.org). The scientific literatures should cover both reviews articles as well as **original research papers**. The students should understand the methodology of research described so that they can critically assess the experimental basis of the conclusions drawn in these papers. After reading a number of relevant papers in the selected topics, the students will summarize the research findings, critically analyze the information obtain and propose the way forward; platform and written presentations are required.

Learning Outcome:

The students will be able to:

1. find relevant scientific literature in life sciences
2. interpret and analyze the experimental data presented in the scientific literature
3. understand the research methodology
4. summarize the findings in the scientific literature, and present them to the peers
5. write a review article on a current research topic in life sciences

1. Oral presentation: 40%

Each student will have 15 minutes for presentation, and 5 minutes for discussion. The oral presentation will be graded according to the following criteria:

(1) **Content** (15%): Can the students demonstrate that they have provided an in-depth understanding of the topics they have chosen? (5%) Have they presented original research findings with relevant citations? (5%) Have they demonstrated that they understand the methodology of how these research findings are obtained? (5%)

(2) **Critical Thinking** (10%): Do the students understand the limitation of the research methodology they presented? (4%) Can the students formulate alternative interpretation of the experimental data? (3%) Can the students provide insights into future direction of research? (3%)

(3) **Presentation Skill** (10 %) Are the slides clear and of good quality? (5%) Is the presentation in logical flow and well organized? (5%)

(4) **Discussion** (5 %): Can the student respond well to the questions raised (2.5%), and demonstrate that they have a thorough understanding of the topic presented? (2.5%)

(5) **Time management**: 1 mark will be deducted per minute of over-time.

(6) **Participation in Q&A bonus**: In each Q&A section, the students are encouraged to ask questions. The students will receive 2 marks for each excellent question asked, and 1 mark for good question. The maximum bonus marks a student can obtain is 5.

Attendance of the oral presentation

For students who are late for their presentations, no extra time will be compensated (e.g. if s/he is late for 10 minutes, the maximum time allowed for his/her presentation will be 20 minutes; if s/he is late for 20 minutes, the time allowed will be 10 minutes; if s/he is late for 30 minutes or more, it assumes that s/he gives up his/her presentation). One sub-grade (e.g. A- to B+) will be deducted when a student fails to attend his/her whole day (both morning and afternoon sessions) oral presentation session.

Score Sheet:

Items	Descriptions	Marks
Content (15%)	<ul style="list-style-type: none"> Can the student demonstrate that s/he has provided an in-depth review on the topics s/he chosen? (5%) Has s/he presented original research findings? (5%) Has s/he demonstrated that they understand the methodology of how these research findings are obtained? (5%) 	
Critical Thinking (10%)	<ul style="list-style-type: none"> Does the student understand the limitation of the research methodology they presented? (4%) Can the student formulate alternative interpretation of the experimental data? (3%) Can the student provide insights into future direction of research? (3%) 	
Presentation Skill (10%)	<ul style="list-style-type: none"> Are the slides clear and of good quality? (5%) Is the presentation in logical flow and well organized? (5%) 	
Discussion (5%)	<ul style="list-style-type: none"> Can the student respond well to the questions raised, and demonstrate that s/he has a thorough understanding of topic presented? 	

2. Written Report (40%)

The students are required to submit a written report on the topics they have selected. The detailed format should follow those described for the Annual Reviews. You should refer to the “Author Handbooks” at the web page of Annual Reviews (<http://www.annualreviews.org/page/authors/author-instructions/preparing/handbooks>). **Each written report must contain at least 5,000 words and no more than 8,000 words; around 8 to 10 figures/tables/diagrams must be included.** Any experimental data or other

published information must be cited in accordance to the University guidelines on Honesty in Academic Work.

In brief, the manuscript should contain the following components:

1. Title
2. Abstract (within 400 words)
3. Keywords
4. Graphical Abstract (optional)
5. List of abbreviations and acronyms
6. Introduction (background), with aims of the paper at the end
7. Contents – with listing of section headings and page numbers
8. Main text – divided into section headings
9. Conclusions and future perspectives
10. References

The length of the review article should be around ~50 A4 pages (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing)

The review article will be graded according to:

Items	Descriptions	Marks
Content (15%)	<ul style="list-style-type: none"> • Can the student demonstrate that s/he has provided an in-depth review on the topics s/he chosen? (5%) • Has s/he presented original research findings? (5%) • Has s/he demonstrated that they understand the methodology of how these research findings are obtained? (5%) 	
Critical Thinking (10%)	<ul style="list-style-type: none"> • Does the student understand the limitation of the research methodology they presented? (4%) • Can the student formulate alternative interpretation of the experimental data? (3%) • Can the student provide insights into future direction of research? (3%) 	
Presentation Skill (10%)	<ul style="list-style-type: none"> • Is the report clear and nicely written? (5%) • Is the presentation in logical flow and well organized? (5%) 	

Late submission of the written report

One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

3. Supervisor marks: 20%

The supervisors will give marks according to their students' attitudes and engagement.

Meeting with supervisor

The students are required to meet their supervisors at least three times within a term. Marks will be deducted from the supervisor marks if the students fail to do so **(Note: failure to meet supervisors as required may lead to failure of the course)**. It is the responsibility of

the students to take the initiative to make appointment with their supervisor. The students should plan your meeting schedule ahead, and ‘supervisor cannot be reached’ is not an excuse for failure to meet this requirement.

As a general guideline, in the 1st meeting (preferable in the first month of the term), the students are expected to discuss with their supervisors on potential topics of literature reviews. The students should then perform a preliminary survey of literatures and finalized the reviews topics with the supervisor in the 2nd meeting. In the 3rd meeting, the students should discuss with the supervisor on the final outline of the oral presentation and draft the abstract of the presentation.

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Signature
September or January	<input type="checkbox"/> Has the student discussed the literature research topic with you? <input type="checkbox"/> Was the student well prepared for the discussion with you? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
September or January	<input type="checkbox"/> Has the student discussed the plan of the final year project with you? <input type="checkbox"/> Has the student taken an initiative to work on the final year project? <input type="checkbox"/> Has the student reasonably read the required books? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
October or February	<input type="checkbox"/> Has the student discussed the outline of the oral presentation with you? <input type="checkbox"/> Has the student discussed the abstract of the oral presentation with you? <input type="checkbox"/> Has the student reasonably read the required books? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
November or March	<input type="checkbox"/> Has the student reasonably read the required books? <input type="checkbox"/> Has the student rehearsed the oral presentation with you? <input type="checkbox"/> Others, please specify	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
November or March	<input type="checkbox"/> Has the student discussed the manuscript with you? <input type="checkbox"/> Has the student gone through any sample manuscripts of your former students? <input type="checkbox"/> Has the student let you preview the manuscript? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

Required reading for generic skill development:

Johnson & Scott. (2014). Study and communication skills for the biosciences, 2nd ed. Oxford: Oxford University Press. (QH315.J64 2014)

Blann, AD. (2015). Data handling and analysis. Oxford: Oxford University Press. (WA950.B5853 2015)

Grade Descriptors

Grade	Overall Course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent critical thinking skills Demonstration of excellent understanding of research methodologies; Demonstration of excellent understanding of data analysis and interpretation; Demonstration of excellent scientific communication skills; Excellent contents of literature research;
A-	<ul style="list-style-type: none"> Outstanding achievement of most of the stated learning outcomes; Demonstration of very good critical thinking skills Demonstration of very good understanding of research methodologies; Demonstration of very good understanding of data analysis and interpretation; Demonstration of very good scientific communication skills; Very good contents of literature research;
B	<ul style="list-style-type: none"> Substantial achievement of the stated learning outcomes; Demonstration of good critical thinking skills Demonstration of good understanding of research methodologies; Demonstration of good understanding of data analysis and interpretation; Demonstration of good scientific communication skills; Good contents of literature research;
C	<ul style="list-style-type: none"> Fair to satisfactory achievement of the stated learning outcomes; Demonstration of satisfactory critical thinking skills Demonstration of satisfactory understanding of research methodologies; Demonstration of satisfactory understanding of data analysis and interpretation; Demonstration of satisfactory scientific communication skills; Satisfactory contents of literature research;
D	<ul style="list-style-type: none"> Fair achievement of the essential parts of the stated learning outcomes; Demonstration of fair critical thinking skills Demonstration of fair understanding of research methodologies; Demonstration of fair understanding of data analysis and interpretation; Demonstration of satisfactory scientific communication skills; Fair contents of literature research;
F	<ul style="list-style-type: none"> Poor achievement of the stated learning outcomes; Demonstration of poor critical thinking skills Demonstration of poor understanding of research methodologies; Demonstration of poor understanding of data analysis and interpretation; Demonstration of poor scientific communication skills; Poor contents of literature research; Plagiarized materials found.

Research Ethics

In compliance with the University's Guidelines on Research Ethics and Policies, graduates of SLS are encouraged to complete the online research ethics

training (<https://www.research-ethics.cuhk.edu.hk/orktsResearch/>) and obtain the certificate awarded.

Plagiarism

The University adopts a policy of zero tolerance on plagiarism. Any related offence will lead to disciplinary action including termination of studies at the University. All students must also submit a softcopy of the manuscript to the Veriguide System at <http://www.cuhk.edu.hk/veriguide>. A signed veriguide form should be submitted together with the report.

The students should visit <http://www.cuhk.edu.hk/policy/academichonesty/> for the CUHK's guideline for plagiarism. In particular, the Appendix A and B of the web page give detailed examples on the proper use of source material. "I didn't know this is plagiarism" is not an acceptable excuse. **Using other people to write the report for you is also a fraud and unacceptable.**

SCHOOL OF LIFE SCIENCES SENIOR GROUP PROJECT GUIDELINES

Course Code	Term	Course Description
4911 Group Research in Life Sciences I	Summer Session (2 units)	Students form a group to carry out an independent laboratory/non-laboratory-based research project provided by the supervisor or jointly decided with the group. To fulfill the course requirements, students are required to discuss their progress with their supervisors regularly and submit and present a research proposal with some preliminary data.
4912 Group Research in Life Sciences II	1st Term (2 units)	Group of students carrying out an independent laboratory/non-laboratory-based research project. Students are required to discuss their progress with their supervisor(s) regularly and submit a revised proposal and progress report towards the end of the term. The progress report should highlight the goals of the project and the achievements accomplished. If difficulties are encountered, the progress report should suggest how to tackle the problems.
4913 Group Research in Life Sciences III	2nd Term (2 units)	Students continue to work on and complete the research project from 4912. Student should discuss with their supervisor(s), analyze relevant data, compare the data obtained with other similar studies, and formulate conclusion. Students should submit a final report in the form of a manuscript and give an oral presentation before the end of the term.

LEARNING OUTCOMES

- Identify a life science topic that has an impact on the society of Hong Kong and/or neighboring regions
- Learn to trust and respect their groupmates, and understand the importance of shared responsibility and good collaboration.
- Integrate both knowledge and skills learnt previously in other major courses.
- Survey articles and/or scientific literature relevant to their research project.
- Read scientific literature critically to identify the scientific questions or problems and formulate a working hypothesis.
- Design surveys and/or independent research experiments to address the scientific questions.
- For lab-based project, acquire hands-on and bench-top research techniques in conducting experiments.
- For non-lab-based project, acquire skills that aligned to their project topics such as: public engagement, educational development, machine learning, etc.
- Improve problem-solving and independent research abilities.
- Analyze and interpret data in a logical, professional, and scientific way.
- Foster their skills in scientific writing and oral presentation.

COURSE ARRANGEMENT

Three courses are group-based STOT courses. School will provide a list of group final year project for students' selection at the end of February. The students are required to approach the professor(s) on the projects that you are interested and submit a selection form indicating a maximum of three project titles, in order of priority, and the results will be released in mid-April. Students are required to perform literature review on the background of the research topic, identify the scientific question(s) the group wants to address, and understand how the study will impact the society. With the guidance of the supervisor, the group will design different tasks that might include but not limited to market research, survey, experiments of different approaches, to address the questions. For students enrolling in 4911, you will have to submit a research proposal by late August with some preliminary data. In the first term, you will have to submit the progress report (4912) in early December. In the end of second term, you will conduct an oral presentation and submit the final report (4913).

COURSE ASSESSMENT OF 4911

PARTICIPATION (20%, INDIVIDUAL) - BY GROUPMATES

Students are expected to share the responsibility and workload in a fair manner. Students will assess each other's participation and contribution; and provide constructive feedback to each other.

WORK PERFORMANCE (40%, GROUP) - BY SUPERVISOR

Students are expected to meet their supervisor(s) regularly to discuss the progress of the project. The supervisors will grade the students according to their attitude and performance in the project.

PROJECT PROPOSAL (40%, GROUP) - BY 2 MARKERS EXCLUDING SUPERVISOR

The proposal together with a signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the "course assignment" in blackboard site of LSCI 4911 before the deadline in **12 August 2022 (Friday) 23:59**. The files should be in PDF format. The documents should NOT be locked or protected. One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
Week 1 to 2	<input type="checkbox"/> Has the group discussed the research topic with you? <input type="checkbox"/> Was the group well prepared for the discussion with you? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 3 to 4	<input type="checkbox"/> Has the group discussed the plan of the research project with you? <input type="checkbox"/> Has the group carried out adequate literature research for the research project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 5 to 6	<input type="checkbox"/> Has the group reasonably acquired new research skills relevant to the project? <input type="checkbox"/> Has the group made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 7 to 8	<input type="checkbox"/> Has the group demonstrated any problem solving skills throughout the project? <input type="checkbox"/> Has the group reasonably worked out any useful results for the project? <input type="checkbox"/> Others comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
Week 9 to 10	<input type="checkbox"/> Has the group reasonably demonstrated any project management skills? <input type="checkbox"/> Has the group demonstrated a good attitude and perseverance throughout the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

PROJECT PROPOSAL ASSESSMENT SCHEME

	Criteria including
Project objective(s) and impact to the society, including abstract (10%)	<ul style="list-style-type: none"> • Clear title showing the main theme of this project • Well-defined objectives and impact to the society • Informative abstract • Comprehensible to a non-specialist
Background of research (10%)	<ul style="list-style-type: none"> • Relevant literature review • Capability to integrate proposed research with existing knowledge • Elaborate any unpublished work done before
Research plan and methodology (15%)	<ul style="list-style-type: none"> • Whether the proposed research adequately address the objectives • Proper hypothesis and prediction • Adequate and precise data analysis • Suggestion of alternative methods if problems encountered • Include a project milestone-plan in the research plan
Organization, style and format (5%)	<ul style="list-style-type: none"> • Correct format, (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-line spacing) • Grammar & word usage • Conciseness and clarity • Proper use of tables, figures and legends (if applicable) • Proper citations in correct style

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> • Outstanding achievement of all the stated learning outcomes; • Research plan with excellent social relevance; • Demonstration of excellent research skills; • Demonstration of excellent research attitude; • Demonstration of excellent research plan and/or outcome; • Demonstration of excellent communication skills and teamwork.
A-	<ul style="list-style-type: none"> • Outstanding achievement of most of the stated learning outcomes; • Research plan with very good social relevance; • Demonstration of very good research skills; • Demonstration of excellent research attitude; • Demonstration of very good research plan and/or outcome; • Demonstration of excellent communication skills and teamwork.
B	<ul style="list-style-type: none"> • Substantial achievement of the stated learning outcomes; • Research plan with good social relevance; • Demonstration of good research skills; • Demonstration of good research attitude; • Demonstration of good research plan and/or outcome; • Demonstration of very good communication skills and teamwork.
C	<ul style="list-style-type: none"> • Fair to satisfactory achievement of the stated learning outcomes; • Research plan with satisfactory to good social relevance; • Demonstration of satisfactory or fair research skills; • Demonstration of satisfactory or fair research attitude; • Demonstration of satisfactory or fair research plan and/or outcome; • Demonstration of good communication skills and teamwork.
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Research plan with satisfactory social relevance; • Demonstration of little research skills; • Demonstration of little research attitude; • Demonstration of satisfactory research plan and/or outcome; • Demonstration of satisfactory communication skills and teamwork.

Grade	Overall Course
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Research plan with poor social relevance; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of poor research plan and/or outcome; • Demonstration of poor communication skills and teamwork; • Plagiarized materials found.

For reference only

INSTRUCTIONS FOR PROPOSAL

<20 A4 pages (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-lined spacing)

Title page

The title should identify the content of the report. Names and student numbers of all group members, programme affiliation and the date of submitting the report are placed below the title. Please specify the total number of words in your proposal.

Abstract

Briefly state your project, background, social relevance and justification (or significance), your preliminary results and on-going work, in 300 -400 words, with several key words.

Project objectives and long-term social impact (maximum 1 A-4 page)

State the purpose of the proposed investigation, identify the key issues and problems being addressed, and state the possible outcome of the research project in terms of its significance, social relevance and impact. You can use point form where appropriate.

Background of research (maximum 4 A-4 pages, including references)

Summarize and provide key references on related work, including previous and alternative approaches to the problem. State the working hypothesis clearly to justify the aims of the project.

Research plan and methodology (maximum 3 A-4 pages, including key references)

Describe your research plan and the special techniques that you will be used in your study. There is no need to state the details of the procedures, but references are needed.

Figures or tables

A maximum of three non-text pages of attached diagrams, photos, charts, and table etc., if any. Captions are inserted together with the figure and table. Figures must be properly labelled, with figure title and legends at bottom. Table titles are on top of the table. Flow chart showing the graphical abstract of the project would be useful but not a must.

References (maximum 4 A-4 pages, single-lined spacing)

This is the list of references actually cited in your proposal. It is not a "bibliography," or enumeration of the literature on a topic. References should be cited according to the format used in the examples below and arranged in **chronological** order. Be consistent with the format of the references: The names and initials of the author(s), the year, the full title, the abbreviated name of the journal, followed by the volume and page numbers. Please use the citations in the **Journal of Biological Chemistry (JBC)** for reference.

Format for article references (JBC format)

France, S.C., Tachino, N., Duda, T.F., Jr., Shleser, R.A., and Palumbi, S.R. 1999. Intraspecific genetic diversity in the marine shrimp *Penaeus vannamei*: multiple polymorphic elongation factor-1 α loci revealed by intron sequencing. *Marine Biotechnology* 1: 261-268.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. Year. Article title in full. *Full Name of the Journal* Volume: pages.] (Remark: issue number of a volume is not required)

Format for book section references

Dent, D.R. 1993. The use of *Bacillus thuringiensis* as an insecticide. In Jones, D.G. (ed.) *Exploitation of Microorganisms*, pp. 19-37. Chapman and Hall, London.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. Year. Article title in full. In Editor1, F.M. and Editor2, F.M. (eds.) *Book Name in Full (edition if any)*. pages. Publisher, City.]

Format for whole book references

Simpson, B.B. and Ogorzaly, M.C. 1995. *Plants in Our World (2nd ed.)*. McGraw-Hill, New York.

[FirstAuthorLastName, F.M., Second, F.M., Etc, F.M., and Last, F.M. (eds. to specify editors) Year. *Book Name in Full (edition if any)*. pages. Publisher, City.]

Proposal assessments:

The proposal will be graded according to Innovation and Design of the Project (15%); Organization and Presentation Skills (10%); Social Impact of the Project (15%).

COURSE ASSESSMENT OF 4912

ATTENDANCE AT LIFE SCIENCE SEMINAR SERIES (5%)

Students are required to attend at least two sessions of seminars within the term.

PARTICIPATION (20%, INDIVIDUAL) - BY GROUPMATES

Students are expected to share the responsibility and workload in a fair manner. Students will assess each other's participation and contribution; and provide constructive feedback to each other.

WORK PERFORMANCE (35%, GROUP) - BY SUPERVISOR

Students are required to meet with the supervisor regularly to report the progress on a regular basis. The group should present the summarized data and future research plan to their supervisor in PowerPoint format before the end of term 1.

PROGRESS REPORT (40%, GROUP) - 2 MARKERS EXCLUDING SUPERVISOR

The progress report together with the signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the course assignment in 4912 on or before **4 December 2022 (Sunday), 23:59**. One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
September	<input type="checkbox"/> Has the group demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the group demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the group made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
October	<input type="checkbox"/> Has the group demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the group demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the group made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
November	<input type="checkbox"/> Has the group demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the group demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the group made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
December	<input type="checkbox"/> Has the group demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the group demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the group made reasonable progress in the project? <input type="checkbox"/> Other comments:	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

PROGRESS REPORT ASSESSMENT SCHEME

	Criteria including
Project objective(s) and impact to the society, including abstract (10 %)	<ul style="list-style-type: none"> Well-defined objectives and impact to the society Significance of the proposed research Abstract informative with background, justification, experiments, results obtained, and perspectives Writings comprehensible to a non-specialist
Background of research (10 %)	<ul style="list-style-type: none"> Relevant up-to-date literature review Citations with other related research Capability to integrate proposed research with existing knowledge Elaborate any unpublished or collaborative work done here
Research plan, methodology, and data analysis (15 %)	<ul style="list-style-type: none"> Whether the proposed research adequately address the objectives Proper working hypothesis and prediction Adequate and precise data analysis Suggestion of alternative methods if problems encountered Include a project milestone-plan in the research plan
Organization, style and format (5 %)	<ul style="list-style-type: none"> Conciseness and clarity Use of tables, figures and legends (if applicable) Citations and references in correct style Correct format, i.e., font size in 12, double-line spacing and top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm Grammar & usage including punctuation, spelling, correct grammar, word usage, etc.

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Research plan with excellent social relevance; Demonstration of excellent research skills; Demonstration of excellent research attitude; Demonstration of excellent research plan and/or outcome; Demonstration of excellent communication skills and teamwork. Excellent ability of problem solving; Able to show quantitative analyses of the data obtained; Quality similar to a brief communication style of research paper.
A-	<ul style="list-style-type: none"> Outstanding achievement of most of the stated learning outcomes; Research plan with very good social relevance; Demonstration of very good research skills; Demonstration of excellent research attitude; Demonstration of very good research plan and/or outcome; Demonstration of excellent communication skills and teamwork. Able to show quantitative analyses of the data obtained; Very good ability of problem solving.
B	<ul style="list-style-type: none"> Substantial achievement of the stated learning outcomes; Research plan with good social relevance; Demonstration of good research skills; Demonstration of good research attitude; Demonstration of good research plan and/or outcome; Demonstration of very good communication skills and teamwork; Able to show quantitative analyses of the data obtained; Good ability of problem solving.
C	<ul style="list-style-type: none"> Fair to satisfactory achievement of the stated learning outcomes; Research plan with satisfactory to good social relevance; Demonstration of satisfactory or fair research skills;

Grade	Overall Course
	<ul style="list-style-type: none"> • Demonstration of satisfactory or fair research attitude; • Demonstration of satisfactory or fair research plan and/or outcome; • Demonstration of good communication skills and teamwork; • Satisfactory ability of problem solving.
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Research plan with satisfactory social relevance; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of satisfactory research plan and/or outcome; • Demonstration of satisfactory communication skills and teamwork; • Fair ability of problem solving.
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Research plan with poor social relevance; • Demonstration of poor research skills; • Demonstration of poor research attitude; • Demonstration of poor research plan and/or outcome; • Poor ability of problem solving; • Demonstration of poor communication skills and teamwork; • Plagiarized materials found in the report submitted.

INSTRUCTIONS FOR PROGRESS REPORT

<30 A4 pages (12pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-lined spacing)

Title page

The title should identify the content of the report. Names and student numbers of all group members, programme affiliation and the date of submitting the report are placed below the title. Please specify the total number of words in your report.

Abstract

Briefly state your project background, rationale, social relevance, your results and on-going work, in no more than 400 words. Five key words should be included.

Introduction (maximum 3 A-4 pages)

Post your questions and state the issues being addressed and give a brief resume of past information bearing on your work. Background of your research should provide up-dated literatures. Explained what have been done before and state the significance of your project. A statement of specific objectives and working hypothesis of your project will be very useful.

Materials and Methods (maximum 3 A-4 pages)

Describe your general approach and any special techniques used in your study. Many students tend to put far too much into this section; restrict it to basic methodology with relevant citations. If you used a standard instrument (such as a thermocycler), it suffices merely to say so, but if you have devised a new and special method, describe it adequately. The key is to ensure that other researchers can repeat your data using the same materials and methods described in your report.

Results (maximum 3 A-4 pages)

Provide a brief rationale on why the experiment/survey/study is important for the project and state concisely what your team has performed, each followed by its results. The amount of detail you include should be consonant with and 'directed by' the aim of your project, which should be kept in mind at all times. In this section, be sure to include only results obtained by your team. Suggest alternative ways to solve the problems being encountered.

Your team can decide if you want to leave comments on the results for a standalone "Discussion" section; or your team wants to integrate the comments and discussion here and change the section to "Results and Discussion". In general, past sense should be used to describe the actual procedures done and data obtained.

Please highlight the achievements you have made in the table of your research milestone-plan.

Discussion and On-going work (maximum 3 A-4 pages, including key references)

Here you discuss the implications, speculations, and significance of your results. Be sure to distinguish between speculations and your factual observations. If the results obtained are not as anticipated, explain why and propose alternatives to solve existing problems.

In general, past tense should be used when citing experimental data and present tense should be used when you describe a fact or a general concept. You will need to state specifically the work your team is performing or planning to do and the results you anticipate in the second term to achieve the objectives of your proposed study.

References (maximum 5 A-4 pages, single-lined spacing)

Format similar to the proposal, but the numbers of references are expected to be doubled, as you need to discuss some of your preliminary data, and update your literature review on the research topic chosen.

Progress report assessments:

The progress report will be graded according to Abstract, Objective, and Social Impact (5%); Background and Design of the Research (10%); Progress of the Project, Quality of the Preliminary Results, On-going Work, and Discussion (15%); Presentation or writing Skill (10%).

reference only

COURSE ASSESSMENT OF 4913

ATTENDANCE AT LIFE SCIENCE SEMINAR SERIES (5%)

Students are required to attend at least three sessions of seminars within the term.

PARTICIPATION (10%, INDIVIDUAL) - BY GROUPMATES

Students are expected to share the responsibility and workload in a fair manner. Students will assess each other's participation and contribution; and provide constructive feedback to each other.

WORK PERFORMANCE (15%, GROUP) - BY SUPERVISOR

Students are expected to meet their supervisor(s) regularly to discuss the progress of the project. The supervisors will grade the students according to their attitude and performance in the project.

FINAL REPORT (35%, GROUP) - BY TWO MARKERS EXCLUDING SUPERVISOR

Date of submission: **23 April 2022 (Sunday), 23:59.**

The final report together with your signed VeriGuide report should be submitted to <https://elearn.cuhk.edu.hk/> under the course assignment in 4903. One sub-grade (e.g. A- to B+) will be deducted for each day of late-submission.

ORAL PRESENTATION (35%, GROUP) - BY TWO MARKERS EXCLUDING SUPERVISOR

Tentatively, the oral presentation will be held on the last Saturday in 2nd term or the make-up class days; the exact date and time will be confirmed later.

MEETING THE SUPERVISOR

Meeting Date	Meeting check-list (completed by supervisor)	Supervisor Endorsement
January	<input type="checkbox"/> Has the team demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the team demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the team made reasonable progress in the project? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
February	<input type="checkbox"/> Has the team demonstrated reasonable commitment to the project? <input type="checkbox"/> Has the team demonstrated reasonable time management skills for the project? <input type="checkbox"/> Has the team made reasonable progress in the project? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
March/April	<input type="checkbox"/> Has the team discussed the manuscript with you? <input type="checkbox"/> Has the team gone through any sample manuscripts of your former students? <input type="checkbox"/> Has the team let you preview the manuscript? <input type="checkbox"/> Other comments	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:
April	<input type="checkbox"/> Has the s team let you preview the abstract of the oral presentation? <input type="checkbox"/> Has the team rehearsed the oral presentation with you? <input type="checkbox"/> Others, please specify	<input type="checkbox"/> Requirement met <input type="checkbox"/> Requirement not met Signature:

FINAL REPORT ASSESSMENT SCHEME

	Criteria including
Title, Abstract and Objectives (7%)	<ul style="list-style-type: none"> • Clear title showing the main theme of your research • Well-defined objectives • Informative abstract • Comprehensible to a non-specialist
Background of research (7 %)	<ul style="list-style-type: none"> • Relevant up-to-date literature review • Citations with other related research • Capability to integrate proposed research with existing knowledge • Elaborate any unpublished or collaborative work done here
Research plan, methodology, results and data analysis, discussion (16 %)	<ul style="list-style-type: none"> • Proper research plan and methodology • Capable of carrying out independent research • Reasonable data with relevant statistical analysis • Understand the limitations of the research methods • Critical comments on the results obtained and how they provide new insights
Organization, style and format (5%)	<ul style="list-style-type: none"> • Correct format, i.e., font size in 12, Times New Roman, single-line spacing and 1 inch in margin • Grammar & word usage • Conciseness and clarity • Proper use of punctuation, tables, figures and legends • Proper citations in correct style

ORAL PRESENTATION ASSESSMENT SCHEME

Criteria
Content (15%)
<ul style="list-style-type: none"> ✓ Hypothesis and objective ✓ Social relevance and impact ✓ Logical concept and argument ✓ Design and quality of the research ✓ Findings interpretation and conclusions ✓ Appropriate for audience with no or limited background knowledge of the presented topic
Organization (10%)
<ul style="list-style-type: none"> ✓ Group member has equal share of preparation and presentation ✓ Suitable pace and tone ✓ Effective use of visual aids ✓ Structure and organization (Beginning, middle and end)
Communication (10%)
<ul style="list-style-type: none"> ✓ Confidence in presentation ✓ Fluency in use of English ✓ Appropriate body language, i.e., eye contact ✓ Interaction with audience

- ✓ Discussion
- ✓ Response to the question raised

For reference only

INSTRUCTIONS FOR FINAL REPORT WRITING

The students should describe their research in a concise manner, and the manuscript should generally be **within 6,000 – 8,000 words** (12 pt fonts; top/bottom/right/left margin = 2.5/2.5/2.5/3.0 cm; double-lined spacing).

You should read the “Author Guidelines” for the PLoS One (<http://www.plosone.org/static/guidelines.action>) and sample (http://journals.plos.org/plosone/s/file?id=wjVg/PLOOne_formatting_sample_main_body.pdf) for reference.

Title page

The title should identify the content of the report. Your name, student number and the date of submitting the report are placed below the title. Please specify the total number of words in your report.

Abstract

Describe the background and main objective(s) of your study, explain how the study done and summarize the results, conclusions, and their significance, in no more than 400 words

Introduction (around 5 pages)

In this section you should provide background information and state the problem being addressed and explain the importance. A statement of specific objectives and hypothesis of your project will be very useful.

Materials and Methods

Describe your general approach and any special techniques and/or protocols used in your study. You should provide enough details (but not showing any procedures in point forms) to allow other scientists can repeat your data using the same materials and methods described in your report. Relevant citations are important.

Results

State concisely what you did in individual experiments, each followed by its results. The amount of detail you include should be consonant with and 'directed by' the aim of your project, which should be kept in mind at all times. In this section, be sure to include only the experimental results obtained on your own, with relevant statistical analyses.

Leave comments on the results for the Discussion. In general, past sense should be used to describe the actual procedures done and data obtained.

Discussion

Here you compare your work with that of previous workers, and bring out any implications, speculations and significance about your project. Be sure to distinguish between speculations and your factual observations. In general, past tense should be used when citing experimental data and present tense should be used when you describe a fact or a general concept.

Conclusion (optional)

Acknowledgements

Supporting information- Figures and tables with legends

References (maximum 5 A-4 pages, single-lined spacing)

Final report assessments:

The final report will be graded according to Abstract, Objective, and Social Impact (5%); Background and Design of the Research (10%); Results and Discussion (10%); Presentation or writing Skill (10%).

For reference only

GUIDELINES FOR ORAL PRESENTATION

Students will present their research findings in an oral presentation. Each **group will have 20 minutes** for presentation, including **3-5 minutes** for discussion. The oral presentation will be graded according to the following criteria:

- (1) **Hypothesis and Objective** (5%): How well the students define and explain the significance of their scientific questions they want to address in their research?
- (2) **Design and Quality of the Research** (10%): Did the research methodology used by the students adequately address the scientific questions? Did the students include the appropriate control experiments? Are the results technically sound? Did the students perform the research well?
- (3) **Conclusions/Interpretation of Results** (10%): Do the results support the conclusion? Are there any problems of misinterpretation? Did the students consider any alternative interpretation of their results?
- (4) **Presentation and Organization Skill** (5%) Is the presentation clear and well organized with a logical flow? Did all students have equal share of presentation time?
- (5) **Discussion** (5%): How well the students discuss the research findings of related study? Can the students respond well to the questions raised, and demonstrate that they have a thorough understanding of their research topic?
- (6) **Time management**: Did the presentation finish in 20 minutes? One mark will be deducted for each minute of overrun.
- (7) **Participation in Q&A (bonus)**: In each Q&A section, the students are encouraged to ask questions.
- (8) **Attendance**: Students are required to attend a minimum number of presentations (to be specified later) of the other students.

GRADE DESCRIPTOR

Grade	Overall Course
A	<ul style="list-style-type: none"> Outstanding achievement of all the stated learning outcomes; Demonstration of excellent research and critical thinking skills; Demonstration of excellent research attitude; Demonstration of excellent research planning and problem-solving skills; Demonstration of excellent understanding of research methodologies and quantitative data analysis; Demonstration of excellent scientific communication skills; Excellent research output; the quality is up to a standard of a research paper manuscript
A-	<ul style="list-style-type: none"> Outstanding achievement of most of the stated learning outcomes; Demonstration of excellent research and critical thinking skills; Demonstration of excellent research attitude; Demonstration of excellent research planning and problem-solving skills; Demonstration of excellent understanding of research methodologies and quantitative data analysis; Demonstration of excellent scientific communication skills; Very good research output;

B	<ul style="list-style-type: none"> • Substantial achievement of the stated learning outcomes; • Demonstration of very good research and critical thinking skills; • Demonstration of very good research attitude; • Demonstration of good to very good research planning and problem-solving skills; • Demonstration of good to very good understanding of research methodologies and sufficient data analysis; • Demonstration of very good scientific communication skills; • Good to very good research output;
C	<ul style="list-style-type: none"> • Fair to satisfactory achievement of the stated learning outcomes; • Demonstration of satisfactory to good research and critical thinking skills; • Demonstration of good research attitude; • Demonstration of satisfactory or fair to good research planning and problem-solving skills; • Demonstration of satisfactory or fair to good understanding of research methodologies and data analysis; • Demonstration of good scientific communication skills; • Satisfactory to good research output;
D	<ul style="list-style-type: none"> • Fair achievement of the essential parts of the stated learning outcomes; • Demonstration of fair to satisfactory research and critical thinking skills; • Demonstration of fair research attitude; • Demonstration of fair to satisfactory research planning and problem-solving skills; • Demonstration of fair to satisfactory understanding of research methodologies and data analysis; • Demonstration of little scientific communication skills; • Minimal research output;
F	<ul style="list-style-type: none"> • Poor achievement of the stated learning outcomes; • Demonstration of poor research and critical thinking skills; • Demonstration of poor research attitude; • Demonstration of poor to fair research planning and problem solving skills; • Demonstration of poor understanding of research methodologies and data analysis; • Demonstration of poor scientific communication skills; • Poor research output; plagiarized materials found in the report. • Plagiarized materials found.

ACADEMIC HONESTY:

According to University regulations, students must submit an electronic version of their assignment to VeriGuide system for the purpose of checking for possible plagiarism. Read the University's policies on plagiarism carefully and do not plagiarize! CUHK has adopted a policy of zero tolerance for plagiarism. Instructors will send all suspected cases of plagiarism directly to the disciplinary committee for investigation. In the case of group report, plagiarism will affect all partners! Students submitting assignment done by third party is also a serious misconduct and regarded as fraud or academic dishonesty. The updated Procedures are available at the University's website "Honesty in Academic Work: A Guide for Students and Teachers" (<http://www.cuhk.edu.hk/policy/academichonesty/>).

Students please note the aforementioned marking scheme, grade descriptors, academic honesty principle and the university penalty guideline are all applicable to this course. General university regulations are available online: <http://www.res.cuhk.edu.hk/en-gb/general-information/university-regulations>. Work or writings done by others could not be used as your work or writings in the report, otherwise it is considered as scientific fraud and not acceptable.