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) at CUHK. It is composed of (**A**) Background of the Biochemistry Programme, (**B**) Suggested Study Streams for career development and (**C**) Course List and Course Outline (2016-2017 version). After finishing the courses in the Programme, you should be able to appreciate how life functions. Also, it is important to plan ahead to map out your career path. Hope you enjoy your studies in the Biochemistry Programme at the CUHK.

(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;
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.

Highlight/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. Apart from convention teaching in lecture theaters and student laboratory, our programme provides a number of eLearning materials/topics and they can be found in the following website 'http://www.bch.cuhk.edu.hk/learnbiochem/'.

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 have joined the medical and research laboratories.
- Some other graduates have entered the education, commercials, industrial and government sectors

Contact Information

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(B) Suggested Study Streams for Career Development

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
BCHE3090	Self-study Modules in Biochemistry	2
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
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

B1) Suggested study stream with the courses in SLS for different types of career/higher degree studies

Medical Biochemistry Stream

BCHE4030 Clinical Biochemistry
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
BIOL3630 Animal Physiology
BIOL4310 Human Genetics
FNSC4101 & FNSC4102 Human Physiology for Nutrition Studies I & II

Environmental Science Stream

BIOL2210 Ecology
BIOL4220 Environmental Biotechnology
BIOL4260 Conservation Biology

ENSC2270 Introduction to Environmental Science
ENSC3520 Environmental and Biochemical Toxicology
ENSC4250 Environmental Health

Food and Nutritional Science Stream
BCHE4090 Biochemistry for Sport and Exercise
FNSC2002 Nutrition for Health
FNSC3010 Nutrition and Human Development
FNSC3030 Nutritional Biochemistry
FSNC3180 Food Microbiology
FNSC4150 Introduction to Medical Nutrition Therapy
FNSC4101 & FNSC4102 Human Physiology for Nutrition Studies I & II

B2) Suggested Streams through Other Courses

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

Biochemical Engineering
BMEG2001 Introduction to Biomedical Engineering
BMEG2011 Biomedical Engineering Laboratory
BMEG3102 Bioinformatics
BMEG3430 Biomaterials and Tissue Engineering
BMEG4450 Bionanotechnology
BMEG4510 Biomolecular Engineering
BMEG4520 Cardiovascular Engineering
BMEG4530 Musculoskeletal Tissue Engineering
BMEG4540 Electrophysiology

Chemistry Stream
BCHE4080 Biochemistry for Forensic Sciences
CHEM2120 Main Group Chemistry
CHEM2200 Organic Functional Groups: Structure and Reactivity
CHEM2300 Thermodynamics and Chemical Equilibrium
CHEM2400 Analytical Chemistry
CHEM2408 Analytical Chemistry Laboratory I
CHEM2820 Organic Chemistry Laboratory I
CHEM2830 Physical Chemistry Laboratory I
CHEM3410 Instrumental Analysis
CHEM4430 Accreditation of Laboratory Tests
CHEM4788 Chemical Applications in Forensic Science

Business Administration
BCHE2070 Research Internship
BCHE4070 Management and Accreditation of Biochemical Laboratory
MBTE3000 Business and Social Aspects of Biotechnology
MGNT1010 Introduction to Business
MGNT1020 Principles of Management
DSME1035 Fundamentals of Business Economics

MGNT2510 Introduction to International Business
FINA3010 Financial Markets
MKTG3030 Integrated Marketing Communication

Education Stream
EDUC2120 Principles and Implementation of Curriculum and Instructional Design
EDUC2210 Education and Society in Hong Kong
EDUC2240 Understanding Schooling and Education Policy in Hong Kong
EDUC2312 Child and Adolescent Development
EDUC3260 Teacher Development and Leadership
EDUC3311 Psychology Applied to Learning and Teaching
EDUC4130 Information Technology in Education

Geography Stream
GRMD1402 Global Change and Environmental Sustainability
GRMD1404 Geographical Landscape of the World
GRMD2209 Physical Geology
GRMD2221 Weather and Climate
GRMD3203 Urban Environmental Problems
GRMD3404 Natural Hazards and Human Responses

Management
MGNT1010 Introduction to Business
MGNT1020 Principles of Management
MGNT2040 Human Resource Management
MGNT3010 Organizational Behaviour
MGNT4080 Managerial Skills for Modern Managers
MGNT4090 Technology and Innovation Management

Psychology Stream
PSYC1000 General Psychology
PSYC2010 Introduction to Statistics
PSYC2190 Physiological Psychology
PSYC2780 Neuropsychology
PSYC3004 Special Topics in Clinical and Health Psychology
PSYC3720 Health Psychology

Sport Science Stream
BCHE4090 Biochemistry for Sport and Exercise
PHPC2007 Nutrition and Health
PHPC2016 Theories and Concepts of Health Behaviours
SPED2520 Functional Human Anatomy and Sports Injuries
SPED2540 Introduction to Exercise Physiology
SPED3550 Physiology of Human Performance
SPED3820 Introduction to Exercise and Sports Psychology
SPED4560 Physical Fitness Appraisal and Exercise Prescription

(C) Course List and Course Outline

BCHE2000 Frontiers in Biochemistry
(2016-17, Term 2)

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. Contents will vary from year to year.

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. Towards the end of the course, students are required to present an idea of their interest in a poster format.

Course Syllabus
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, Alzheimer).

Required Readings
Lecture handout for each of the topics will be uploaded to the accompanied Blackboard site a week before the lecture. Required readings for each topic will be provided by the teaching staff concerned. The reading materials are expected to change every year to reflect the latest development in the research field.

Recommended Readings
Additional reading materials will be provided by individual teachers.
Students are also encouraged to use the online PubMed search engine (http://pubmed.gov) to find related reference materials for self-study.

Enrollment Requirements
Pre-requisite(s): BCHE2030

BCHE2000 Frontiers in Biochemistry (2016-17, 2nd Term)

Wed 9:30 am – 11:15 am (W2-3); L1 Science Centre

CLASS SCHEDULE

Wk.	Date	Topic no.	Topic	Teacher
1	Jan. 11	1	Biochemistry: Past, Present and Future	PCS
2	Jan. 18	2	Synthetic Life	KMC
3	Jan. 25	3	RNA Biology	CKN
4	Feb. 1	-	***Lunar New Year Vacation***	-
5	Feb. 8	4	Non-coding RNA in Development	HLH
6	Feb. 15	5	Stem Cell Research	SYT
7	Feb. 22	-	General Discussion (Topics 1-5)	PCS/KMC/CKN/HLH/SYT
8	Mar. 1		**Mid-term Examination (Topics 1,3-5)**	-
9	Mar. 8	6	Etiology of Cancer	SKK
10	Mar. 15	7	Cancer Treatment	WPF
11	Mar. 22	8	Protein Folding Disease	KBW
12	Mar. 29	9	Metabolic Disease	HKN
13	Apr. 5	10	Biochemistry of Infections	FHL
14	Apr. 12	11	Structural Biology and Drug Discovery	WNA
15	Apr. 19	-	General Discussion (Topics 6-11)	SKK/WPF/KBW/HKN/FHL/WNA

TEACHERS' INFORMATION

Teacher Name		Office	Tel.	Email
Prof. Shannon AU *(Course coordinator)*	WNA	SC 178	3943 4170	shannon-au@cuhk.edu.hk
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Prof. KB WONG	KBW	SC 289	3943 8024	kbwong@cuhk.edu.hk

ASSESSMENT SCHEME

4.55% (5 marks)	*On-line exercise: Topic 1*
9.1% (10 marks)	Group poster presentation: *Topic 2*
31.85% (35 marks)	Mid-term exam (MCQs + short Qs): *covering Topics: 1, 3-5*
54.5% (60 marks)	Final exam (MCQs + short Qs): *covering Topics 6-11*

REFERENCES Reading materials will be given by individual teachers.

BCHE2030 Fundamentals of Biochemistry
(2016-17, 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 acid – basic building block of proteins Peptide bond Primary, secondary, tertiary and quaternary protein structures Hemoglobin as an example to illustrate how proteins function
Thermodynamics – to predict if a reaction will proceed	Free energy as a measure of a reaction's tendency to proceed spontaneously Concepts of 'high-energy' compounds and coupled reactions
Energy and Matters	Flow of energy and cycling of carbon/nitrogen in the biosphere Energy relationship between catabolic and anabolic pathway Oxidation of carbon fuels as a major source of cellular energy NAD(P)H/FADH2 as universal electron carriers ATP is synthesized by proton gradients across membrane generated by transferring electrons to oxygen The light reaction of photosynthesis generates both proton gradients and reducing equivalents The dark reaction of photosynthesis uses the reducing power generated for biosynthesis of sugar from CO2

BCHE2030 Fundamentals of Biochemistry (2016-17, Term 1)

Chemical logic of biochemical reactions – to predict how a reaction should proceed	Electronegativity and polarity of covalent bond Six different types of biochemical reactions
Enzyme catalysis – to predict how fast a reaction could proceed	Enzymes affect reaction rates but not equilibria Enzymes increase reaction rates by lowering the activation free energy Concepts of transition-state complementarity Why biochemical reaction is stereospecific? Basic enzyme kinetics Enzymes are good target for drug design
Glycolysis	Reactions in the glycolytic pathway are used as examples to illustrate the recurring motifs in metabolic pathway
Vitamins	Vitamins are often co-factors in enzyme catalysis
Overviews of metabolism	Convergent catabolism Divergent anabolism Cyclic pathway Regulatory strategy Compartmentation of metabolic pathways

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, and appreciate how biomolecules are interconverting with each other.

4. Assessment Scheme

Mid-term exam.	30%
Final exam.	60%
Assignment	10%

5. Textbooks

Nelson & Cox, Lehninger Principles of Biochemistry, W.H. Freeman
Berg, Tymoczko & Stryer, Biochemistry, W.H. Freeman

6. Lecturers

Prof. KB Wong (course co-ordinator), SC 289 tel: 3943 8024 email: kbwong@cuhk.edu.hk
Prof. KF Lau, SC 291 tel: 3943 1106 email: kflau@cuhk.edu.hk

BCHE2030 Fundamentals of Biochemistry (2016-17, Term 1)

7. Course Schedule

Friday 8:30 am – 11:15 am (F1-3); Lee Shau Kee Building (LSK LT6)

Wk.	Date	Topic	Teacher
1	Sept. 9	Introduction	Prof. KF Lau
2	Sept. 16	Day after Mid-Autumn Festival	
3	Sept. 23	Water	Prof. KF Lau
4	Sept. 30	Carbohydrates	Prof. KF Lau
5	Oct. 7	Lipids	Prof. KF Lau
6	Oct. 14 (F1)	Nucleotide and Nucleic Acids	Prof. KF Lau
6	Oct. 14 (F2-F3)	Proteins	Prof. KB Wong
7	Oct. 21	Proteins	Prof. KB Wong
8	**Oct. 28 (F1-F2)**	**Mid-term Examination**	Prof. KF Lau
8	Oct. 28 (F3)	Protein Functions	Prof. KB Wong
9	Nov. 4	Thermodynamics, Energy and Matters	Prof. KB Wong
10	Nov. 11	Enzyme Catalysis	Prof. KB Wong
11	Nov. 18	Chemical Logic of Biochemical Reaction	Prof. KB Wong
12	Nov. 25	Glycolysis, Vitamins	Prof. KB Wong
13	Dec. 2	Overview of Metabolism	Prof. KB Wong

8. Posting Course Announcements

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

BCHE2070 Research Internship
(2016-17, 1st Term / 2nd Term)

Description

This course is designed to allow students to 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 School.

Learning Outcome

After completing the course, students should be able to:

1. experience to carry out an independent research under supervision by a faculty staff;
2. design simple experiments and follow protocols to carry out some biochemical analyses;
3. obtain data and carry out data analysis with simple statistics, and
4. learn how to write a brief scientific report.

Objectives for students development:

1. Learn how to integrate basic biochemistry techniques to perform some experiments or develop an assay.
2. Learn how to collect and read literature in a specific area of research.
3. Learn how to design simple experiments, carry out the experimental procedure independently, and work as a member of the team.
4. Learn how to compile or collect data with accuracy and precision.
5. Learn how to analyze the data obtained and write a short paper to summarize the experiments or work done.
6. Better prepare students to learn time management skills and do independent research for their final year project (Supervised Research)

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 DREAM) may take this course but a local supervisor or supervisor from Biochemistry Program has to 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 the summer or early at term start and complete the project with a report written for marking by the end of first term. Deadline of submission of report is at term end. Two markers (including the supervisor and an extra marker is needed for dual supervisors) will evaluate the report (assessment form attached).

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) or sequence analyses, testing of a drug, etc.

Assessment Scheme

Research report 100%

Required Readings

To be assigned by supervisor.

Recommended Readings

Web

This website explain how to write a scientific report:
http://geog.arizona.edu/~comrie/geog230/report.htm

BCHE 3030 Methods in Biochemistry
(2016-17, 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, X-ray crystallography, centrifugation, chromatography and electrophoresis will be covered.

Content/Fundamental Concepts

Fluorescence Technology: This block is intended to introduce to students an in-depth knowledge of the principles of fluorescence and its applications for biochemistry and cell biology research. Topics include principles of fluorescence, design and application of fluorescence probes, fluorescence measurements, special techniques and recent advances in fluorescence technology.

X-ray Crystallography: This session will introduce the basic principles of protein crystallization. Different crystallization methods and optimization strategies will be discussed. The use of X-ray diffraction to determine the three-dimensional structure of proteins will be introduced.

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.

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, X-ray crystallography,

centrifugation, chromatography and electrophoresis. The knowledge gained will be useful in their final year experimental research project.

Assessment Scheme

Class Test (I)	30%	Fluorescence technology
Class Test (II)	30%	X-ray crystallography
Class Test (III)	40%	Centrifugation, chromatography and electrophoresis

Learning Resources

Textbook:
Principles and Techniques of Biochemistry and Molecular Biology 7th edition, 2010 Edited by Keith Wilson and John Walker, Cambridge University Press (QP 519.7 P75)

Reference:
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 MMW LT2
H 4 11:30 am – 12:15 pm MMW LT2

Week no.	Date	Hour	Topic	
1	10 Jan (Tue)	2	Introduction to Fluorescence	S K Kong
	12 Jan (Thu)	1	Design and Application of Fluorescent Probes	S K Kong
2	17 Jan (Tue)	2	Fura-2, a Good Example for Fluorescent Probe Design	S K Kong
	19 Jan (Thu)	1	Fluorescence Measurement I: Fluorescence Fluorometer, Epi-Fluorescence Microscope & Confocal Microscopy	S K Kong
3	24 Jan (Tue)	2	Fluorescence Measurement II: Flow Cytometry, Real-time PCR Machine	S K Kong
	26 Jan (Thu)	1	Special Techniques and Recent Advances in Fluorescence Technology I: Fluorescence Resonance Energy Transfer	S K Kong

4	31 Jan (Tue)	0	**Holiday: Lunar New Year**	
	2 Feb (Thu)	0	**Holiday: Lunar New Year**	
5	7 Feb (Tue)	2	Special Techniques and Recent Advances in Fluorescence Technology II: Green Fluorescence Protein & its Application	SK Kong
	9 Feb (Thu)	1	Introduction to Protein X-ray Crystallography	Shannon Au
6	14 Feb (Tue)	2	Basic Principles in Protein Crystallization and Crystallization Methods	Shannon Au
	16 Feb (Thu)	1	**CLASS TEST (I)**	SK Kong

7	21 Feb (Tue)	2	Crystallization Optimization	Shannon Au
	23 Feb (Thu)	1	Basic Concepts in X-ray Diffraction (I)	Shannon Au
8	28 Feb (Tue)	2	Basic Concepts in X-ray Diffraction (II)	Shannon Au
	2 Mar (Thu)	1	Structure Determination	Shannon Au
9	7 Mar (Tue)	2	Modeling Building and Refinement, Recent advances in Protein Crystallography	Shannon Au
	9 Mar (Thu)	1	Basic Principles in Centrifugation	W P Fong
10	14 Mar (Tue)	2	Different Centrifugation Techniques	W P Fong
	16 Mar (Thu)	1	**CLASS TEST (II)**	Shannon Au
11	21 Mar (Tue)	2	Basic Principles in Chromatography	W P Fong
	23 Mar (Thu)	1	Resolution in Chromatographic Separation	W P Fong
12	28 Mar (Tue)	2	Different Modes of Chromatographic Separation	W P Fong
	30 Mar (Thu)	1	Chromatography in Protein Purification	W P Fong
13	4 Apr (Tue)	0	**Holiday: Ching Ming Festival**	
	6 Apr (Thu)	1	Electrophoresis: SDS-PAGE	W P Fong
14	11 Apr (Tue)	2	Factors Affecting Electrophoretic Mobility	W P Fong
	13 Apr (Thu)	1	Detection of Protein after Electrophoresis	W P Fong
15	18 Apr (Tue)	2	Isoelectric Focusing, 2-D Electrophoresis, Electrophoresis of Nucleic Acids	W P Fong
	20 Apr (Thu)	1	Capillary Electrophoresis	W P Fong

Teacher's Contact Details

Professor FONG, Wing Ping (coordinator) wpfong@cuhk.edu.hk	MMW 608	3943 6868	
Professor KONG, Siu Kai skkong@cuhk.edu.hk	MMW 609	3943 6799	
Professor AU, Shannon W.N. au@cuhk.edu.hk	SC 178	3943 4170	shannon-

A Facility for Posting Course Announcements

Course announcements and materials will be posted on the Blackboard website at the CU E-Learning system. The powerpoint slides used will be posted on the website before the lecture. No hard copies will be distributed in the class.

BCHE3040 Proteins and Enzymes
(2016-17, 1st Term)

Description

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

Contents/Fundamental Concepts

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.

Enzyme Kinetics: 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 Km and kcat 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.

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: Specific examples will be used to illustrate the general structure of membrane 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. Transcription factors are DNA-binding proteins that regulate gene activity. Different DNA binding motifs will be introduced.

Proteins can be engineered to improve their properties. 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 co-immunoprecipitation, chemical cross linking, 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.

Learning Outcomes

After completing the course, students should be able to:

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

Assessment Scheme

Assignment:	Enzymes:	10%
Mid-term Examination:	Enzymes:	45 %
Final Examination:	Proteins:	45 %

Learning Resources

References:

(1) Fundamentals of Enzymology: The Cell and Molecular Biology of Catalytic Proteins.
N. C. Price and L. Stevens, Oxford University Press, 1999. (QU135 P83)
(2) Proteins: Structure and Function.
D. Whitford, John Wiley & Sons Ltd., 2005. (QU55 W535)
(3) Introduction to Proteins: Structure, Function and Motion.
A. Kessel and N. Ben-Tal, CRC Press, 2011. (QU55 K37)
(4) Introduction to Protein Structure.
C. Branden and J. Tooze, Garland Pub., 1999. (QU55 B76)
(5) Biochemistry.
J.M. Berg, J.L. Tymoczko and L. Stryer, W.H. Freeman, 2012. (QU4 S77)
(6) Lehninger Principles of Biochemistry.
D.L. Nelson and M.M. Cox, W.H. Freeman, 2008. (QD415 L44)
(7) Principles and Techniques of Practical Biochemistry.
K. Wilson and J. Walker, Cambridge University Press, 2010. (QP 519.7 P75)

BCHE3040 Proteins and Enzymes
2016-17, 1st Term

Course Schedule

M1	8:30 am - 9:15 am	MMW LT2
W1-2	8:30 am - 10:15 am	MMW LT2

a. Course Schedule

Week	Date	Hour(s)	Topic
1	**5 Sep (Mon)**	**0**	***Inauguration Ceremony for Undergraduates – NO CLASS***
	7 Sep (Wed)	2	Introduction to Enzymes
2	12 Sep (Mon)	1	RNA as Biocatalyst
	14 Sep (Wed)	2	Cofactor Requirement
3	19 Sep (Mon)	1	Determination of Enzyme Activity
	21 Sep (Wed)	2	Michaelis–Menten Kinetics
4	26 Sep (Mon)	1	Enzyme Inhibitors
	28 Sep (Wed)	2	Bi-substrate Reactions and Pre-steady State Kinetics
5	3 Oct (Mon)	1	Allosteric Enzyme and Multimeric Enzyme
	5 Oct (Wed)	2	Regulation of Enzyme Activity
6	**10 Oct (Mon)**	**0**	***PUBLIC HOLIDAY***
	12 Oct (Wed)	2	Mechanism of Enzyme Catalysis
7	17 Oct (Mon)	1	Examples of Enzyme Mechanism
	19 Oct (Wed)	2	Clinical Enzymology
8	24 Oct (Mon)	1	Industrial Enzymology
	26 Oct (Wed)	2	Introduction to Protein Structure
9	31 Oct (Mon)	1	Super-secondary Structure
	2 Nov (Wed)	**2**	***MID-TERM EXAMINATION***
10	7 Nov (Mon)	1	Protein Folding
	9 Nov (Wed)	2	Proteins Associated with Protein Folding and Degradation
11	14 Nov (Mon)	1	Membrane Proteins
	16 Nov (Wed)	2	Bacteriorhodopsin, Potassium Channel and G Protein

12	21 Nov (Mon)	1	DNA-binding Protein
	23 Nov (Wed)	2	Protein Engineering
13	28 Nov (Mon)	1	Protein-Protein Interaction
	30 Nov (Wed)	2	Protein Identification and Mass Spectrometry
Total:		**37**	

b. Tutorial Schedule
Question and Answer Session (s) will be arranged.

Teacher's Contact Details
Professor FONG WING-PING MMW 608 39436868 wpfong@cuhk.edu.hk

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.

Academic Honesty and Plagiarism
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/.

BCHE3050 Molecular Biology
(2016-17, 2nd Term)

Description

This course discusses basic areas of molecular biology, including characteristics of DNA and RNA, genomic elements, DNA replication, transcription, translation, mutation, repair, gene regulation and epigenetics.

Learning Outcome

1. To understand the basic phenomena of life in the molecular biology level, which include the characteristics of DNA and RNA, genome and elements, DNA replication, DNA mutation and repair, transcription, translation, gene regulation and epigenetics.

2. To know the major differences of the above phenomena between prokaryotic and eukaryotic organisms.

Course Syllabus

1. Characteristics of DNA and RNA,
2. Eukaryotic genome and elements,
3. DNA replication,
4. DNA mutation,
5. DNA repair,
6. Transcription of DNA,
7. RNA processing,
8. Transcriptional regulation,
9. Protein translation,
10. Translational control,
11. Epigenetics.

Enrollment Requirements

Not for students who have taken BCHE4010 or BIOL2310.

BCHE3050 Molecular Biology (2016-17, Term 2)

Time and Venue: **Fri 9:30 am – 11:15 am, LSK LT3**

Convenor: **Prof. Diane GUO Dianjing (convenor)**
Rm G81, Science Center
Tel: 3943-6298
Email: djguo@cuhk.edu.hk

Topic	Lecture	Meeting Date
• Introduction	1,2	13/1
• Structure of DNA, RNA, and chromosome	3,4	20/1
• DNA replication	5,6	3/2
• Transcription	7,8	10/2
• Transcription	9,10	17/2
• Translation	11,12	24/2
• Midterm exam		3/3
• Regulation of gene expression	13,14	10/3
• Regulation of gene expression	15,16	17/3
• Gene Mutation and DNA repair	17,18	24/3
• Recombination and Transposition	19,20	31/3
• Recombinant Technology	21,22	7/4
• Tutorials	23,24	21/4

Assessment: Mid-term: 45%, Final: 55%
Mid-term Examination (Lectures 1-12) (1 hr.)
Final Examination (Lectures 13-26) (2 hrs.)

Major Reference:

1. Brooker, Robert J. 2015. Genetics: analysis and principles. 5rd ed. McGraw.Hill
2. Klug, WS & Cummings, MR. 2006. Concepts of Genetics. 8th ed. MacMillan
3. Snustad, DP & Simmons, MJ. 2006. Principles of Genetics. 4th ed. J. Wiley.

BCHE3070/BCHE4020 Recombinant DNA Techniques (2016-17, 2nd Term)

Week	Date	Topic	Teacher
1	12 Jan	Restriction and modification enzymes	PCS
2	29 Jan	Restriction and modification enzymes	PCS
3	26 Jan	Separation and joining of DNA, purification of DNA, short exercise 1	PCS
4	2 Feb	Chinese New Year Holiday	-
5	9 Feb	Submit exercise, Prokaryotic vectors and their introduction to cells	PCS
6	16 Feb	Discussion on exercise	PCS
7	23 Feb	Prokaryotic vectors and their introduction to cells	PCS
8	2 Mar	Polymerase chain reaction, DNA sequencing and applications	PCS
9	9 Mar	Polymerase chain reaction, DNA sequencing and applications, short exercise 2	PCS
10	16 Mar	Eukaryotic vectors and their introduction to cells	PCS
11	23 Mar	Submit exercise, to obtain clones of a specific gene Production of protein from cloned gene	PCS
12	30 Mar	Discussion on exercise	Tutor
13	6 Apr	Production of protein from cloned gene	PCS
14	13 Apr	Studying gene expression and function	PCS
15	20 Apr	Test (45min –open note)	PCS/Tutor

Class Period: 10:30AM - 11:15AM (Thursday), MMW LT1

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 and study of gene expression and function.

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

Reference
Brown, T.A. (2010) Gene cloning and DNA analysis. An introduction. 6th Edition.

Assessment scheme
Exercise: 20%, Open note test: 80%

BCHE3080 Bioenergetics and Metabolism
(2016-17, 1st term)

Teacher	Office	Tel.	E-mail
Dr. Ngai Hung-Kui, Patrick	MMW507B	3943 4359	hkngai@cuhk.edu.hk

Meeting Information

Monday 09:30 - 10:15 Mong Man Wai Building LT1
Friday 08:30 - 10:15 Mong Man Wai Building LT2

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.

Assessment Scheme

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

Recommended Textbooks

1. David L. Nelson, Michael M. Cox. (2013). **Lehninger Principles of Biochemistry** (6th ed.). New York: W.H. Freeman. [UL: QU4 .N45 2013]
2. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer. (2012). **Biochemistry** (7th ed.). New York: W.H. Freeman. [UL: QU4 .S77 2012]
3. Thomas M. Devlin. (2011). **Textbook of biochemistry with clinical correlations** (7th ed.). Hoboken, NJ: John Wiley & Sons. [UL: Oversize - QU4 .T49 2010]
4. Donald Voet, Judith G. Voet. (2011). **Biochemistry** (4th ed.). Hoboken, NJ: John Wiley & Sons. [UL: Oversize - QP514.2 .V64 2011]

Electronic Resources (E-Books)

1. **Philip W. Kuchel, Simon Easterbrook-Smith, Vanessa Gysbers, J. Mitchell Guss. (2012). Biochemistry (3rd ed.).** New York: McGraw-Hill.
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b4968891~S8

2. John W. Pelley. (2012). **Elsevier's integrated review. Biochemistry (2nd ed.).** Philadelphia: Elsevier/Saunders.
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b5073806~S8

3. **Gerhard Meisenberg, William H. Simmons (2012). Principles of medical biochemistry (3rd ed.)** Philadelphia: Elsevier/Saunders.

Permanent URL for this record: http://library.cuhk.edu.hk/record=b5329956~S8

Electronic Resources (E-Journals)

1. **Biological chemistry (**Berlin; New York: W. de Gruyter**)**
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b2813130~S3

2. **Biochemistry (**New York: MAIK Nauka/Interperiodica**)**
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b2813087~S3

3. Cell metabolism (Cambridge, MA: Cell Press]
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b4058128~S3

4. **The journal of clinical endocrinology & metabolism (**Baltimore, MD: Endocrine Society**)**
   Permanent URL for this record: http://library.cuhk.edu.hk/record=b2821335~S3

CU eLearning System (Blackboard)

Visit the website of the CU eLearning System (https://elearn.cuhk.edu.hk/) and login using your Student ID and CWEM password.

1. **Course Website**
   2016R1-BCHE3080: Bioenergetics and Metabolism

2. **Companion Website**
   CU-BCHE3080-EL: Bioenergetics and Metabolism (Extended Learning)

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.
http://www.cuhk.edu.hk/policy/academichonesty/Eng_htm_files_(2013-14)/declaration_en.doc

BCHE3080 Bioenergetics and Metabolism
(2016-17, 1st term)

Course Schedule

Date	Hr.	Modules
Sept. 5 (M)	-	*Inauguration ceremony for undergraduates, classes suspended in the morning until 1:30 pm*
Sept. 9 (F)	2	**Module 1 Overview of Bioenergetics and Metabolism**
Sept. 12 (M)	1	
Sept. 16 (F)	-	*Public Holiday – The day following the Chinese Mid-Autumn Festival*
Sept. 19 (M)	1	**Module 2 Glycolysis and the Catabolism of Hexoses**
Sept. 23 (F)	2	• Glycolysis: a central pathway of glucose metabolism • Utilization of other sugars as metabolic fuels • Pentose phosphate pathway: production of reducing powder and formation of pentose sugars
Sept. 26 (M)	1	**Module 3 The Citric Acid Cycle**
Sept. 30 (F)	2	• Common pathway for oxidation of acetyl group • Regulation and amphibolic nature of TCA cycle
Oct. 3 (M)	1	**Module 4 Oxidative Phosphorylation**
Oct. 7 (F)	2	• Structure and function of electron transport chain • Mechanism of ATP synthesis
Oct. 10 (M)	-	*Public Holiday – The day following the Chung Yeung Festival*
Oct. 14 (F)	2	**Mid-term Examination** *(Modules 1- 4)*
Oct. 17 (M)	1	**Module 5 Photophosphorylation** • Structure of photosynthesis apparatus • The generation of ATP and the Calvin cycle
Oct. 21 (F)	2	
Oct. 24 (M)	1	**Module 6 Oxidation of Fatty Acids**
Oct. 28 (F)	2	• Utilization of fatty acids as metabolic fuels • Degradative pathway for fatty acid of even or odd number of carbons • Formation and utilization of ketone bodies
Oct. 31 (M)	1	**Module 7 Oxidation of Amino Acids and the Urea Cycle**
Nov. 4 (F)	2	• Pathways of amino acid degradation • Metabolic fates of amino groups • Nitrogen excretion and the urea cycle
Nov. 7 (M)	1	**Module 8 Biosynthesis of Carbohydrates**
Nov. 11	2	• Gluconeogenesis

(F)		• Biosynthesis of glycogen and other carbohydrates
Nov. 14 (M)	1	**Module 9 Biosynthesis of Lipids**

Nov. 18 (F)	2	• Biosynthesis of fatty acids and triacylglycerol • Biosynthesis of membrane phospholipids • Biosynthesis of cholesterol, steroids and isoprenoids
Nov. 21 (M)	1	**Module 10 Biosynthesis of Amino Acids**
Nov. 25 (F)	2	• Biosynthesis of amino acids • Molecules derived from amino acids
Nov. 28 (M)	1	**Module 11 Integration of Metabolism**
Dec. 2 (F)	2	**Module 12 Nucleotide Metabolism** • Biosynthesis and degradation of nucleotides ***Discussion***

First Term Period: 5 September 2016 (Mon) – 3 December 2016 (Sat)

[END]

BCHE3090 Self-study Modules in Biochemistry (2016-17, 1st Term)

Course Coordinator: Prof. WN Au
Teachers: Prof. KM Chan, Prof. TF Chan, Dr. FH Lo, Dr. HK Ngai, Prof. CK Ngo

COURSE OBJECTIVES
This course aims at training students to critically read and present scientific papers. Life-long self-learning abilities in information search, critical analysis and communications are our emphasis. Through different course activities, students should also be able to develop their generic skills in collaborative teamwork, problem solving, and peer-assessment.

COURSE OPERATION
This course will include lectures and presentation sessions. Students are required to give two group oral presentations (I & II) and submit one individual written report.

Group presentation I

1. Each presentation group (two students per group) will give an oral presentation on an assigned research paper. Matching of the research papers will be made by random draw on 6 Sep 2016.
2. Each oral presentation will be in 20-min, followed by a 10-min open discussion. One mark will be deducted for each minute of overrun.
3. All students are required to read the papers and actively participate in the discussion.
4. Each presentation group is required to hand in a draft Powerpoint file and meet their teacher on 4 Oct 2016. (**Note: Failure to meet the teacher on 4 Oct 2016 will receive zero mark for the corresponding assessment. It is the responsibility of the students to take the initiative to make appointment with their teacher.)**
5. Presentation file needs to be uploaded to Blackboard 24-hr before the assigned date of oral presentation. For any late submission, two marks will be deducted from the final score.
6. Guidelines for the oral presentation are attached.

Group presentation II

1. Each group is required to give an oral presentation on a selected research article published within 3 years in one of the journals in Appendix I. Students should submit the article to Blackboard on or before 28 Oct 2016. For any late submission, two marks will be deducted from the final score.
2. Presentation file needs to be uploaded to Blackboard 24-hr before the presentation. For any late submission, two marks will be deducted from the final score.

3. Each oral presentation will be in 20-min, followed by a 10-min open discussion. One mark will be deducted for each minute of overrun.
4. All students are required to read the papers and actively participate in the discussion.

Attendance of the oral presentation

The oral presentation will start at 10.30am. For students who are late for their presentations, no extra time will be compensated (e.g. if a student is late for 10 minutes, the maximum time allowed for his/her presentation will be 10 minutes).

One sub-grade (e.g. A- to B+) will be deducted when a student fails to attend two group oral presentations.

Individual written report

1. The written report should be on an article selected in a specific Virtual Issue of *Journal of Biological Chemistry*. Students will be notified which Virtual Issue can be used for the written report.
2. Deadline for report submission is 5 p.m., 9 Dec 2016. For each day of late submission, two marks will be deducted from the final score.
3. Format of the written report can be found in the attached guidelines.

ASSESSMENT (100%)

1. Draft powerpoint file and meet your teacher: 10%

2. Group presentation I: 30%

- Presentation: 20%
- Peer assessment: 5%
- Participation (Q&A session): 5%

3. Group presentation II: 30%

- Presentation: 20%
- Peer assessment: 5%
- Participation (Q&A session): 5%

4. Individual written report: 30%

Remarks:

1. Oral presentation will be evaluated by teacher and also peer assessed by participants in the same group.
2. Individual written reports will be evaluated by two teachers.
3. Assessment criteria are listed in the assessment forms.

BCHE3090 Self-study Modules in Biochemistry
(2016-17, 1st Term)

Teachers		Office	Tel.	E-mail
Prof. Shannon W.N. Au (Coordinator)	WNA	SC 178	3943 4170	shannon-au@cuhk.edu.hk
Prof. T.F. Chan	TFC	SC 177	3943 6876	tf.chan@cuhk.edu.hk
Prof. K.M. Chan	KMC	SC 184	3943 4420	kingchan@cuhk.edu.hk
Dr. F.H. Lo	FHL	MMW 507B	3943 5019	lofaihang@cuhk.edu.hk
Dr. Patrick H.K. Ngai	HKN	MMW 507B	3943 4359	hkngai@cuhk.edu.hk
Prof. Jacky C.K. Ngo	CKN	SC E403	3943 6346	jackyngo@cuhk.edu.hk

Schedule for Group A- F TUESDAY (10:30am-12:15pm)

Wk.	Date	Topic	Teacher/Venue	Remarks
1	6 Sep	Introduction	WNA / MMW LT2	Review Module 6
2	13 Sep	How to read and present a scientific paper	WNA / MMW LT2	Review Module 6
3	20 Sep	Self-study	-	Review Module 1-5 & 7
4	27 Sep	Self-study	-	Review Module 1-5 & 7
5	4 Oct	Meet your teacher	WNA/KMC/TFC/FHL/ HKN/CKN	Prepare a draft powerpoint file and meet with your group teacher
6	11 Oct	Group presentation I – Assigned Paper I	WNA (Group A): LSK203 KMC (Group B): ERB406 TFC (Group C): MMW706 FHL (Group D): MMW715 CKN (Group E): MMW622 HKN (Group F): LHC G01	
7	18 Oct	Group presentation I – Assigned Paper II	WNA (Group A): LSK203 KMC (Group B): ERB406 TFC (Group C): MMW706 FHL (Group D): MMW715 CKN (Group E): MMW622 HKN (Group F): LHC G01	
8	25 Oct	Self-study		Submit your selected article by 28 Oct 2016, 5pm
9	1 Nov	Writing a scientific paper	CKN: ICS L1	
10	8 Nov	Self-study	-	
11	15 Nov	Group presentation II – Selected papers	HKN (Group A): LSK203 WNA (Group B): ERB406 KMC (Group C): MMW706 TFC (Group D): MMW715	

			FHL (Group E): MMW622 CKN (Group F): LHC G01	
12	22 Nov	Group presentation II – Selected papers	HKN (Group A): LSK203 WNA (Group B): ERB406 KMC (Group C): MMW706 TFC (Group D): MMW715 FHL (Group E): MMW622 CKN (Group F): LHC G01	
13	29 Nov	Self-study		Submit your written report by 9 Dec 2016, 5pm

BCHE3650 Molecular Biology and Recombinant DNA Laboratory (2016-17, 2nd Term)

Description

A set of experiments to illustrate various molecular biology and recombinant DNA techniques will be performed. These include recombinant DNA construction and characterization, DNA sequencing and analyses, DNA authentication, gene expression study. Students are preferred to attend BCHE3050 and BCHE3070.

Learning Outcome

1. Students should be able to perform simple experiments using molecular biology and recombinant DNA techniques such as DNA preparation, construction and analyses of recombinant DNA, generation of cDNA, DNA sequencing and polymerase chain reaction.
2. Students should be able to grasp the basic concept of molecular biology and recombinant DNA techniques.
3. Knowledge gained from this course is useful for the final year course Supervised Research in Biochemistry and other research work.

Course Syllabus

Recombinant DNA construction, DNA transformation, plasmid DNA preparation, paternity test, DNA sequencing, bioinformatic analyses, gene expression study.

Course Schedule

Date	Experiment	Content
Jan. 12		Check in
Jan. 19	1	DNA Extraction and Polymerase chain reaction
Feb. 9	2	Recombinant DNA construction
Feb. 16	3	DNA transformation into E. coli.
Feb. 23	4	Plasmid preparation (Part I)
Mar. 2	4 and 6	Plasmid preparation (part II) Paternity test (part I)
Mar. 9	5 and 6	DNA Sequencing Demonstration and Blast Search Paternity test (part II)
Mar. 16	7	Gene Expression study (part I)
Mar. 23	5 and 7	DNA Sequencing Demonstration and Blast Search Gene Expression Study (part II)
Mar. 30		Lab Discussion
Apr. 13		Lab Examination

BCHE3650 Molecular Biology and Recombinant DNA Laboratory (2016-17, 2nd Term)

Assessment Scheme

Lab performance:	10%
Lab. reports:	25%
Pre-class exercise:	10%
Pre-lab quiz:	10%
Examination:	45%

BCHE3730 Analytical Biochemistry Laboratory
(2016-17, 2nd Term)

Description

This laboratory course provides basic training in biochemical techniques. Students will learn the application of different biochemical methods in the qualitative and quantitative analyses of biologically active molecules. This course is identical to the BCHE3630 Methods in Biochemistry Laboratory offered in 2014 or before.

Learning Outcome

Students are expected to learn different methods for biochemical analyses, including chromatography, electrophoresis, protein crystallization, centrifugation and fluorescence techniques. Knowledge gained from this course is useful for the final year course Senior Experimental Project and other research work.

Course Syllabus

Fluorescence Techniques: Because of its outstanding sensitivity, reliability, non-invasiveness and friendliness to our environment, detection of target molecules by using fluorescence has been a common technology for various types of biochemical and biomedical studies. This session attempts to introduce to students different fluorescence techniques including the use of fluorometer, fluorescence plate reader, confocal microscope, and flow cytometer for a number of biochemical analyses.

Crystallization of Lysozyme: The X-ray crystallography is a very important technique to study the three-dimensional structure of proteins. A good X-ray diffraction pattern, however, requires a large protein crystal that is free of contaminants and aggregation. In this experiment, students will acquire the basic skills of producing a crystal of lysozyme. In addition, the effects of different protein and salt concentrations on lysozyme crystallization will also be investigated.

Separation of Sub-cellular Components by Differential Centrifugation: Differential centrifugation will be used to separate sub-cellular components for biochemical analysis. Different sub-cellular components, such as the nucleus and the cell membrane, have different sedimentation properties and therefore, they can be differentially sedimented to the bottom of the centrifuge tube. In this experiment, we will attempt to separate key cellular components (the nucleus, the mitochondria/membrane and the cytosol fractions) using a simple centrifuge. The experiment was designed to show that by varying the parameters of centrifugation, one could selectively separate cellular components into fractions with distinctive biochemical characteristics.

Ion Exchange Chromatography: Chromatography is a technique which depends on the distribution of a molecule between two different phases, a stationary phase and a mobile phase. Depending on the stationary phase used, there are different kinds of chromatography which allow for separation of molecules with different properties.

In the experiment, ion exchange chromatography will be used to separate three different proteins.

Sodium Dodecyl Sulfate-Polyacrylamide Discontinuous Gel Electrophoresis: SDS is an anionic detergent which binds strongly to protein at a constant ratio such that all the SDS-treated proteins are negatively charged. Besides having the same charge to mass ratio, the SDS-treated proteins also have the same shape. Consequently, when electrophoresed in the molecular sieving polyacrylamide gel, they will be separated according to size and their molecular weight can be determined with reference to the standards.

Course Schedule

Date	**Experiment**	**Content**
11 Jan.	Check in	
25 Jan. & 8 Feb.	1	The use of Fura-2 for measurement of free calcium ion concentration Demonstration : Cell death analysis by flow cytometry and fluorescence microscopy
1 Mar.	2	Crystallization of lysozyme
22 Mar.	3	Separation of sub-cellular components by differential centrifugation
29 Mar.	4	Ion exchange chromatography
5 Apr.	5	Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE)
12 Apr.		Lab. discussion
19 Apr.		Lab. examination

Assessment Scheme

Report:	50%
Pre-lab quiz:	10%
Lab-log:	10%
Performance:	5%
Exam:	25%

Required Readings

The students will be given a laboratory manual with details, including the basic principles and the procedures of the experiments.

Enrollment Requirements

Co-requisite: BCHE3030; Not for students who have taken BCHE3630.

BCHE4030 Clinical Biochemistry
(2016-2017, 2nd Term)

Course Code: BCHE4030 (3 units)
Period: M5 (12:30pm – 1:15pm); W1-2 (8:30am - 10:15am)
Venue: SC L4
Medium of Instruction: English

Teachers:

FH Lo MMWB Rm 507B, Tel: 3943-5019, e-mail: lofaihang@cuhk.edu.hk
SK Kong (Coordinator) MMWB Rm 609, Tel: 3943-6799, e-mail: skkong@cuhk.edu.hk

Objectives:

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

Learning Outcomes:

After completing the course, students should be able to:

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

Wk	Date/2017	Hr.	Topics	Teacher
			eAdd-Drop: 16–22 Jan 2017	
1	**Jan 9 (M)**	**1**	• Introduction to Clinical Biochemistry	**LFH (25)**
	Jan 11 (W)	**2**	• Revision of Analytical Methods	
2	**Jan 16 (M)**	**1**	• Biochemical Endocrinology	
	Jan 18 (W)	**2**	• Principles of Endocrine Disorders	
3	**Jan 23 (M)**	**1**	• Laboratory Investigations of Endocrine Disorders	
	Jan 25 (W)	**2**	• Metabolic Aspects of Malignant Diseases	
4	**Jan 30 (M)**		**No-Class/Chinese New Year Holiday**	
	Feb 1 (W)			
5	**Feb 6 (M)**	**1**	• Liver Functions	
	Feb 8 (W)	**2**	• Liver Diseases and Biochemical Investigations	
6	**Feb 13 (M)**	**1**	• Blood Cells, Plasma Proteins and Enzymes I	
	Feb 15 (W)	**2**	• Blood cells, Plasma Proteins and Enzymes II	
7	**Feb 20 (M)**	**1**	• Haemostasis and Thrombosis	
	Feb 22 (W)	**2**	• Blood Disorders and Tests	
8	**Feb 27 (M)**	**1**	Tutorial	
	Mar 1 (W)*	**2**	Mid-term Test I (Venue to be confirmed)	
9	**Mar 6 (M)**	**1**	• Renal Functions and Bone Profile	
	Mar 8 (W)	**2**	• Iron Profile, Lipid Profile, and Cardiac Markers	
10	**Mar 13 (M)**	**1**	Tutorial	
	Mar 15 (W)*	**2**	Mid-Term Test II (Venue to be confirmed)	
11	**Mar 20 (M)**	**1**	• Electrolytes and Water Balance	**SKK (14)**
	Mar 22(W)	**2**	• Electrolytes and Water Balance	

12	**Mar 27 (M)**	**1**	• Disorders of Electrolytes and Water Balance	
	Mar 29 (W)*	**2**	Quiz I • Acid-Base Regulation	
13	**Apr 3 (M)**	**1**	• Acid-Base Regulation	
	Apr 5 (W)	**2**	• Disorders of Acid-Base	
14	**Apr 10 (M)**	**1**	• Disorders of Acid-Base	
	Apr 12 (W)*	**2**	Quiz II • Development of New Clinical Biochemistry Assays	
15	**Apr 17 (M)**		**No class/Ester Holiday**	
	April 19 (W)	**2**	• Development of New Clinical Biochemistry Assays Course Evaluation (10:00 am – 10:15 am)	

***: Quiz**

References:

George J. Netto, Rana D. Saad, Peter A. Dysert, II. Diagnostic molecular pathology: current techniques and clinical applications, part I. 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, 4th 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 Test I:	Short Questions (close-book format) 30% final mark
Mid-term Test II:	MCQ (close-book format) 20% final mark
Quiz I:	10% final mark (SKK materials) (Close-book format)
Quiz II:	10% final mark (SKK materials) (Close-book format)
Final examination:	30% final mark (SKK 30%, Open-notes exam: Two A4 pages all you can write.)

BCHE4040 Aspects of Neuroscience
(2016-17, 1st Term)

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 tometabolic 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
   e. Affective disorders and schizophrenia

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.

Assessment Scheme
Mid-term Exam 45%
Final Exam 55%

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.

Lecturers
Prof. HY Edwin Chan MMW509B tel: 39434021 email: hyechan@cuhk.edu.hk
Prof. KF Lau (Course Coordinator) SC 291 tel: 39431106 email: kflau@.cuhk.edu.hk

Course Schedule

BCHE4040 Aspects of Neuroscience (2016-17, Term 1)
T3-4 (10:30 a.m. – 12:15 p.m.) MMW 710 and
H4 (11:30 a.m. – 12:15 p.m.) SC L5

Wk.	Date	Hr.		Teacher
1	Sept. 6 (T)	2	• Structure and function of the central nervous system	
	Sept. 8 (H)	1	• Cells of the nervous system: neuron, Schwann cells and astrocytes	
2	Sept. 13 (T)	2	• Myelin	
	Sept. 15 (H)	1	• Biochemistry, physiology and pharmacology of transport system:	
3	Sept. 20 (T)	2	a. Blood-brain-CSF barriers	Prof. HY Chan
	Sept. 22 (H)	1	b. Cellular (Membrane) transport	
4	Sept. 27 (T)	2	c. Axoplasmic transport	
	Sept 29 (H)	1	• Ion channels, potentials and signal conduction	
5	Oct. 4 (T)	2		Prof. KF Lau
	Oct. 6 (H)	1		
6	**Oct. 11 (T)**	**2**	**Mid-term Exam**	Prof. HY Chan
	Oct. 13(H)	1		
7	Oct. 18 (T)	2	• Biochemistry, physiology and pharmacology of synaptic transmission	
	Oct. 20 (H)	1	• Classification of neurotransmitters	
8	Oct. 25 (T)	2	• Biosynthesis of transmitters and their regulation	
	Oct. 27 (H)	1	• Termination of neurotransmission	
9	Nov. 1 (T)	2	• Properties and molecular biology of receptors	
	Nov. 3 (H)	1	• Second messenger and signal transductioin	Prof. KF Lau
10	Nov. 8 (T)	2	• Modulation of signal transmission	
	Nov. 10 (H)	1	• Biochemistry and molecular biology of neurological and	
11	Nov. 15# (T)	2	• Psychiatric disorders	
	Nov. 17* (H)	0		
12	Nov. 22 (T)	2		
	Nov. 24 (H)	1		
13	Nov. 29 (T)	2		
	Dec. 1 (H)	1		
	Total:	**38**		

Special class arrangement
* Class suspension (due to the 81st Congregation for the Conferment of Bachelor's Degrees and Master's Degrees)

BCHE4060 BASIC AND APPLIED IMMUNOLOGY
2016 – 2017, Term 1

Course Code: BCHE4060 (3 Units, First Term)
Period: W3-4 (10:30 am - 12:15 pm); F3 (10:30 am - 11:15 am)
Venue: SCL2
Medium of Instruction: English

Objectives:

This course aims at providing students with the essential concepts of basic and applied immunology. 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 of infectious disease, immunodeficiency, hypersensitivity, transplantation and cancer will be discussed. The applications of immunology to modern medicine and biotechnology, including vaccination, monoclonal antibody production and antibody engineering will also be covered.

Learning Outcomes:

After completing the course, students should be able to:

• have an in-depth knowledge of the key features of the immune system;
• comprehend the integrated nature of the immune system;
• understand the molecular basis for generation of antibody diversity, immune response, self-tolerance
and disorders in the immune system;
• appreciate the relevance of the immune system in our daily lives & the applications in biotechnology;
• have developed competence in accessing & reviewing scientific literature, and critical appraisal of information.
• Develop generic skills such as critical thinking, writing and lifelong learning skills.

Lecturers:

SK Kong MMWB Rm 609, Tel: 3943-6799, e-mail: skkong@cuhk.edu.hk
Iris Pang SC 138, Tel: 3943-1393, email: irispang@cuhk.edu.hk

Textbooks: (Some are reserved in the University Library) (QW504 .K83 2013)

1) Owen, Punt & Stranford (2013) Kuby Immunology (7th Ed) Macmillan
Kindt, Goldsby & Osborne (2007) Kuby Immunology (6th Ed) Freeman (W504.K53 2007)
2) Murphy (2012) Janeway's Immunobiology (7th Ed) Garland Science. (QW504.J37 2012)
3) Abbas, Lichtman, and Pillai (2015) Cellular and Molecular Immunology (8th Ed) Saunders.
(electronic resource at CUHK library: http://library.cuhk.edu.hk/record=b5884950~S15)
4) Doan, Melvold, Viselli & Waltenbaugh (2013) Immunology (2nd Ed) Lippincott Williams & Wilkins
(QW518.2.I55 2013)
5) Coico & Sunshine (2009) Immunology: A Short Course (6th Ed) Wiley-Blackwell (QW504.B35 2009)
6) Male, Brostoff, Roth & Roitt (2013) Immunology, (8th Ed) Mosby. (QW504.R65 2013)

e-Learning Materials:

Biochemistry is a practical science. Learning the laboratory techniques and skills is an important element in the biochemistry curriculum. Videos (5-10 minutes each) for laboratory techniques (e.g. ELISA), skills for data presentation and self-study skills are available at http://www.bch.cuhk.edu.hk/learnbiochem/).

Assessment Scheme:

There are 4 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.

Quizzes: 4 (close-book)	20% final mark
Mid-term examination (open-book examination):	30% final mark
Term paper assignment	10% final mark
Final examination (close-book):	40% final mark

Posting of Course Contents and Announcements:

Course materials including lectures slides, notes are all provided in the course Blackboard (https://elearn.cuhk.edu.hk/). Students can download the course materials from Blackboard using their student username and password.

Feedback and Evaluation:

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

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

Week	Date	Hrs	Topics	Teacher
1	Sept 7 (Wed)	2	Overview of Our Immune System (2 L)	
	Sept 9 (Fri)	1	Nature of Antigens & Immunogens (1 L)	
2	Sept 14 (Wed)	2	Lymphoid Tissues & Immunocytes (2 L)	
	Sept 16 (Fri)		**Holiday (**Day after Mid-Autumn Festival)	
3	Sept 21 (Wed)	2	Immunoglobulin Structure & Functions (2 L)	
	Sept 23 (Fri)	1	Antibody Diversity (1 L)	Prof. SK Kong

4	Sept 28 (Wed)*	2	Antibody Diversity (1 L) The Major Histocompatibility Complex (1 L)	(19 Lectures)
	Sept 30 (Fri)	1	The Major Histocompatibility Complex (1 L)	
5	Oct 5 (Wed)	2	T Cells & T Cell Receptors (2 L)	
	Oct 7 (Fri)	1	Integration of Immune Responses (1 L)	
6	Oct 12 (Wed)*	2	Integration of Immune Responses (2 L)	
	Oct 14 (Fri)	1	Immunological Tolerance (1L)	
7	Oct 19 (Wed)	2	Immunological Tolerance (1L)	
	Oct 21 (Fri)	1	Cytokines in Health & Diseases (1 L)	Dr. Iris Pang (17 Lectures)
8	Oct 26 (Wed)	2	**Mid-term Examination**	
	Oct 28 (Fri)	1	Cytokines in Health & Diseases (1 L)	
9	Nov 2 (Wed)	2	Host defense Part 1 & the Complement System (2 L)	
	Nov 4 (Fri)	1	Host Defense Part 2 (1 L)	
10	Nov 9 (Wed)*	2	Emerging Infectious Diseases & Vaccine Strategies (2 L)	
	Nov 11 (Fri)	1	Allergy & Hypersensitivity Reactions (1 L)	
11	Nov 16 (Wed)	2	Allergy & Hypersensitivity Reactions (2 L)	
	Nov 18 (Fri)	1	Immunodeficiency & AIDS (1 L)	
12	Nov 23 (Wed)*	2	Immunodeficiency & AIDS (2 L)	
	Nov 25 (Fri)	1	Transplant Immunology (1 L)	
13	Nov 30 (Wed)	2	Immunity to tumors (2 L)	
	Dec 2 (Fri)	1	Immunity to tumors (1 L)	

Tutorials:

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

Term Paper Assignment:

Write a term paper on the following (10% of the final grade):

• To apply immunology concepts as tools for understanding real-world phenomena.
• What you need to do is to use the knowledge of immunology to explain 2 pieces of experience in our daily life.

Guidelines:

• Four students in one group will prepare **2 phenomena in 2 slides (in .ppt or .pptx format).**
• Below is one example showing how histamine from mast cells gives the Facial Flushing after drinking alcohol.
• On a 3rd slide, put down your name & student ID and add one statement for academic honesty.

• Upload your term paper (3 slides) to Blackboard (https://elearn.cuhk.edu.hk/).

• Deadline: **5:00 pm, 2 Nov 2016** (Late submission: mark deduction: 1**%** of the final grade /day.)

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.

BCHE4070 Management and Accreditation of Biochemical Laboratory (2016-17, 2nd Term)

Time: *Saturday, 2:30 pm - **5:30 pm***
Classroom: **LT7, Yasumoto International Academic Park (YIA LT7)**

Medium of Instruction: **English**

Unit: **3**

Minimal Passing Grade: D

Course Coordination: **Prof. SK Kong, MMWB Rm 609, Tel: 3943-6799, e-mail: skkong@cuhk.edu.hk**

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. **The class will be taught with MSc students under different course code (BBMS6300) and assessment scheme.**

Time Table:

Week	Date	Lecture	Teacher	Title of the Lecture
1	14 Jan	1	Dr. Ken YEUNG[1]	*Good Laboratory Practice (GLP)*
2	21 Jan	2	Dr. Ken YEUNG[1]	Good Laboratory Practice (GLP)
3	28 Jan	-----	*No class (public holiday)*	
4	4 Feb	*3*	*Dr. Ken YEUNG[1]*	*Good Manufacturing Practice (GMP)*
5	11 Feb	4	Dr. Alice WONG[2]	*Intellectual Property Rights Relevant to Biotechnology*
6	18 Feb	5	Dr. Alice WONG[2]	*Technology Transfer, Licensing and Enforcement of IPRs*
7	25 Feb	-----	*No class (study week)*	
8	4 Mar		*Test I (2 hours) Classroom: Rm 702, Mong Man Wai Building*	
9	11 Mar	*6*	*Dr. John HO[3]*	*What is accreditation? How laboratory quality management system can ensure the quality of results?*

10	18 Mar	*7*	*Dr. William CHO*[4]	*Clinical Laboratory Sciences and Practice*
11	25 Mar	*8*	*Dr. William CHO*[4]	*Quality Assurance in Clinical Laboratory*
12	1 Apr	*9*	*Dr. Henry CHEUNG*	*Quality Programs for Forensic DNA Laboratory*
13	8 Apr	*10*	*Dr. Benson YEUNG*[5]	*Accreditation Program of AAALAC International for Care and Use of Laboratory Animals (1)*
14	15 Apr	-----	*No class (public holiday)*	
15	22 Apr	*11*	*Dr. Benson YEUNG*[5]	*Accreditation Program of AAALAC International for Care and Use of Laboratory Animals (2)*
16	*29 Apr*		Course Evaluation Test II (2 hours) Classroom: Rm 705, Mong Man Wai Building	

[1] Chinese University Institute of Biotechnology, CUHK
[2] Intellectual Property Specialist at Albert Wai-Kit Chan Intellectual Property Limited
[3] Hong Kong Accreditation Service, HKSAR
[4] Queen Elizabeth Hospital
[5] Research and Development Manager at Vanway Pharmaceutical Holdings Ltd.

Assessments:

Term paper	:	20%
Test I	:	30% (Lectures 1-5)
Test II	:	50% (Lectures 6-11)

References:

To be recommended by individual teachers

Term papers guidelines:

- Write a term paper on a topic taught in **BCHE4070**.
- 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, 14 May 2017 (Sunday).**
- 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. Details may be found at http://www.cuhk.edu.hk/policy/academichonesty/.
- **All assignments must FIRST be submitted to VeriGuide (https://academic.veriguide.org/academic/login_CUHK.jspx) 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://elearn.cuhk.edu.hk) 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 for the case.
  - **(b) Summary:** Give your findings and a summary of the case.
  - **(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.
  - **(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.

Test format:

- Section A: Close-notes test (MCQ / T/F)
  Section B: Open-notes test (Essay / short questions)
- Students need to return answer sheet/book for Section A before they can answer Section B open-notes test questions. Students cannot request to review their answers after they have handed in their answer sheet/book of Section A. For Section B, students will **ONLY** be allowed to bring in one piece of A4 paper to the examination hall. Students may write down/print out information on both sides of the paper.

B.Sc. Attributes Table

Graduate Skills	Teaching & Learning	Practice	Assessment
Effective communication (written, oral, interpersonal)	☒	☒	☒
Core knowledge literacy	☒	☒	☒

Problem solving	☒	☒	☒
Critical thinking and evaluation	☒	☒	☒
Work autonomously	☒	☒	☐
Work in teams (with classmate, supervisor & RA etc)	☐	☐	☒
Creativity and innovation	☒	☒	☒
Information technology (IT) literacy	☒	☒	☒
Lifelong learning skills	☒	☒	☒
Ethical behaviours in social/professional/work environment	☐	☒	☒
Responsible, effective citizenship	☒	☒	☒

BCHE4080 Biochemistry for Forensic Sciences
(2016-17, 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 examination: 12 October (Wednesday)
30%

Final Examination: 9 December (Friday) **To be confirmed**
70%

Learning Resources

(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]

Course Schedule:

Wednesday 2:30 pm - 4:15 pm (Weeks 1-6) Science Centre (SC) LG23
Friday 6:30 pm - 9:30 pm (Weeks 8-13) Yasumoto International Academic Park (YIA) LT7

Week	Date	Hour(s)	Topic	Teacher
1	7 Sep (Wed)	2	Introduction to Forensic Sciences	KF Lau
2	14 Sep (Wed)	2	Forensic Serology & Blood Analysis	KF Lau
3	21 Sep (Wed)	2	Detection of Saliva, Semen & Other Bodily Fluids	KF Lau
4	28 Sep (Wed)	2	Forensic Toxicology & ….	KF Lau
5	5 Oct (Wed)	0	No class	
6	**12 Oct (Wed)**	1	**Mid-Term Examination**	KF Lau
7	21 Oct (Fri)	0	Class suspended due to tropical cyclone warning signal no. 8	
8*	28 Oct (Fri)	3	1. Forensic sciences and CSI[#] 2. Development of DNA typing methods, DNA extraction and DNA quantitation 3. Forensic genetics and RFLP typing 4. PCR-STR typing 5. Results interpretation and forensic issues 6. Evaluation of DNA evidence and presentation of such evidence at courts 7. Y chromosome DNA typing, mitochondrial DNA typing and a special topic	Henry Cheung
9*	4 Nov (Fri)	3		
10*	11 Nov (Fri)	3		
11*	18 Nov (Fri)	3		
12*	25 Nov (Fri)	3		
13*	2 Dec (Fri)	3		
Total:		**27**		

[#]Optional as the teaching material will be similar to lectures in the first four weeks.

*Students in the M.Sc. programme (BBMS5120 Biochemical Genetics and Forensic Sciences) will join the class together in the lecture.

Teachers:

Professor LAU Kwok Fai SC 291 3943 1106 kflau@cuhk.edu.hk
Dr. Henry K Y Cheung

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.

BCHE4090 Biochemistry for Sport and Exercise
(2016-17, Term2)

Course code: BCHE4090
Course title: Biochemistry for Sport and Exercise
Venue: Y.C. Liang Hall G04
Unit: 2
Term: 2
Period: 9:30 – 11:15, Friday

Instructor: FH Lo
Office: MMW507B
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%**
*Mind-map**	*10%*
*In-class activities***	*10%*
Written assignment	**30%**
Group written assignment[+]	*25%*
Individual written assignment[#]	*5%*
Quiz and exam	**50%**
Quiz	*10%*
Final exam (T/F, MCQ, and SQ)	*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.

Schedule

Week	Date	Contents
1	13 Jan	- Course introduction - Skeletal system
2	20 Jan	- Muscular and nervous system - Class activity I: body posture
	27 Jan	- Chinese New Year
3	3 Feb	- Neuromuscular control - Muscle contraction and synthesis - Bone synthesis and soft tissue biochemistry - Class activity II: balancing the body
4	10 Feb	- Energy utilization at rest and during physical activities - Class activity III: estimation of basal metabolic rate
5	17 Feb	- Haematology - Cardiac functions for physical activities - Cardiovascular system during physical activities - Class activities IV: blood pressure measurement
6	24 Feb	- Quiz: skeletomuscular system - Molecular mechanism of cellular injury and recovery - Ischemia, inflammation, and spasm - Fatigue and rest
7	3 Mar	- Adaptation mechanisms to extreme environments - Class activity V: mind-map drawing
8	10 Mar	- Endocrine effect on physical activities - Biochemical principles of training and doping - Class activity VI: how stressed you are?
9	17 Mar	- Nutrition for sports - Fat cell biology - Class activity VII: measurement of body fat composition
10	24 Mar	- Physical activities in extreme conditions - Biochemical principles of sports therapeutics - Class activity VIII: measurement of blood O_2 saturation
11	31 Mar	- Creative workshop - Critique on mind-map
12	7 Apr	- Group activity
12	14 Apr	- Easter
13	21Apr	- Group activity

Creative self-reflection

Self-reflective activity will be conducted in the form of mind-map drawing; each student will assign a specific topic for him/herself during the preparation of the mind-map, according to the guidelines provided in Class Activity V. The students will briefly introduce the ideas of their maps to the class during the Critique on mind-

map. The assessment criterion of the mind-map will be based on the creativity of the mind-map, which will be assessed collectively by the whole class during the critique.

Group activity for learning integration

Group activity will be held at the end of the course; where students will be divided into four large groups; two groups on each day (students will be further divided into small groups according to their plan and judgment). Before the group activity, students will be reminded to revise the materials covered by the course and to do extra self-study about (wilderness) emergency rescue. During each 45-minute group activity, students will be briefed with a case of disaster: each large group will act as the patients; while the other large group will act as the rescuers. The rescuer group will have to apply their skills to comprehend and analyze the situation, to apply their knowledge and creativity, and to make judgment to act as a team. The rescuer group will be allowed to debrief among themselves after the activity. The students will rotate their roles once the activity has been completed. The activity will take place within the classroom and each student will have to make use of their imagination.

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.

BCHE4130 Molecular Endocrinology
(2016-17, 2nd Term)

This course describes the chemical structures and biological functions of hormones in vertebrates with emphasis but not focus only on human subjects. The organization and operation of different hypothalamus- pituitary- peripheral endocrine gland axes will be discussed. The molecular 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. Current advances in molecular endocrinology techniques will also be discussed.

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:

Time: T3-4 (10:30 am to 12:15 pm) and H6 (1:30 pm to 2:15 pm); Venue: SC L4

Week	Date	Topic (Text Chapters in Hadley and Levine, 2007)	Teachers
1	Jan 10 (2 h) Jan 12 (1 h)	1. Mechanisms of Hormone Action (1, 2, 3)	**KM Chan (Coordinator)** SC184 Tel: 3943-4420 Email: kingchan@cuhk.edu.hk
2	Jan 17 (2 h) Jan 19 (1 h)	2. Endocrine Methodologies and Signal Transductions (4)	
3	Jan 24 (2 h) Jan 26 (1 h)	3. Hypothalamic and Pituitary Hormones (5, 6, 12)	
4	Feb 2 (1 h) Feb 7 (2 h)	4. Posterior Pituitary Hormones & POMC (7, 8)	
5	Feb 9 (1 h) Feb 14 (2 h)	5. Pancreatic Hormones and Metabolic Regulation (11)	
6	Feb 16 (1 h) Feb 21 (2 h)	6. Hypothalamic-Pituitary-IGF Axis and Growth Control (12)	
7	Feb 23 (1 h) Feb 28 (2 h)	7. Hypothalamic-Pituitary-Thyroid Axis (13, 14)	
8	Mar 2 (1 h) Mar 7 (2 h)	8. Hypothalamic-Pituitary-Gonads Axis (17-19)	
9	Mar 9 (1 h) Mar 14 (2 h) Mar 16 (1 h)	**9. Presentation on hormone techniques** $	
10	Mar 21 (2 h) Mar 23 (1 h)	Study week and e-learning: on-line videos on hormonal control of sugar, lipid, and calcium metabolisms	
11	Mar 28 (2 h) Mar 30 (1 h)	10. Calcium Homeostasis and Bone Metabolism (9)	**FH Lo** MMW507B Tel: 3943-5019 Email: lofaihang@cuhk.edu.hk
12	Apr 6 (1 h) Apr 11 (2 h)	11. Reproduction, Sex Hormones and Contraceptives	
	Apr 13 (1 h) Apr 18 (2 h)	12. Steroid hormones and their actions (15- 16)	

13	Apr 20 (1h) Apr 25 (2 h)	13. Gastrointestinal (GI) Hormones (10)	

Evaluations:

1. $ **Presentation (group) on Hormone Techniques** (15%): 5% peer-assessment; 10% based on oral presentation and slides submitted as group project. Please include one multiple-choice question in your presentation.
2. ^**Assignment** (25% covering week 3-8): students should answer any 2 questions posted on lecture notes, students are required to write research proposal or design experiments to test hypothesis or discuss case study. All students are encouraged to apply critical thinking, creativity, and problem-solving skills to solve a research problem. **Warning: no two assignments could have similar contents and that would be regarded as plagiarism (DEADLINE: APRIL 2, 2016).**
3. #**Poster (group) Presentation** (20%): covering all endocrinology research topics **(DEADLINE: May 1, 2015).**
4. ***FINAL EXAMINATION (40%): covering all topics taught from Week 1 to 13, date to be confirmed.**

$Oral Presentation on Hormone Techniques: students in a group of 3-4 students should select and present in 10 minutes a special and advanced technique to detect hormones or study the effects of hormones in animals. Power point slides (<12) should be submitted one day ahead of presentation. Please include one multiple-choice question in your presentation.

^Assignments: each student should submit a written assignment describing their original approach to solve a research problem. In the assignment, 1) a research problem relevant to the course should be clearly identified; 2) the hypothesis should be clearly defined; 3) the method followed by the hypothesis should be described; 4) how the data should be analyzed in order to get conclusion should be mentioned; 5) the reference of scientific information should be cited; 6) student full name and student ID should be included. (Page limits: 10; max word counts: 6,000)

#Poster presentation: students in a group of 2-3 students would select a research paper within last 5 years (2011-16) and write an overview (commentary) on the major findings of the paper(s), rationales and merit of the study, and discuss the perspective or future experiments that can be performed to extend the study and the understanding of the subject matter. All posters should be finished within one page (maximum word count is 2000, with 3- 4 figures or tables) in a pdf file to be uploaded to blackboard with the signed VeriGuide statement (on page 2). Contents of the poster include [1] the title of the poster, [2] student names (id), [3] full name(s) of the article(s) reviewed (with links and downloaded dates), [4] abstracts, [5] keywords, [6] major findings with 2-3 figures or tables, [5] critiques, [6] discussions (e.g. accuracy of techniques involved), [7] conclusions, [8] perspectives, and [9] reference**s**.

***Final Examination:** this is an open note examination and students may take only **one A4 paper** with their own notes to finish this exam consists of mainly multiple choice or short-answer questions on concepts of endocrinology.

Expected learning outcomes

After completing the course, students should be able to:

1. Understand the homeostatic controls in our body using the endocrine system;
2. Understand how polypeptide hormones and lipid soluble hormones act on their target cells to activate various intracellular signaling pathways;

3. Understand the concepts of hormonal control via feedback mechanisms;
4. 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 appreciate and find information about the complexes of hormonal control of growth, metabolism, reproduction and development.

BCHE4760 Immunology and Haematology Laboratory (2016-17, Term 1)

Course code:	BCHE4760
Course title:	Immunology and Haematology laboratory
Venue:	Course introduction and examination: Lady Shaw Building LT6 Oral presentation: Lee Shau Kee Building LT3 Practical sessions: Science Centre Room 188/190
Unit:	2
Term	1
Period:	2:30 – 6:15 pm, Thursday
Maximum class size:	30

Course Objectives:

This course is designed to focus on the practical work in the fields of immunology and haeamtology; where students will participate in five practical sessions specialized in specific themes of immunology and haeamtology, such as innate immunity, humoral immunity, haematological specimens, red blood cells (RBCs), white blood cells (WBCs), and immunological assays. The practice of 'flipped classroom' will be implemented in this laboratory course: students are required to do self-study of the e-learning course materials beforehand; students are expected to acquire adequate knowledge to attend the laboratory. In other words, the laboratory is a place for the students to practise, to experience, to solve problems, and to discuss. At the end of each practical session, discussion time will be scheduled for the written assignment. In the meantime, there is collaboration with ILC to cover technical skills of scientific communication. On the other hand, important generic skills, such as team building skills, will be covered by the course. The training of students' self-learning, problem-solving, teamwork, and scientific communication skills will also be emphasized: students are encouraged to give presentations with topics in immunology they are interested in; they will be fully supported and provided with the optimal learning environment to reflect on the topics they select. Throughout the learning process, 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 skills of self-learning, problem-solving, teamwork, and communication for future career development as well as every-day-life application.

Learning Outcomes:

- 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;
- Gain learning methodologies that promote life-long learning in immunology, haeamtology, and other life science-related discipline.

Course Assessment

Performance[1] & participation[2]	**10%**
Written assignment	**25%**
Write-up form[3,4]	*15%*
Data[5]	*10%*
Presentation	**25%**
Preparation	*4%*
Coordinators	*10%*
Demonstrators	*5%*
Peers[6]	*6%*
Lab Exam	**40%**
Total	**100%**

[1]One performance mark will be awarded to groups finishing their practical work before 5:30 pm;
[2]The participation mark will be deducted for students who is late for or fail to attend ILC Workshop;
[3]The write-up form of each practical session accounts for 3% of the total marks of the course;
[4]Each write-up form will have to be submitted onto *Blackboard* within one week of the corresponding practical session;
[5]The data of each practical session accounts for 2% of the total marks of the course; 1% is allocated for the *accuracy* of the raw data and 1% is for the *scientific presentation* of the raw data.
[6]Five 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.

Staff Correspondence

Name	Office	Telephone number	Email address
Course lecturers			
KONG, Siu Kai	MMW 609	3943-6799	skkong@cuhk.edu.hk
PANG, Iris	SC 138	3943-1393	irispang@cuhk.edu.hk
Course coordinators			
KONG, Ada	MMW 525	3943-6255	adakong@cuhk.edu.hk
LO, Fai Hang	MMW 507B	3943-4359	lofaihang@cuhk.edu.hk
Demonstrators			
CHENG, Lilian	SC193	3943-6118	hiufucheng@yahoo.com.hk
LAM, Thomas	MMW 610	3943-8034	thomaslam_521@yahoo.com.hk
LAW, Iris	MMW 610	3943-8034	lokgi14@gmail.com
WONG, Margaret	MMW 610	3943-8034	catbone_margaret_wong@yahoo.com.hk
YEUNG, Jacky	MMW 610	3943-8034	yeungkawing223@yahoo.com.hk
ZHANG, Huawei	SC 193	3943-6118	zhw2508@gmail.com

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);

Schedule

Week	Date		Experiment	Venue	Staff
1	8 Sept	- -	Lab Check-In/student consultation Grouping/presentation topic selection	LSB LT6	LFH
2	15 Sept	-	Study week		
3	22 Sept	-	Study week		
4	29 Sept	- -	Assay for Innate Immunity Assay for Humoral Immunity (I)	SC 188/190	Ada, Jacky, & others
5	6 Oct	-	Assay for Humoral Immunity (II)	SC 188/190	Ada, Huawei, Lilian, & others
6	13 Oct	-	Study week		
7	20 Oct	-	Assays of Haematological Specimens	SC 188/190	Ada, Margaret, & others
8	27 Oct	-	Assays of Red Blood Cells (RBCs)	SC 188/190	Ada, Thomas, & others
9	3 Nov	-	ILC Workshop	ILC expert team	ILC
10	10 Nov	-	Flow Cytometric Analysis and Immunological Assay	SC 188/190	Ada, Iris, & others
11	17 Nov	-	University Ceremony		
12	24 Nov	-	Lab examination	LSB LT6	All
13	1 Dec	- -	Group Presentation on Immunological Techniques Laboratory discussion and group sharing	LSK LT3	All

BCHE4830 Medical Biochemistry Laboratory
(2016-17, Term 2)

Course code: BCHE4830
Course title: Medical biochemistry laboratory
Venue: Classrooms: Science Centre LG23
Laboratory: Science Centre East Block Room 402
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 (William J Marshall & Stephen K Bangert) (available online)
- Medical Biochemistry (John W Baynes & Marek H Dominiczak) (available online)
- Essential Haematology (Victor Hoffbrand) (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 LG23	All
2	16 Jan	-	Add/Drop period		
3	23 Jan	-	Part One (a & b)	SC E402	Anita and Demonstrators
4	30 Feb	-	Chinese New Year		
5	6 Feb	-	Study week		
6	13 Feb	-	Part Two (a & b)	SC E402	Anita and Demonstrators
7	20 Feb	-	Part Two (b & c)		
8	27 Feb	-	Study week		
9	6 Mar	-	Part Three (a & b)	SC E402	Anita and Demonstrators
10	13 Mar	-	Workshop: problem-solving	SC LG23	LFH
11	20 Mar	-	Study week		
12	27 Mar	-	Park 4	SC E402	Anita and Demonstrators
	28 Mar	-	Park 4 follow-up		
13	3 Apr	-	Study week		
14	10 Apr	-	Lab exam	TBC	LFH
15	17 Apr	-	Easter Holiday		

Staff Correspondence

Name	Office	Telephone number	Email address
Course lecturers			
Prof CHAN, King Ming	SC 184	3943-4420	kingchan@cuhk.edu.hk
Prof KONG, Siu Kai	MMW 609	3943-6799	skkong@cuhk.edu.hk
Course coordinators			
LO, Fai Hang	MMW 507B	3943-5019	lofaihang@cuhk.edu.hk
YIU, Anita	SC E412A	3943-6881	anita-garcia@cuhk.edu.hk

Course Assessment

Performance & participation	**10%**
Data	**20%**
Raw data[1]	*10%*
Presentable data[2]	*10%*
Written assignment	**30%**
Write-up form[3]	*20%*
Reflective journal	*10%*
Lab exam	**40%**
Total	**100%**

[1] Students will have to provide their raw at the end of each practical session; the raw data of each practical session accounts for 2%. Groups with deviated data receive no mark.

[2] The presentable data of each practical session accounts for 2%.

[3] The write-up form of each practical session accounts for 4%.

Presentable data

Each group will have to work together to present their raw data in an appropriate manner. The presentable data will then be printed out and submit with their write-up form.

Reflective journal

Each student will have to write an individual reflective journal titled 'The Impact of Medical Biochemistry on the Society like Hong Kong'. In the reflective journal, the student has to demonstrate his/her understanding of the topics by analyzing and commending the selected from different perspectives. **The reflective journal (less than 2,000 words) will have to be submitted onto *Blackboard* with a *VeriGuide* statement by the last day on 22 April (Saturday).**

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 the laboratory course starts, the demonstrator in charge of the day will provide basic guidance of the experiment(s) involved; then the students are expected to **work independently**, with minimal interference by the demonstrator

team, where from 5:30 to 6:15 pm is a dedicated discussion session held at SC297 or MMW622 conference rooms.

Week	Date	Discussion venue
4	29 Sept	MMW 622
5	6 Oct	SC 297
7	20 Oct	SC 297
8	27 Oct	SC 297
10	10 Nov	SC 297

Multi-dimensional development modules (optional)

Module A: site visits (Bonus: 5 marks)

Students may wish to form groups and visit the approved sites according to the course requirement. The proof of the visit will have to be submitted onto *Blackboard* by 7 May (Sunday).

Approved sites

① Educational activities organized by Cancer Fund
Website: http://www.cancer-fund.org/en/howwehelp_download.html

② Educational activities organized by Hong Kong College of Cardiology
Website: http://www.hkcchk.com/index.php

③ Educational activities organized by Stroke Fund
Website: http://www.strokefund.org/eng/joinus_part3.php

④ Hong Kong Museum of Medical Sciences (recommended)
Website: http://www.hkmms.org.hk/English/main.htm

⑤ Hong Kong Science Museum
Website: http://hk.science.museum/eindex.php

Other sites with the approval of the course coordinator

Module B: Information technology and transferable skills training (Bonus: 5 marks)

Students may wish to participate the training course/workshop offered by the University Library or Information Technology Services Centre related to IT skills, such as information search, computer software training, etc. Other events offered by the Career Planning and Development of CUHK, or public seminars offered by other organizations to promote transferable skills in specific topics will also be accepted. The proof of participation will have to be submitted onto *Blackboard* with a by 7 May (Sunday).

Useful websites

① CUHK Library Workshop
Website: http://www.lib.cuhk.edu.hk/en/learning/workshops/

② Career Planning and Development Centre
Website: http://cpdc.osa.cuhk.edu.hk/

③ Hong Kong Public Library
Website: http://www.hkpl.gov.hk/

④ Hong Kong Science Park Corporation
Website: https://www.hkstp.org/hkstp_web/en/Events-calendar/
⑤ Productivity Training Institute
Website: https://www.hktrainingonline.com/

Other training with the approval of the course coordinator

Module C: Independent Learning Centre Language Improvement Workshop (Bonus: 5 marks)
Students will have to participate the workshop offered by Independent Learning Centre related to scientific writing or other related generic and communication skills approved by the course coordinators. The proof of participation will have to be submitted onto *Blackboard* with a by 7 May (Sunday).

Module D: Video Presentation on 'how to improve the communication and social skills of shy and introverted students' (Bonus: 5 marks)
Students will have to form a group of five students and produce a video presentation titled '*how to improve the communication and social skills of shy and introverted students?*'. The video should NOT exceed 5 minutes and the faces of all the presenters have to be clearly seen for identification. Each student is required to have even share of the air time of the video (~1 minute per student). The video will have to be submitted onto *Blackboard* by 7 May (Sunday).

BCHE4901 Senior Experimental Project I
(2016-17)

Course Description

In this course, students carry out an independent laboratory research project either provided by the supervisor or jointly decided with the student. To fulfill the course requirement, students are required to discuss their progress with their supervisors regularly and submit a research proposal.

Learning Outcome

Students taken this course are expected to develop the following abilities:

1. Integrate the knowledge and skills learnt previously in other courses
2. Survey scientific literature relevant to their research project
3. Read scientific literature critically to identify the scientific questions or problems
4. Design independent research project to address the scientific questions
5. Acquire hands-on research techniques in conducting experiments
6. Develop problem-solving abilities
7. Improve skills in writing scientific proposal
8. Develop a sense of responsibility and term spirit

Course Syllabus

The students should take the initiative to discuss with their supervisors and compromise a topic for the independent research project. The students should first survey the background of their research project and identify the scientific questions they want to address. The students then design and perform the experiments for this project under the guidance of the supervisors and submit a research proposal in the term end.

Assessment Scheme

Essays	40%
Other	60%

Required and Recommended Readings

Relevant reference materials will be provided by the supervisor.

Enrollment Requirements

Prerequisite: BCHE3090

BCHE4902 Senior Experimental Project II
(2016-17)

Course Description
Students are required to discuss their progress with their supervisor(s) regularly and submit a progress report at the end of the term. For student who will not be enrolled in BCHE4903, a final report in the form of a manuscript and an oral presentation are assessed at the end of term for performance.

Learning Outcome
Students taken this course are expected to develop the following abilities:
1. Integrate the knowledge and skills learnt previously in other courses
2. Survey scientific literature relevant to their research project
3. Read scientific literature critically to identify the scientific questions or problems
4. Design independent research project to address the scientific questions
5. Acquire hands-on research techniques in conducting experiments
6. Develop problem-solving abilities
7. Develop data analysis and interpretation skills in logical and scientific ways
8. Improve skills in scientific writing and oral presentation
9. Develop a sense of responsibility and term spirit

Course Syllabus
The students should continue to work on the research project from BCHE4901. Students should discuss the progress with their supervisors and submit a progress report in the term end. If the students will not continue to work on the research project in BCHE4903, they should submit a final report in the form of manuscript and present orally in the term end.

Assessment Scheme

Essays	40%
Other	60%

Required and Recommended Readings
Relevant reference materials will be provided by the supervisor.

Enrollment Requirements
Pre-requisite: BCHE3090

BCHE4903 Senior Experimental Project III (2016-17)

Course Description
In this course, students continue to work on and finish up the research project from BCHE4902. Relevant data analysis and conclusion formulation are performed after discussion with supervisors. A final report in the form of a manuscript and an oral presentation are assessed at the end of term for performance.

Learning Outcome
Students taken this course are expected to develop the following abilities:
1. Integrate the knowledge and skills learnt previously in other courses
2. Survey scientific literature relevant to their research project
3. Read scientific literature critically to identify the scientific questions or problems
4. Design independent research project to address the scientific questions
5. Acquire hands-on research techniques in conducting experiments
6. Develop problem-solving abilities
7. Develop data analysis and interpretation skills in a logical and scientific ways
8. Improve skills in scientific writing and oral presentation
9. Develop a sense of responsibility and term spirit

Course Syllabus
The students should continue to work on the research project from BCHE4902. Students should discuss the progress with their supervisors and submit a final report in the form of manuscript and present orally in the term end.

Assessment Scheme

Essays	40%
Presentation	40%
Other	20%

Required and Recommended Readings
Relevant reference materials will be provided by the supervisor.

Enrollment Requirements
Pre-requisite(s): BCHE3090 & BCHE4902.

- **End –**

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