香港中文大學
The Chinese University of Hong Kong

2021-22

Programmes of the School of Life Sciences

生命科學學院課程

- Biochemistry
- Biology
- Cell & Molecular Biology
- Environmental Science
- Food and Nutritional Sciences
- Molecular Biotechnology

香港中文大學理學院
FACULTY OF SCIENCE
THE CHINESE UNIVERSITY OF HONG KONG

Table of Contents

Message from the Director

The School of Life Sciences was established in 2010 under the Faculty of Science by merging the Departments of Biochemistry and Biology, which are among the oldest departments in CUHK. Our School offers six major programmes: Biochemistry, Biology, Cell & Molecular Biology, Environmental Science, Food & Nutritional Science, and Molecular Biotechnology, which have trained over 8800 alumni over the years. Our curriculum is designed to meet the diverse interests of life science students. The students will receive training in fundamental knowledge in life sciences in their junior years, before they specialize into one of the six programmes in their senior years.

In addition to quality teaching, we also strive for excellence in research. For example, three research projects “Plant and Agricultural Biotechnology”, “Centre for Organelle Biogenesis and Function” and “Center for Genomic Studies on Plant-Environment Interaction for Sustainable Agriculture and Food Security” led by our school have been selected by the University Grants Committee as one of the Areas-of-Excellence in Hong Kong. We believe that the best way to train future generation of scientists is to inspire the students and give them the opportunities to take part in cutting-edge research themselves. To this end, we have the SMART (young Scientist Mentorship And Research Training) and DREAM (Dedicated Research Exchange And Mentorship) programs to allow motivated students to engage in research in local and overseas laboratories. To equip our students with a global perspective and enhance their learning experience in a world-renowned university, we have introduced a Berkeley Biosciences Study Abroad (BBSA) Programme, which enables our students to spend a semester in UC Berkeley.

If you are interested in the science of living organisms - from the structure and function of DNA and proteins to the interactions among living organisms in an ecosystem; from preparing a career in environmental protection, food technologists, or nutritionists to research and development of biotechnological products - you will find our diverse courses and flexible curriculum fit your interests.

– Professor Wong Kam-Bo

Establishment of the School of Life Sciences

Year	Event
1963	Established Department of Biology
1971	Established Department of Biochemistry
1994	Established Environmental Science Programme, jointly by Departments of Biochemistry, Biology, and Chemistry
	Established Food & Nutritional Sciences Programme, jointly by Departments of Biochemistry and Biology
1998	Established Molecular Biotechnology Programme, jointly by Departments of Biochemistry and Biology
2008	Established Cell & Molecular Biology Programme
2009	Launched Life Sciences Broad-based Admission Scheme
2010	Established the School of Life Sciences

Why SLS at CUHK?

High diversity in life sciences

The School provides highly diverse and sophisticated courses in life sciences. Study topics cover from biomolecules to ecology. And the flexible curriculum offered by the School also fits the needs of individual students.

World class education

The extraordinary reputation of our programmes and the excellent quality in education are commended and affirmed by the Quality Assurance Council of the Hong Kong University Grants Committee (UGC).

Excellent research

The School has a marvelous team of teachers who are field-pioneers and outstanding researchers. For instance, our plant biotechnology research is an Area of Excellence, with the establishment of the State-key laboratory of Agrobiotechnology. With a variety of the state-of-the-art equipment and our excellent research personnel, we ensure that our research shall continue to prosper.

Ample opportunities

We provide incomparable undergraduate research opportunities, for instance DREAM and SMART programmes, and these chances are something difficult to find in other institutes. Students will also find numerous exchange and internship opportunities that the learning experience will not be confined to the textbooks and classrooms. A newly introduced Berkeley Biosciences Study Abroad (BBSA) Programme enables selected students to study in UC Berkeley for a term with subsidies. In addition, plentiful of other activities also help to develop the all-round competence. Numerous scholarships are provided to outstanding students throughout the studies.

High internationalization

Our programmes attract local and overseas students. This enables students to appreciate different cultures, hone language skills and grow as confident individuals.

Outstanding career prospects

According to the recent career survey of our graduates, the distribution of the work type of the respondents is as follows: 45% in scientific/research work and medical & health service; 10% in administration/management; 15% in business/commerce; 6% each in environmental science, media and teaching, the rest in hotel/tourism, disciplined service, construction/architecture, human resource/training and logistics/shipping, etc.

High Diversity in Life Sciences

The School of Life Sciences offers six programmes that focus on the study of an extensive range of topics in all aspects of life sciences.

In total, we provide over 130 courses at the undergraduate level for our students. In addition to the lecture courses, more than 40% of the courses the School offers are laboratories courses, workshops, student-oriented teaching courses, independent study modules, and supervised research courses. This wide variety of course format and course content facilitates the establishment of the solid knowledge foundation in life sciences, and fosters the development of students' all-round competence.

Course List for 4-year Cohort (2021-22)

Life Sciences

Course Code	Course Title	Unit(s)
LSCI1000	Biochemistry of Health and Disease	3
LSCI1001	Basic Concepts in Biological Sciences	3
LSCI1002	Introduction to Biological Sciences	3
LSCI1003	Life Sciences for Engineers	3
LSCI1012	Introduction to Life Forms in the Biosphere	3
LSCI2002	Basic Laboratory Techniques in Life Sciences	2
LSCI2003	Scientific Conduct and Ethics	2
LSCI2005	Junior Summer Project	3
LSCI3000	Synthetic Biology Workshop	2
LSCI4000	Literature Research	3
LSCI4911, 4912, 4913	Group Research in Life Sciences I, II, III	2@

Biochemistry

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

Biology

Course Code	Course Title	Unit(s)
BIOL2120	Cell Biology	3
BIOL2210	Ecology	3
BIOL2213	Ecology Laboratory	1
BIOL2313	Genetics Laboratory	1
BIOL2410	General Genetics	2
BIOL2420	Population Genetics	1
BIOL3012	Biodiversity Laboratory I	2
BIOL3022	Biodiversity Laboratory II	2
BIOL3310	Human Biology	3
BIOL3410	General Microbiology	3
BIOL3413	Microbiology Laboratory	1
BIOL3420	Advanced Genetics and Epigenetics	3
BIOL3530	Plant Physiology	3
BIOL3560	Biology of Fungi and Non-Vascular Plants	2
BIOL3570	Biology of Vascular Plants	2
BIOL3610	Invertebrate Form and Function	2
BIOL3620	Vertebrate Life	2
BIOL3630	Animal Physiology	3
BIOL3710	Marine Biology	3
BIOL4010	Evolutionary Biology	3
BIOL4012	Field and Environmental Biology	2
BIOL4032	Physiological Investigations	2
BIOL4120	Developmental Biology	3
BIOL4220	Environmental Biotechnology	3
BIOL4230	Global Change Biology	3
BIOL4260	Conservation Biology	3
BIOL4310	Human Genetics	3
BIOL4420	Marine Microbial Ecology	2
BIOL4510	Hong Kong Flora and Vegetation	3
BIOL4520	Plant Metabolism and Metabolic Engineering	2
BIOL4901	Senior Experimental Project I	2
BIOL4902	Senior Experimental Project II	2
BIOL4903	Senior Experimental Project III	2
BIOL4906	Internship	2
BIOL4907	Field Study	2

Cell and Molecular Biology

Course Code	Course Title	Unit(s)
CMBI2200	Literature survey in CMB and Scientific Communication	2
CMBI2500	Research Internship	2
CMBI3010	CMB Laboratory I	3
CMBI3020	CMB Laboratory II	3
CMBI3030	CMB Laboratory III	1
CMBI3040	CMB Laboratory IV	1
CMBI3100	Methodology of Critical Thinking in CMB	2
CMBI3101	Biology of Model Organisms for CMB Research	3
CMBI3200	Proposal Formulation and Creative Scientific Writing in CMB	2
CMBI4001	Protein Trafficking	1
CMBI4002	Protein Folding	1
CMBI4003	Signal Transduction	1
CMBI4101	Cancer Cell Biology	1
CMBI4102	Stem Cell Biology	1
CMBI4103	Neuronal Cell Biology	1
CMBI4201	Genomics and Transcriptomics	1
CMBI4202	Proteomics	1
CMBI4203	Metabolomics	1
CMBI4301	Current Topics in Cell Biology	1
CMBI4302	Current Topics in Molecular Biology	1
CMBI4303	Current Topics in Biotechniques	1
CMBI4901	Senior Experimental Project I	2
CMBI4902	Senior Experimental Project II	2
CMBI4903	Senior Experimental Project III	2

Enviromental Science

Course Code	Course Title	Unit(s)
ENSC2270	Introduction to Environmental Science	3
ENSC2515	Environmental Chemistry	3
ENSC2517	Environmental Chemistry Laboratory	2
ENSC3230	Principles of Environmental Protection and Pollution Control	3
ENSC3415	Environmental Instrumentation Techniques	3
ENSC3417	Environmental Instrumentation Techniques Laboratory	2
ENSC3520	Environmental and Biochemical Toxicology	3
ENSC3820	Environmental and Biochemical Toxicology Laboratory	2
ENSC4210	Environmental Pollution and Toxicology	3
ENSC4240	Environmental Impact Assessment	3
ENSC4242	Environmental Impact Assessment Laboratory	2
ENSC4250	Environmental Health	3
ENSC4310	Methods in Toxicological Research	3
ENSC4510	Methods in Toxicological Research Laboratory	2
ENSC4525	Advanced Environmental Chemistry	3
ENSC4535	Chemical Treatment Processes	3
ENSC4901	Senior Experimental Project I	2
ENSC4902	Senior Experimental Project II	2
ENSC4903	Senior Experimental Project III	2
ENSC4906	Internship	2
ENSC4907	Field Study	2

Food and Nutritional Sciences

Course Code	Course Title	Unit(s)
FNSC2001	Introduction to Food Sci & Technology	2
FNSC2002	Nutrition for Health	2
FNSC2005	Ethics and Professionalism for Nutritionists	1
FNSC3001	Food Sci Lab I	2
FNSC3002	Nutritional Sci Lab I	2
FNSC3010	Nutrition and Human Development	3
FNSC3030	Nutritional Biochemistry	3
FNSC3110	Food Chemistry and Analysis	3
FNSC3180	Food Microbiology	3
FNSC4001	Food Sci Lab II	2
FNSC4002	Nutritional Sci Lab II	2
FNSC4101	Human Physiology for Nutrition Studies I	3
FNSC4102	Human Physiology for Nutrition Studies II	3
FNSC4110	Food Technology	3
FNSC4120	Community Nutrition	3
FNSC4150	Introduction to Medical Nutrition Therapy	3
FNSC4160	Nutrition Planning and Food Policy	3
FNSC4170	Food Product Development and Quality Control	3
FNSC4901	Senior Experimental Project I	2
FNSC4902	Senior Experimental Project II	2
FNSC4903	Senior Experimental Project III	2
FNSC4906	Internship	2
FNSC4907	Nutrition Practicum	2
FNSC5430	Food Toxicology and Safety	3

Molecular Biotechnology

Course Code	Course Title	Unit(s)
MBTE2000	Introduction to Molecular Biotechnology	2
MBTE2010	Diversity of Life: Applications and Sustainability	2
MBTE3000	Business and Social Aspects of Biotechnology	3
MBTE3510	Medical Biotechnology	2
MBTE4033	Methods in Molecular Biotechnology Laboratory I	2
MBTE4034	Methods in Molecular Biotechnology Laboratory II	2
MBTE4320	Genetic Engineering	3
MBTE4510	Plant Biotechnology	3
MBTE4520	Animal Biotechnology	3
MBTE4530	Microbial Biotechnology	3
MBTE4901	Senior Experimental Project I	2
MBTE4902	Senior Experimental Project II	2
MBTE4903	Senior Experimental Project III	2
MBTE4906	Internship	2

Study Scheme

Starting from 2012, students who wish to choose Biochemistry, Biology, Cell & Molecular Biology, Environmental Science, Food & Nutritional Sciences, and Molecular Biotechnology as their majors are first necessary to enroll in the Science Programme (JS4601). Then, they begin their first phase of study, which comprises the first 3 terms, to strengthen the basic knowledge in general science. In Term 1 and Term 2, students are recommended to finish the Faculty Package which secures a wide exposure to related disciplines. This Package includes 2 introductory courses in life science and chemistry, plus 1 elective course in physics, mathematics or statistics. Afterward, in Term 3, 3 courses on the fundamentals of biochemistry and biology are compulsory to students. These courses well serve as the solid foundations for the subsequent specialized major studies in life science.

General Study Scheme for entrants from 3-3-4 curricular system

Term 1 Term 2 Term 3	**Build up fundamental knowledge** *with Faculty Package in Terms 1 and 2* LSCI1002* + CHEM1280 or CHEM1070 + one course from Maths, Physics, Statistics. *with foundation courses in life sciences in Term 3:* LSCI2002 + BIOL2120 + BCHE2030
Term 4	**Confirm your interest** *Select preferred courses from a list of 16 offered by all 6 programmes* BCHE2000 BCHE3050 BCHE3070 BCHE3650 BIOL2210 BIOL2213 BIOL2313 BIOL2410 BIOL2420 CMBI2200 ENSC2270 FNSC2001, 2002 FNSC3180 MBTE2000 MBTE2010
Term 5 Term 6 Term 7 Term 8	**Foster to be a specialist** *Engage in the advanced and specialized study posed by your Major program*

** Students who do not have high school Biology should take LSCI1001 prior to LSCI1002.*

The next phase of the undergraduate study helps to understand in more detail of the 6 major programmes in the School of Life Sciences. In Term 4, students can choose classes from 15 different courses offered by our programmes. To avoid possible overloading, students are recommended not to take more than 13 units of major courses. Nonetheless, this limitation can already accommodate the requirements of up to 3 majors to acquire their preliminary savors. Through this flexible course-selecting scheme, students can comprehend their specific interests in the diverse fields in life sciences and formulate their best fitting choice for the majors.

Course code	Unit	BCHE	BIOL	CMBI	ENSC	FNSC	MBTE
BCHE2000	2	✓					
BCHE3050	2	✓		✓			
BCHE3070	1	✓		✓			
BCHE3650	2	✓					
BIOL2210	3		✓		✓		
BIOL2213	1		✓		✓		
BIOL2313	1	✓	✓	✓			✓
BIOL2410	2	✓	✓	✓		✓	✓
BIOL2420	1		✓				
CMBI2200	2			✓			
ENSC2270	3				✓		
FNSC2001	2					✓	
FNSC2002	2					✓	
FNSC3180	3					✓	
MBTE2000	2						✓
MBTE2010	2						✓

[a] choose only ONE laboratory course from BIOL2213, BIOL2313 or BIOL3413 (offered in the second year) for the major requirement of BIO.

Examples of course patterns for the Exploration phase

■ Example 1:

Alan can never resist the temptation from food. Starting from several years ago, the issues of malachite green and nitrofuran residues found in freshwater fish, Sudan dyes in eggs as well as melamine in dairy products had aroused his awareness in the science of food safety. Hence, he decides to major in FNSC.

■ Example 2:

Jackson enjoys nature and outdoor activities. Whenever he has a chance, he would go camping or diving with his friends. However, it frustrates him a lot lately as he can hardly find a nice local place for the activities due to pollution or urbanization. He wonders if he can contribute something to preserve our planet. Therefore, he wants to focus on the study of biodiversity and environmental science.

■ Example 3:

Jenny is interested in the study of DNA and proteins, and wishes to find out more about BCHE, CMBI, and MBTE before she makes a final decision on her major.

Suggested course pattern in second term for:

Example 1: Alan

Course	*Unit*
BIOL2410	2
FNSC2002	2
FNSC3180	3
1 major elective	3
	Total: 10

Example 2: Jackson

Course	*Unit*
BIOL2210	3
BIOL2213	1
BIOL2410	2
BIOL2420	1
ENSC2270	3
	Total: 10

Example 3: Jenny

Course	*Unit*
BCHE2000	2
BIOL2410	2
BIOL2313	1
CMBI2200	2
MBTE2000	2
	Total: 9

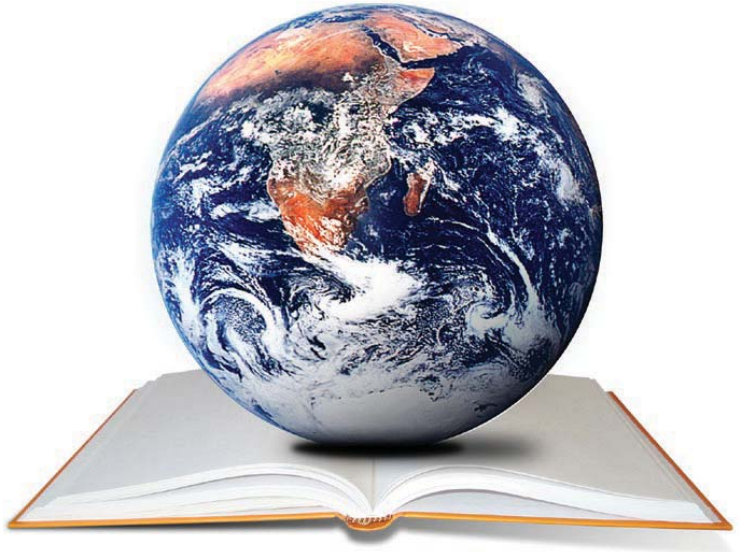
After the second phase of study, students should finalize their decisions on major selection according to their interests. There are 3 occasions on which students can declare their major: after admission, by the end of the first year and by the end of the second year of study. Depending on the pre-defined academic achievements, students can declare their major on any one of the 3 occasions within the first 2 years of study.

Declaration occasion	After admission	End of Year 1	End of Year 2
Condition	*Level 5 or above in HKDSE of*	*C+ or above in*	*Taken (NOT necessarily ALL PASSED)*
	Biology OR Chemistry OR Combined Science (with Biology or Chemistry component) OR Integrated Science OR Technology and Living* (Food Science and Technology Strand only)	LSCI1002	LSCI1002, LSCI2002, BCHE2030 AND BIOL2120

** Apply to FNSC only*

After major declaration, in the final phase which is basically the last 4 terms, students take courses to fulfill the study requirement posed by the specific major to graduate.

World Class Education



The Hong Kong University Grants Committee (UGC) stated that the University *'provides high quality student learning experience that reflects its mission and role statement, underpinned by good quality assurance systems'.*

This merit, of course, is not the only affirmation. Hong Kong Economic Journal Monthly ranked CUHK to be the top among the other UGC-funded universities. The six major criteria included the percentage of PhD holders for academic staff, JUPAS admission results, teaching qualities, financial resources, quality of graduates, and research performance.

Indeed, the faculty members from the School of Life Sciences have been recognized to be commendable that over the last few years, our teachers have been receiving various teaching awards.

Vice Chancellor's Exemplary Teaching Award

Year	Awardees
2002	Professor Lee Sau-Tuen Susanna
2003	Professor Ge Wei
2007	Professor Ge Wei
2008	Professor Leung Kwok-Nam
2012	Professor Kong Siu-Kai
2018	Dr. Apple PY Chui

Exemplary Teaching Award in General Education

Year	Awardees
2012	Dr. Chiu Chi-Ming Lawrence
2018	Dr. Apple Pui-Yi Chui

Teachers in the School of Life Sciences

Director

Wong Kam-Bo, PhD (Cantab)
Director, School of Life Sciences
Email: kbwong@cuhk.edu.hk

Research Interests:
1. Structure-function studies of proteins
2. Structure-determination of proteins by NMR spectroscopy and X-ray crystallography
3. Protein engineering and design
4. Simulation and modeling of proteins

Professors

Au Wing-Ngor Shannon, PhD (HK)
Email: shannon-au@cuhk.edu.hk

Research Interests:
1. Protein post-translational modification
2. Macromolecular assembly

Chan Ho-Yin Edwin, PhD (Cantab)
Associate Director, Biochemistry Programme
Email: hyechan@cuhk.edu.hk

Research Interests:
1. Cellular, genetic and biochemical analyses of RNA and protein toxicity in neurological diseases
2. Human disease modelling

Professors

Chan Michael Kenneth, PhD (UC Berkeley)
Email: michaelkchan88@cuhk.edu.hk

Research Interests:
1. Protein crystallography
2. Chemical biology

Chen Zhen-Yu, PhD (Mass.)
Division Head, Research Postgraduate Programmes
Email: zhenyuchen@cuhk.edu.hk

Research Interests:
1. Cholesterol metabolism and heart diseases
2. Antioxidants and free radicals
3. Fatty acids and health

Cheung Chi-Keung Peter, PhD (NSW)
Associate Director, Food and Nutritional Sciences Programme
Email: petercheung@cuhk.edu.hk

Research Interests:
1. Structure-function of cell wall polysaccharides
2. Bioactive substances from mushroom and edible fungi
3. Chemical properties and biological functions of dietary fiber and prebiotics
4. Functional foods and nutraceuticals

Fong Wing-Ping, PhD (CUHK)
Email: wpfong@cuhk.edu.hk

Research Interests:
Anti-cancer activities of novel photosensitizers

Jiang Liwen, PhD (S. Fraser)
Director, Cell and Molecular Biology Programme
Director, Centre for Cell and Developmental Biology
Email: ljiang@cuhk.edu.hk

Research Interests:
1. Cell and molecular biology
2. Protein targeting and trafficking
3. Plant endocytosis and exocytosis
4. Organelle dynamics and biogenesis
5. Plant biotechnology

Lam Hon-Ming, PhD (Northwestern)
Director, Molecular Biotechnology Programme
Email: honming@cuhk.edu.hk

Research Interests:
1. Genomic study of soybean
2. Identification and characterization of functional genes to improve abiotic stress tolerance and disease resistance in plants;
3. Manipulation of nitrogen sink-source relationship in plants

Lee Shing-Yip, Joe, PhD (HKU)
Director, Environmental Science Programme
Director, F.S. Li Marine Science Laboratory
Email: joesylee@cuhk.edu.hk

Research Interests:
1. Ecology and biogeochemistry of estuarine wetlands
2. Application of stable isotopes in marine environmental research
3. Marine ecosystem dynamics, rehabilitation and Restoration

Shaw Pang-Chui, PhD (Lond.)
Director, Biochemistry Programme
Director, Centre for Protein Science and Crystallography
Email: pcshaw@cuhk.edu.hk

Research Interests:
1. Structure-function studies of proteins
2. Authentication and quality control of Chinese medicinal material

Associate Professors

Chan Ting-Fung Philos, PhD (Wash.)
Email: tf.chan@cuhk.edu.hk

Research Interests:
1. RNomics and bioinformatics in biological processes and diseases
2. Technology and algorithm development for genomics and transcriptomics

Chung Hau-Yin, PhD (Louisiana State)
Email: anthonychung@cuhk.edu.hk

Research Interests:
1. Food flavor chemistry, analysis and application
2. Natural product, safety, health and application
3. Food evaluation and food product development
4. Soy-based fermented food and seafood

Guo Dian-Jing Diane,
DS (Chinese Acad. of Sc.)
Email: djguo@cuhk.edu.hk

Research Interests:
1. Genomics and bioinformatics
2. Systems biology
3. Plant stress response
4. Plant secondary metabolism and trichome function

He Jun-Xian, DS (Lanzhou)
Email: jxhe@cuhk.edu.hk

Research Interests:
1. Plant development and signal transduction
2. Functional genomics and signaling mechanisms of plant stress resistance
3. Improvement of crop yield and quality using molecular biotechnologies

Hui Ho-Lam Jerome, DPhil (Oxon)
Director, Biology Programme
Email: jeromehui@cuhk.edu.hk

Research Interests:
1. Insect and arthropod biology, cnidarians, invertebrates, insect-plant interaction
2. Marine biotechnology, molecular ecology and conservation of biodiversity
3. Evolutionary biology, genomics

Kang, Byung-ho, PhD (Wisconsin-Madison)
Email: bkang@cuhk.edu.hk

Research Interests:
1. Plant cell biology
2. 3D electron microscopy

Kwan Kin-Ming, PhD (HKU)
Associate Director, Cell and Molecular Biology Programme
Email: kmkwan@cuhk.edu.hk

Research Interests:
1. Genetic manipulation by transgenic and gene knockout technology
2. Study of organogenesis an tumorigensis
3. Mammalian neural development
4. Stem cell research

Lau Kwok-Fai, PhD (CUHK)
Email: kflau@cuhk.edu.hk

Research Interests:
1. Molecular neuroscience
2. Molecular pathogenesis of neurodegeneration

Associate Professors

Luo Haiwei, PhD (South Carolina)
Email: haiweiluo@cuhk.edu.hk

Research Interests:
1. Molecular evolution of marine bacteria and archaea
2. Microbial genomics
3. Ecological and evolutionary bioinformatics

Ngai Sai-Ming, PhD (Alta.)
Associate Director,
Molecular Biotechnology Programme
Email: smngai@cuhk.edu.hk

Research Interests:
1. Bioinformatics and proteomics
2. Protein/peptide structural and functional studies
3. Research and development on modern Chinese medicine

Ngo Chi-Ki Jacky, PhD (UC San Diego)
Email: jackyngo@cuhk.edu.hk

Research Interests:
1. Structure-function studies of pre-mRNA splicing factors
2. The roles of splicing kinases in cancers and viral infections
3. Structure-based drug discovery

Tsang Suk-Ying, PhD (CUHK)
Director, Food & Nutritional Sciences Programme
Email: fayetsang@cuhk.edu.hk

Research Interests:
1. Stem cell biology
2. Derivatives of human embryonic stem cells for therapeutic purposes
3. Ion channels and cardiovascular physiology

Tsui Tsz Ki, Martin, PhD (Minnesota)
Email: mtktsui@cuhk.edu.hk

Research Interests:
1. Environmental pollution
2. Ecosystem biogeochemistry
3. Stable isotope applications

Zhong Silin Steven, PhD (Nottingham)
Email: silin.zhong@cuhk.edu.hk

Research Interests:
1. Genetics and epi-genetics in plant development
2. The roles of transcription factor in hormone signaling
3. Sequencing technology and computational biology

Assistant Professors

Chow Hei Man Kim, PhD (HKU)
Email : heimanchow@cuhk,edu.hk

Research Interests:
1. Metabolic plasticity and neurodegenerative disorders
2. Mitochondrial bioenergetics
3. Aging and cellular senescence

Falkenberg, Laura, PhD (Adelaide)
Email : laurafalkenberg@cuhk.edu.hk

Research Interests:
1. Global change biology – particularly ocean acidification and warming
2. Marine ecosystem dynamics, shifts, and resistance/resilience
3. Herbivore-autotroph ecophysiology, behaviour, and interactions
4. Socio-economic consequences of environmental change

Lau Chun Yu Wilson, PhD (Toronto)
Email: wcylau@cuhk.edu.hk

Research Interests:
1. Structural biology
2. Single particle cryo-electron microscopy
3. Structure-function studies of macromolecular assemblies and membrane proteins

Benoit Thibodeau, PhD (Quebec)
Email: benoit.thibodeau@cuhk.edu.hk

Research Interests:
1. Ocean Biogeochemical Dynamics
2. Stable Isotope Geochemistry
3. Anthropogenic impacts
4. Paleoceanography & paleoclimate

Tsang Ling-Ming, PhD (CUHK)
Associate Director, Biology Programme
Email: lmtsang@cuhk.edu.hk

Research Interests:
1. Biogeography and conservation genetic
2. Evolution and phylogeny of crustaceans
3. Molecular ecology of marine animals

Wong Wing-Tak, Jack, PhD (CUHK)
Email: jack_wong@cuhk.edu.hk

Research Interests:
1. Vascular and metabolic biology
2. Stem cell biology
3. Cardiovascular regeneration

Xu Chunliang, PhD (CAS)
Email: chunliang.xu@cuhk.edu.hk

Research Interests:
1. Gut microbiota
2. Hematopoietic stem cells
3. Stem cell niche
4. Psychological stress
5. Neuroimmunology
6. Aging

Zhuang Xiaohong, PhD (CUHK)
Email: xhzhuang@cuhk.edu.hk

Research Interests:
1. Autophagy and autophagosome formation in plants and green algae
2. Signaling mechanisms of selective autophagy in plant stress resistance
3. Lipid metabolism and membrane dynamics

Research Assistant Professor

Chui Pui Yi, Apple, PhD (CUHK)
Email: applepychui@cuhk.edu.hk

Research Interests:
1. Reproductive and larval ecology of corals
2. Coral recruitment dynamics
3. Reef restoration using sexually research corals

Senior Lecturer

Chiu Chi-Ming Lawrence, PhD (HKU)
Email: chimingchiu@cuhk.edu.hk

Research Interests:
1. Cell signaling in apoptosis
2. Cancer chemoprevention and chemotherapy with natural products targeting the molecular pathways in carcinogenesis
3. Applications of flow cytometry

Excellent Research

Lecturer

Chow Cheung-Ming Cherry, PhD (Oxford)
Email: cmchow@cuhk.edu.hk

Research Interests:
1. Plant cell biology
2. Membrane trafficking
3. Nitrogen metabolism in plants

Li Yuk Man Charis, PhD (CUHK)
Email: charisli@cuhk.edu.hk

Research Interests:
1. Fat and cholesterol metabolism
2. Anti-aging and nutraceutical
3. Food Toxicology

Law Man Suet Michelle, PhD (CUHK)
Email: michellelaw@cuhk.edu.hk

Research Interests:
1. Earthworm Ecology and Biodiversity
2. Soil Biogeochemistry and Ecosystem Functioning
3. Sustainability and Environmental Resource Management

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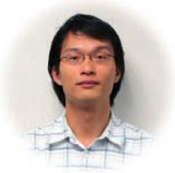

Research Interests:
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2. Cancer research
3. Natural product research
4. Life science research and education method ologies

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2. Immune defense against viruses
3. Commensal bacteria and mucosal immunity

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2. Cell signaling and gene regulation

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Research Interests:
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2. Endocrinology
3. Popular science promotion
4. Learning and teaching methodologies

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Research Interests:
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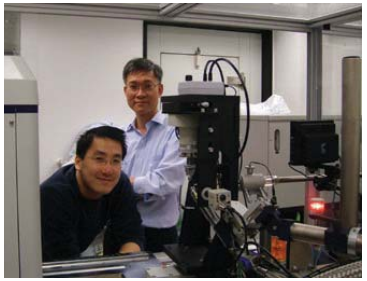
2. Food processing technology
3. Food product development
4. Molecular marker for food authentication

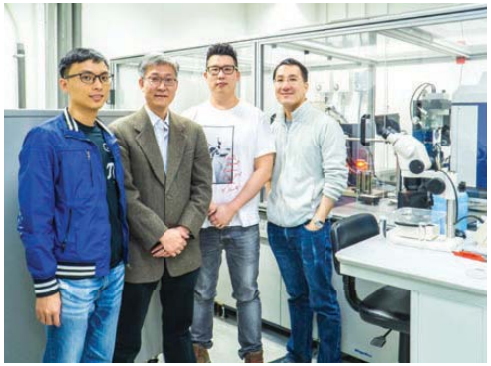
How Helicobacter pylori uses a toxic substance to keep alive in human stomach

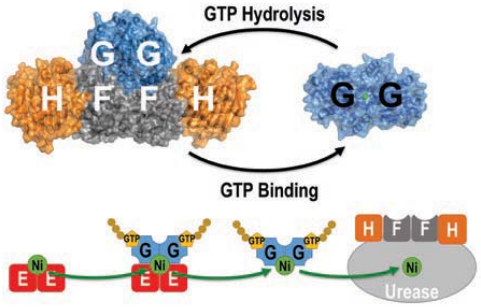


Prof. Kam-Bo Wong's research group at the School of Life Sciences uncovered how *Helicobacter pylori (H. pylori)* solves the problem of delivering a toxic metal, nickel, to the active site of urease, an enzyme essential for the infection of the pathogen in acidic human stomach.

H. pylori, which infects half of the human population and causes peptic ulcers and stomach cancer worldwide, is the only pathogen that can survive the gastric acidity in the human stomach. This is because *H. pylori* produces urease, a neutralising agent that breaks down urea into ammonia, which helps neutralise the acid. However, there is one problem for the bacterium which is that urease requires nickel ions to function - free nickel ions are toxic. *H. pylori* must find a way to deliver the nickel ions to the urease, without releasing the toxic metal ions inside the cells.

In *H. pylori*, the delivery of nickel ions for urease activation is assisted by four helper proteins, UreE, UreF, UreG and UreH. Prof. Wong and his team used X-ray crystallography as a molecular microscope to visualise how these helper proteins work together to deliver the nickel ions to the urease. They showed that the ability of UreG to change its molecular shape is essential for nickel delivery. Upon binding or hydrolysis of guanosine triphosphate (GTP), UreG can change its molecular shape, which determines its protein-interacting partners; UreG interacts with UreE when GTP is bound, but binds UreF/UreH after GTP hydrolysis. This process allows the nickel ions to pass from UreE to UreG, and finally to the urease through protein-protein interactions so that the toxic nickel ions have no chance to escape inside the cells where they can create havoc. Since the survival of *H. pylori* depends on the production of active urease, this discovery helps the future development of novel drugs against *H. pylori* infection.





Innovative Platform for Food Authentication

Supermarkets mislabeled oilfish filet as codfish filet. Stores claimed whelk pieces as abalone slides. 'Fraudulent substitutions' is hot in the city. They damage the confidence of both locals and tourists in food products in Hong Kong.

The Innovative and Technology Commission of the Hong Kong Government funded a HK$3 million project 'First-Stage Development of Platform for Authentication of Dried Seafood and Tonic Food Products'. The leader of the project is Professor Kwan Hoi Shan, Director of the Food Research Centre at CUHK. The project aims to develop a database and platform with morphological data and DNA sequences of common dried seafood and tonic food products in Hong Kong. This platform enables the government, local industry, and testing laboratories to monitor food products with DNA sequence markers. The second target of the project is to develop a rapid DNA-based diagnostic kit for species authentication. Laboratories can quickly distinguish genuine products from the fake ones with the database and the kit.

With these efficient quality assurance controls, mislabeling and fraudulent substitution in the local markets can be controlled. The project will contribute to food safety and enhance the reputation of the local food market.

Professor Kwan received a Bronze Bauhinia Star (BBS) of 2012 for his meritorious public and community service, particularly his contribution to promoting food safety and quality assurance.

The Story Inside and Behind The Soybean Genome

Global Agriculture is facing growing challenges including limitation in freshwater resources, topsoil depletion, as well as extreme temperatures brought upon by climate change. Sustainable agriculture is now among the top national priorities of developing countries, to bolster food security, economy, and environmental sustainability.

Among all crops, soybean is the third most important cash crop in the international trade market. It is the No. 1 source of vegetable protein, the leading source of edible oils as well as a source of biodiesel. In addition, its high symbiotic nitrogen fixing capacity is environmentally important as its cultivation can naturally replenish soil nutrients. Despite all its benefits, soybean's great potential in promoting sustainable agriculture is still undervalued and awaiting to be unveiled.

Prof. Lam Hon-Ming, Director of the Partner State Key Laboratory of Agrobiotechnology, The Chinese University of Hong Kong (PSKLA), has been working on the identification of stress tolerance genes in soybean for almost 20 years. In 2010, Prof. Lam published a cover article in the renowned scientific journal Nature Genetics, reporting the decoding of 31 wild and cultivated soybean genomes that revealed a much higher biodiversity in wild soybeans. In 2014, his team has successfully identified and cloned a major salt tolerance gene from wild soybeans. This finding was published in Nature Communications, a multi-disciplinary scientific journal ranked just after Nature and Science. This is a milestone in the mass production of high quality salt tolerant soybeans, a stage reached which will eventually benefit agriculture worldwide.

Prof. Lam has also been working with soybean breeders in China to produce salinity and drought tolerant soybeans that can be grown on saline and/ or arid lands, via non-GM methods. In 2016, two new stress tolerant soybean cultivars gained provincial approval in China, and were cultivated in arid regions to restore arable land and help the local farmers. In the same year, he jointly published a perspective article to Nature Plants, together with other members of the World University Network (WUN).

Using the WUN platform, Prof. Lam organized an international legume symposium in 2017, hosting more than a hundred legume scientists from the six Continents, establishing extensive collaboration networks for academic exchange and collaboration projects.

In 2017, Prof. Lam leading a team of plant and agricultural researchers, has been awarded funding in excess of HKD81 million over 8 years from the Area of Excellence (AoE) Scheme under the Research Grants Council (RGC), with their vision to develop new plant and agricultural technology to strike for a better balance between food security and agricultural sustainability.

Major Progress Made in Plant Autophagy Research by CUHK Researchers Published in PNAS

A team of researchers at The Chinese University of Hong Kong (CUHK) led by Professor JIANG Liwen, Choh-Ming Li Professor of Life Sciences, has recently made a major breakthrough in revealing the membrane origin of autophagosome in plants, providing new insight into improving crop quality. The results have been published in Proceedings of the National Academy of Sciences (PNAS).

A research team led by Prof. Liwen Jiang of School of Life Sciences sheds new light on the essential role of ATG9 in plant autophagosome membrane initiation.
From Left: Prof. Byung-Ho KANG; Mr. Kin Pan CHUNG; Dr. Xiaohong ZHUANG; Prof. Liwen JIANG and Dr. Yong CUI.

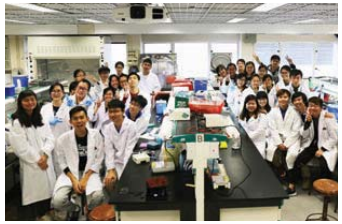
Autophagy is a conserved degradation process in eukaryotic cells to eliminate intracellular components during stress conditions and pathogen infection. Professor Jiang's research team has been working on the underlying mechanisms of protein transport and organelle biogenesis in plant cells for more than 16 years at CUHK, and has been internationally recognized as a leading group in the field of plant cell biology. In the recent study published as a PNAS Plus paper, his research team utilized a combination of in vivo real-time imaging, 3D tomographic reconstruction, and genetic approaches, uncovered a unique role of ATG9 in meditating autophagosome progression from the endoplasmic reticulum (ER). His research team has addressed a fundamental question on " where is the membrane origin of the autophagosome" which puzzling scientists in the past decades.

Professor Jiang said, 'This discovery has far reaching implications for enhancing agricultural productivity. Since ATG9 is conserved among higher eukaryotic cells, such as rice, maize and soybean, further research on the molecular mechanism of plant autophagy pathway will provide new insight into how to improve crop quality to overcome stress environment or pathogen infection, which has become a serious problem in agriculture.'

This study was mainly carried out by two postdoctoral fellows (Drs. ZHUANG Xiaohong and CUI Yong) and a Ph.D. student (Mr. CHUNG Kin Pan) in Professor Jiang's laboratory, in collaboration with Prof. Byung-ho KANG, an expert in 3D Tomography TEM analysis. The project was supported by the Areas of Excellence (AoE) Scheme and Collaborative Research Fund (CRF) of the Hong Kong Research Grants Council, as well as the AoE Centre for Organelle Biogenesis and Function, Centre for Cell and Developmental Biology, and State Key Laboratory of Agrobiotechnology (Partner Laboratory in The Chinese University of Hong Kong) of CUHK.

Graduate students and postdoctoral researchers supervised by Professor Jiang's have received many prestigious awards for their research excellence, including CUHK Young Scholars Dissertation Award (twice), Postgraduate Students Publication Award (six times), Keystone Symposium Scholarship USA (twice) and Human Frontier Science Program Long-Term Fellows (twice), as well as the Thousand Talent Plan of China (three times).

iGEM – Gold Medal Story



Synthetic biology, a rapidly emerging field that applies abstraction and other important engineering concepts to biological science, has taken the undergraduate science and engineering education by storm. The annual iGEM competition has quickly become the major event that encourages undergraduate student worldwide to spearhead in synthetic biology research.

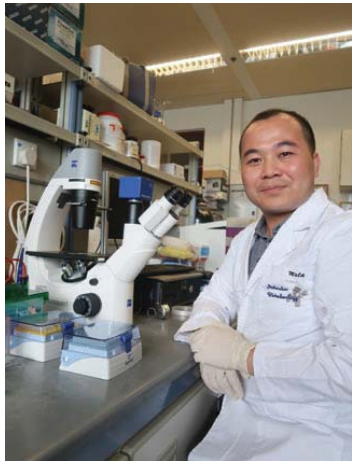
Our iGEM teams consist mainly but not limited to students from the Faculty of Science and Engineering. We work together using synthetic biology experiments to develop their "bio-bricks", the standardized DNA parts tailor-made for different specific tasks, and characterize them systemically and scientifically, we also need to explain their projects to other non-science students and recently to secondary school pupils and the general public. Since the iGEM games are international games, we are able to make contacts with their peers from universities overseas via the Internet and in the virtual competition during the iGEM Jamborees. The games also put emphasis on presentations in oral format, poster format, and the use of wiki pages.

Joining such competition could provide us with opportunities to be at the front row seat to learn the latest development of research field and new techniques outside of the classroom. Most importantly, we also learn how to work together and interact with their peers at top universities around the world. Since 2010, we have obtained 4 gold awards, 1 silver award, and obtained Best New Bio-Brick Part (Natural), Best Bio-Brick Measurement Approach, in 2011 Asia Jamboree (Table 1). Our teams have had many exposures to the general public and mass media through different channels.

Previous iGEM projects of Hong Kong_CUHK and their achievements

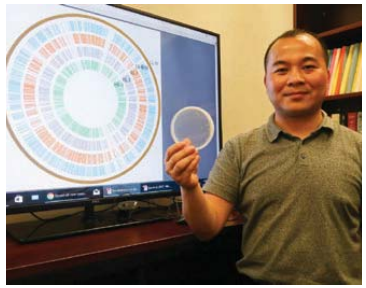
Year	*Team Name*	*Specific Project*	*Achievements*
2010	*Bioencryption*	*Using bacterial DNA to store encrypted information*	*World Jamboree Gold Medal*
2011	*ChloriColight*	*Using light-inducible halorhodopsin to transport chloride ion*	*Gold Medal, best bio-brick, best bio-brick measurement, advanced to world jamboree*
2012	*Light of No Return*	*Using light to attract bacteria to move by a light-sensitive protein linked to a signaling pathway to stimulate cell motility*	*Gold Medal, advanced to world jamboree*
2013	*Switch off PAHs*	*Using enzymes to degrade benzo-a-pyrene or other polycyclic aromatic hydrocarbons*	*Silver Medal, advanced to world jamboree*
2014	*ABCDE, AzotoBacter vinelandaii Cluster-transformable Deoxygenated protein Expression*	*Developed a protein expression system in Azotobacter with genome recombination gene transfer cluster mechanism*	*Gold Medal obtained in World Jamboree*
2015	*Magnetosome Forming Azotobacter vinelandii*	*An expression system for the biosynthesis of magnetosomes - prokaryotic intracellular organelles with magnetic properties - in Azotobacter for biotechnology applications*	*Gold Medal obtained in World Jamboree*
2017	*Dr. Switch*	*A rapid on-site method for subtyping influence A virus*	*Gold Medal obtained in World Jamboree*
2019	*2019 Team CUHK*	*Banana Savior: The X Sense*	*Gold Medal obtained in Giant Jamboree*

A New Theory for Bacterial Genome Evolution in the Ocean



A drop of seawater contains millions of bacteria, most of which are only about 0.5 microns in cell size and about 1.5 mega nucleobases in genome size. A few prominent examples include the photoautotrophs *Prochlorococcus*, which makes 20% of the chlorophyll synthesized by marine and land plants on the Earth, and the most abundant organoheterotrophs SAR11 and SAR86. Over the past decade, it has been believed that the evolutionary pattern of these tiny marine bacteria is well explained by Darwin's theory of biological evolution, which states that organisms adapt to the environment by preserving or eliminating genetic traits through natural selection. Seawater is an extremely dilute matrix where nutrients are scarce and often limit the growth of plankton. Through long-term evolution, many successful planktonic bacteria including *Prochlorococcus*, SAR11 and SAR86 lost a large number of DNA molecules. This phenomenon has been interpreted as the major way that marine bacteria take to adapt to the oligotrophic seawater, because having less DNA can save energy and material in biosynthesis and also reduce the cell volume, thereby increasing the surface-to-volume ratio allowing more efficient uptake of nutrients from seawater. Thus, scientists have generally believed that evolution toward small genomes in marine bacterioplankton is the result of Darwinian natural selection.

A recent study by Prof. Haiwei Luo and his international team has provided convincing evidence against this theory. By reconstructing the evolutionary history and calculating the evolutionary rate of different types of gene mutations in nearly 100 genomes of *Prochlorococcus*, the researchers identified an excess of the more deleterious type of gene mutations accumulated at genome-wide scale during the early evolution of *Prochlorococcus*, which coincided with the large-scale loss of DNA molecules. According to the modern molecular evolution theory, this finding supports that *Prochlorococcus* lost a large number of DNA molecules not for the purpose of adaptation to the nutrient-deficient seawater. On the contrary, it was a random process driven by genetic drift. This mechanism was also shown to drive the massive DNA losses during the early evolution of some marine organoheterotrophs such as SAR86. An important implication from this study is that during the early evolution of these tiny bacteria, the ocean changed to a hostile condition in which these bacteria ceased to grow. This led to the failure of the natural selection mechanism and the concomitant accumulation of harmful genetic mutations. This study involved multi-disciplinary knowledge including microbiology, evolutionary biology, marine science and computer science, and was published in *Nature Microbiology* in July 2017.



Found Link Between 'Fuz' Protein Level and Neurological Disorders - New Treatment Paths for Neural Diseases

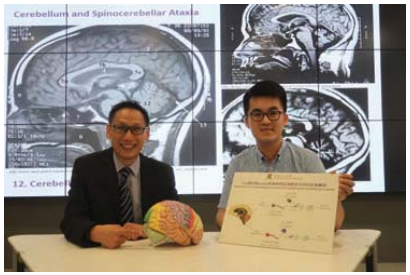
Spinocerebellar ataxia type 3/Machado-Joseph disease (SCA3/MJD) is the most common form of dominantly inherited ataxia in many populations, including Hong Kong. SCA3/MJD patients often present problems with gait and balance, blurred vision, and speech difficulties. The symptoms are progressive, and to date SCA3/MJD remains an incurable disease.

Misfolded protein may contribute to the pathogenesis of neurological disorders

Proteins are the major work force in every single cell type, including neurons, in the human body. Proteins need to adopt proper functional shapes before they can carry out their duties in cells. Any improper folding of a protein may result in cellular malfunctioning and lead to diseases. These malformed faulty proteins eventually form macroscopic aggregates that interfere with the functionality of other normal proteins in the same cell. Misfolded disease proteins (polyQ protein aggregates) are detected in the deteriorating neurons of SCA3/MJD and other polyQ disease patients.

Correlations between YY1, Fuz and polyQ diseases revealed for the first time

Professor Chan and his team showed that the SCA3/MJD polyQ protein aggregates perturb the function of Yin Yang 1 protein (YY1). In neurons, YY1 functions as a repressor of Fuz protein (Fuz). When the function of YY1 is compromised, the expression level of Fuz will increase. Once it exceeds 2.5 times the normal level, it will trigger apoptosis and cause cell death in neurons. The team further detected an abnormal induction of Fuz expression in SCA3/MJD patients, proving that this is a pathogenic mechanism of polyQ diseases. This is the first time that the new function of Fuz in inducing neuronal death has been discovered, and also the first report to demonstrate the role of YY1 and Fuz in polyQ diseases. This work was published in the prestigious scientific journal *EMBO Reports* in July 2018.

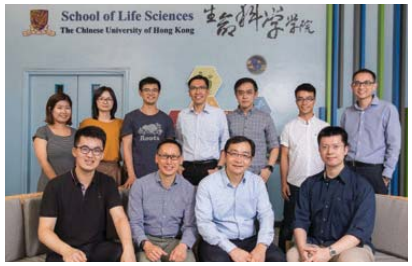


Professor Edwin Chan (left) and Dr Stephen Chen point out that inducing overexpressed Fuz also presents in common neurodegenerative diseases such as Alzheimer's disease

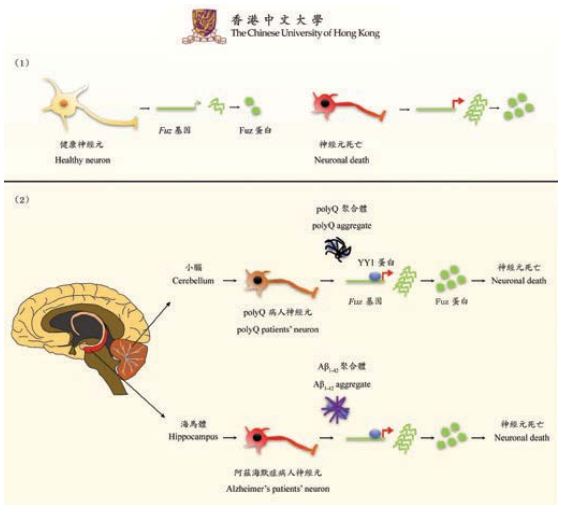
(From left) Professor Edwin Chan, Dr Stephen Chen, SCA patients Mr Cheng and Mr Fung.

Overexpressed Fuz also presents in common neurodegenerative diseases such as Alzheimer's disease

In the past, scientists only considered Fuz as a player in neurodevelopment. However, Professor Chan's team is the first to report this unnoticed cell death-inducing function of Fuz and unveil its role in polyQ diseases. Intriguingly, they also observed that in Alzheimer's disease, the expression level of Fuz also increased. This unexpected and exciting research finding revealed that the Fuz-mediated apoptosis pathway plays some common roles in neurological disorders in general. They are now actively investigating the involvement of Fuz in other disease conditions, and finding compounds that can bring Fuz upregulation back down to a normal level. This will be a novel therapeutic direction toward polyQ and Alzheimer's diseases. They hope that their discovery can demonstrate how rare disease research can make contributions to the advancement of biomedical science research in neural disease biology.'



Professor Edwin Chan (2nd left, front row) and his research team on Fuz



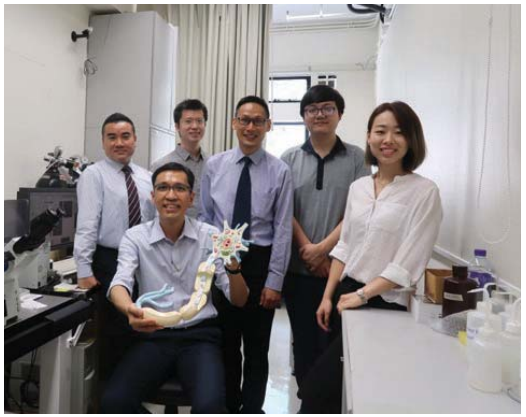
This finding demonstrates the function of Fuz in inducing neuronal death. The study of this function in polyQ disorders will advance the mechanistic research in common neurological diseases.

A Novel Mechanism to Stimulate Neurite Outgrowth – Paving a New Road for Brain Regenerative Medicine

A team of scientists led by Professor Kwok-Fai LAU has recently discovered a novel mechanism that stimulates a process called neurite outgrowth - the growth of nerve cell (neuron) projection. This finding provides important insights into developing strategies to stimulate neurite regeneration after nerve injury caused by traumatic brain injury (TBI) and in neurodegenerative disorders. This research is published in the May 2018 issue of the Journal of Biological Chemistry, the prestigious journal of the American Society for Biochemistry and Molecular Biology.

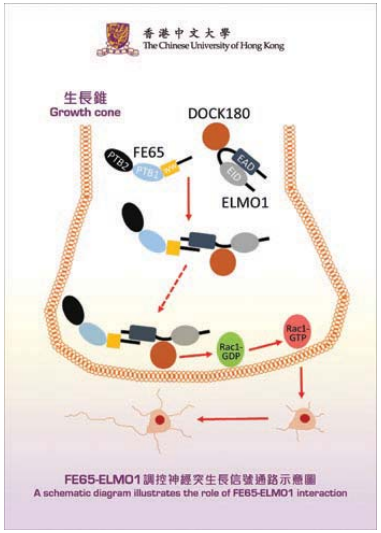
TBI occurs when an external force injures the brain. It usually results from falls, car accidents, sports-related injuries and beatings. Severe situations may lead to permanent disability. Neurodegenerative disorders are symptoms of loss of function in brain and spinal cord cells, including Alzheimer's disease, Parkinson's disease, spinocerebellar ataxia, and amyotrophic lateral sclerosis. About 5% to 8% of elderly people in Hong Kong suffer from dementias, most of whom have Alzheimer's disease, placing a heavy burden on society. In these diseases, a damaged neural network is observed, in which degeneration and retraction of neurite are found.

The brain is the command centre of animals and is composed of neurons interconnected by neurite, grown out from their cell bodies. Such connections are essential for the formation of neural networks which allow the communication of neurons to regulate different cognitive functions and body activities. However, when neurites are degenerated and retracted, the connections of the neural network cannot be maintained and the cognitive and body's motor functions will be difficult to recover. At present, there is no cure for nerve damage. CUHK School of Life Sciences has discovered a mechanism that stimulates neurite outgrowth. As long as two specific proteins are introduced into the neuron, their interactions can increase the length of neurites by at least two times and bring new hope for the reconnection of impaired neural networks.



Professor Kwok-fai Lau and his team members (from left, back row): Professor Jacky Ngo, Professor Alex Koon, Professor Edwin Chan, Mr. Ray Chan, and Dr. Wen Li.

A comparison of neurite length between control and FE65-ELMO1 introduced neurons



A schematic diagram illustrates the role of FE65-ELMO1 interaction. In a growth cone, FE65 recruits the complex of ELMO1 and DOCK180, and together they form FE65-ELMO1-DOCK180complex. It is targeted to the plasma membrane to promote Rac1 activation and thereby neurite outgrowth.

Professor Lau's team has found that the interaction between two proteins, named FE65 and ELMO1, strongly stimulates neurite outgrowth. FE65 is a brain-enriched adaptor that is implicated in nervous system development, while ELMO1 is a widely expressed protein that participates in various processes including cell migration. However, the role of ELMO1 in the nervous system has never been reported. By introducing FE65 and ELMO1 to mammalian neurons, the length of neurite was increased by at least two-fold. Conversely, such stimulatory effect was not observed when the interaction was interrupted. The team further demonstrated that such interaction promotes the transport of ELMO1 to the plasma membrane where it activates Rac1, a key regulator of cytoskeleton, the remodeling of which is required for neurite extension.

One major obstacle in treating neurodegenerative disorders, including Alzheimer's disease, is how to re-connect the neurons in the brain of the patients. Professor Lau believes that their work has provided a new direction in regenerative medicine for the injured brain. He said, 'Re-connection of injured neurons could be achieved by the stimulation of neurite re-outgrowth in these cells through manipulating FE65-ELMO1 interaction.' Most recently, the team has obtained new data regarding how to regulate the interaction.

CUHK Unlocks the Mystery of Small Heat Shock Protein Using Cryo-EM Technology Paves the Way for Plant Genetic Engineering

A research team led by Professor Wilson Chun-Yu Lau has uncovered the anti-aggregation mechanism of small heat shock proteins (sHsps) and unveiled the structure of sHsps for the first time using the state-of-the-art single particle cryo-electron microscopy (cryo-EM) technology. The findings, recently published in the prestigious scientific journal Nature Communications, provide opportunities for potential enhancement of thermo-tolerance in crop plants and improvement in crop production.

Environmental stresses, such as drought, salinity and extreme temperatures, cause over 50% of worldwide yield loss of major crops every year. There is a broad scientific consensus that climate change and global warming will significantly impact future agricultural and food productivity. Therefore, a comprehensive understanding of environmental stresses tolerance mechanisms in plants would be of benefit and essential to genetic modification of crops with the aim of achieving sustainable agriculture and food supply.

Elevated temperature is considered as one of the major environmental stresses that affects the metabolism and many physiological processes of plants and thus has a devastating impact on plant growth and development. In a non-stressed environment, proteins fold into a functional shape and structure in order to function correctly and control dynamic processes in living cells. However, under conditions of stress, for instance, when temperature rises, proteins will tend to unfold and aggregate. Plants have evolved various defense mechanisms such as the heat shock response to cope with environmental stresses.

sHsps represent a class of highly conserved molecular chaperones, meaning they widely exist in plants and animals, and the genetic difference across species is not significant. A molecular chaperone is defined as protein that helps another protein to acquire its functional form. sHsps are known as “housekeeping” proteins to prevent aggregation and unfolding from happening under heat stress condition. In plants, genetically modified production of sHsps has been shown to confer enhanced thermotolerance.

(From left) Professor Wilson LAU, Mr. Stephen LEUNG (Research Assistant), Ms. Chuanyang YU (PhD student), in collaboration with Professor Liwen JIANG, have successfully uncovered the anti-aggregation mechanism of small heat shock proteins (sHsps) for the first time using the state-of-the-art single particle cryo-electron microscopy (cryo-EM) technology.

Structural elucidation of Hsp21 and its complex with a natural substrate

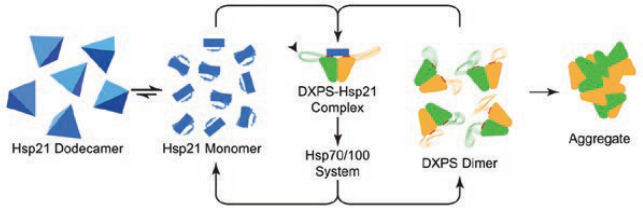
To explore and open up the applicability of sHsps in plant biotechnology, Professor Lau and his research team set out to investigate the molecular mechanism of a plant sHsp, Hsp21, using a structural biology approach. They chose to focus on the Hsp21, a crucial sHsp that protects all photosynthesizing plants from heat stress.

They first identified a substrate (a protein molecule upon which a chaperone acts on) of Hsp21, an enzyme called 1-deoxy-D-xylulose 5-phosphate synthase (DXPS), and then solved three-dimensional structures of Hsp21, DXPS and the Hsp21-DXPS complex, at unprecedented resolution, using cryo-EM of single particles combined with advanced computational image processing algorithms. Structural characterisation of sHsp-substrate complexes by the traditional X-ray crystallography method has proved notoriously difficult owing to the transient and heterogenous nature of their interactions.

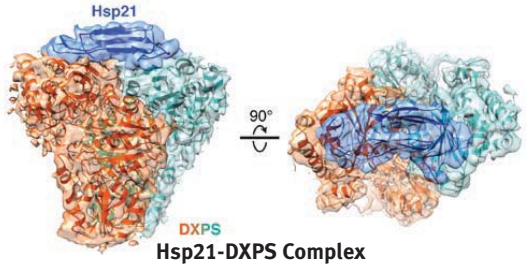
Professor LAU said, “Through solving the Hsp21-DXPS structure, our work unravels an unanticipated mechanism of sHsps anti-aggregation activity that is likely applicable towards a wide range of substrates. The current work not only provides a structural framework for understanding the functional properties of Hsp21 and sHsps in general, but also could form a basis and provide reference for genetic engineering of heat-resistant food crops to fight global climate change.”

The study was carried out by Ms. Chuanyang YU, PhD student of Professor Wilson LAU, and Mr. Stephen King Pong LEUNG, and in collaboration with Professor Liwen JIANG from the School of Life Sciences at CUHK.

A model of the anti-aggregation activity of Hsp21
Towards DXPS under heat stress conditions



Anti-aggregation activity of Hsp21 towards DXPS under heat stress conditions.



Hsp21-DXPS Complex

Cryo-EM map and model of the Hsp21-DXPS complex.

Mangrove ecosystems are important... but fragile

Mangrove forest used to line the majority of the world's tropical coastline but decades of urban development, pollution, and conversion to aquaculture ponds have resulted in continued loss of this important habitat. Recent improved appreciation of the essential ecosystem services provided by mangrove forests has prompted a reduced rate of loss as well as significant international investment in their restoration. Professor Joe Lee, Director of CUHK's Environmental Science Programme, has researched mangrove ecosystems for almost 40 years, focusing on their important functions of carbon storage and acting as nursery sites for juvenile fish and crustaceans such as crabs and shrimps.

Fiddler crab and mudskipper fighting for territory on the Mai Po mudflat

A male Tubuca arcuata plugging the burrow opening with a mud ball just before the incoming tide at the Mai Po Marshes. Animals like this play an important role in shaping the function of mangrove ecosystems

Mangrove forests are key "blue carbon" ecosystems, a role underpinned by their high productivity and the large capacity for storing organic matter. High productivity means that mangroves are able to remove large quantities of carbon dioxide from the atmosphere and turn the greenhouse gas into plant tissues. This carbon stored in the plant will not just end up back in the atmosphere because the anoxic (lack of oxygen) soil in mangrove forests results in slow decomposition, therefore promoting storage rather than loss of the carbon initially removed from the atmosphere. The complex mangrove aerial roots also facilitate trapping of particles of carbon in the tidal water. By conducting a global survey and conducting new measurements, Professor Lee recently provided an updated estimate of the carbon stored in world mangrove forests, as well as refined the value of an important conversion factor used in the estimation of carbon content of mangrove soils. These findings were published in the prestigious journal Nature Communications[1].

One of the key components underpinning the function of mangrove ecosystems is their associated invertebrate fauna, dominated by crustaceans and molluscs (snails and bivalves). Threats, e.g. pollution, that affect mangrove trees also affect the invertebrate community. Professor Lee also led a recent global analysis[2] (published in Proceedings of the National Academy of Sciences of the USA in 2021) of the invertebrate community associated with 16 mangrove forest ecosystems around the world suggested that most systems have very low functional redundancy, i.e. each ecological function is only fulfilled by 1-2 invertebrate species. This means that a small loss of invertebrate biodiversity could mean the loss of significant function, and therefore service, supported by the mangrove forests. Another important discovery is the fact that functional diversity is independent of the area of the mangrove forest, i.e., small forests such as the Mai Po Marshes could support a high variety of functional species, making them biodiversity reservoirs from which recolonization could be effected in damaged habitats nearby.

1 Ouyang, X., Lee, S.Y., 2020. Improved estimates of global carbon stock in tidal wetlands. Nature Communications 11:317*
2 Cannicci S., Lee S.Y., Bravo H., Cantera Kintz J.R., Dahdouh-Guebas F., Fratini S., Fusi M., Jimenez P.J., Nordhaus I., Porri F., Diele K. 2021. Extremely low functional redundancy in global mangrove invertebrate fauna. Proceedings of the National Academy of Sciences USA 118*

Academic Honorees and Awardees

Croucher Senior Research Fellowship
RGC Senior Research Fellow

Professor JIANG Liwen

Dr. Jiang joined CUHK Biology as an Assistant Professor in 2000 and was promoted as Professor in 2007. Professor Jiang is currently Choh-Ming Li Professor of Life Sciences of School of Life Sciences and Director of RGC-AoE Centre for Organelle Biogenesis and Function, as well as Director of Centre for Cell and Developmental Biology. Professor Jiang's research team has been working on the underlying mechanisms of protein transport, organelle biogenesis and function in plants for 21 years at CUHK, and has been internationally recognized as a leading group in the field. Professor Jiang received numerous awards for teaching and research achievements, including CUHK Science Faculty Exemplary Teaching Award 2008, CUHK Research Excellence Award thrice (2006-07, 2009-10 & 2015-16), Croucher Senior Research Fellowship twice (2009-10 & 2015-16), Ministry of Education (MoE) Higher Education Outstanding Scientific Research Output Awards three times (2009, 2013 & 2017), Outstanding Fellow of the Faculty of Science (2013) Choh-Ming Li Professorship of Life Sciences (2014), and more recently the RGC Senior Research Fellow 2021/22. Graduate students from Professor Jiang's lab have also received many prestigious awards, including CUHK Young Scholars Dissertation Award (twice), Postgraduate Students Publication Award (six times), Keystone Symposium Scholarship (twice) and Human Frontier Science Program Long-Term Fellows (twice). 15 graduate students/ postdoctoral fellows from Professor Jiang's lab have become PIs. As PI/PC, Professor Jiang has received competitive research grants worth over HK$130 million from the Research Grants Council of Hong Kong, the Croucher Foundation and other important funding bodies. Professor Jiang has also served as Editors-in-Chief of Plant Science, Associate Editors of Protoplasma and Frontier in Plant Science, Senior Editor of Journal of Integrative Plant Biology, and Editorial Board Member of The Plant Cell, Molecular Plant, and Science China : Life Sciences.

Research Grant Council (RGC)-funded Collaborative Research Fund

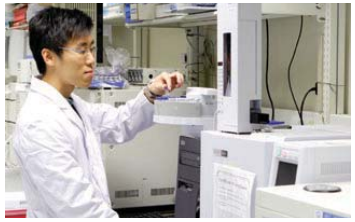
In the last few years, the School of Life Sciences received both the AoE and CRF funding from RGC to build upon our existing strengths and develop them into Areas of Excellence (AoE) and to fund projects with significant potential to develop into an area of strength.

AoE Project:

Professor Liwen Jiang and his team received an AoE grant of HK$47.25M to establish the Center of Organelle Biogenesis and Function beginning in January 2014.

Professor Hon-Ming Lam received an AoE grant of HK$75.591M for "Center for Genomic Studies on Plant-Environment Interaction for Sustainable Agriculture and Food Security."

CRF/RIF Project:



Professor Liwen Jiang was awarded HK$6.4M for "Vacuole Biogenesis, Dynamics and Functions in Plants", HK$7.439M for "The First Integrated State-of-the-Art Sample Preparation System for Cryo-Electron Microscopy/Tomography Analysis to Promote Advanced Cellular and Structural Biology Research in Hong Kong", HK$7.21M for **"**Molecular Mechanisms of Autophagy and Autophagosome in Plants**"**, HK$5M for **"**Plant Bioreactor for Pharmaceutical Proteins**"** and HK$9.5M for **"**The First Integrated cryo-EM and cryo-ET Shared Facility for Life Sciences Research in Hong Kong**"**, for the past 5 years.

Professor TF Chan was granted HK$2.17M for "A Nanochannel-based Next-generation Mapping System for the Study of Complex Genomic Feature and Variation for Biotechnological and Biomedical Applications".

Professor KB Wong was granted HK$2.3M for "A State-of-the-art X-ray Diffraction Facility for Structural Biology Research in Hong Kong".

Professor Hon-Ming Lam and his collaborators were funded HK$6.99M for "Genomic and Molecular Studies of a Salinity Tolerance Locus in the Wild Soybean Genome".

Professor Edwin Chan was granted HK$7M for his project titled "Targeting RNA and Protein Toxicities of Polyglutamine Diseases Using Peptidylic Inhibitors".

Other Research Awards

Research Excellence Award

Year	Awardees
2006-2007	Professor Jiang Liwen
2007-2008	Professor Chu Ka-Hou
2008-2009	Professor Chen Zhen-Yu
2009-2010	Professor Jiang Liwen
2012-2013	Professor Lam Hon-Ming
2015-2016	Professor Jiang Liwen
2018-2019	Professor Wong Po Keung

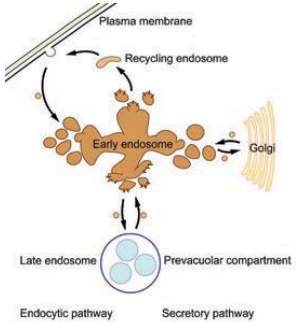
CUHK Young Researcher Award

Year	Awardees
2008-2009	Professor Kwan Kin-Ming
2009-2010	Professor Chan Ho-Yin Edwin
2016-2017	Professor Luo Haiwei

Research in the School

The School of Life Sciences engages actively in a wide array of research areas. They vary from as small as a molecule to as large as a habitat.

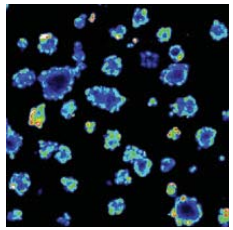
Cell Biology



This covers a wide range of interdisciplinary areas in life sciences that explain the molecular and cellular organization, and how the signaling pathway regulates cellular function. Major topics include signal transduction, cell fate, neuroscience, stem cell biology, and cancer cell biology.

Molecular mechanisms of protein trafficking in the plant secretary and endocytic pathways provide hints for using plants as bioreactors for producing pharmaceuticals.

Recent development of stem cell research focuses on the basic biology and biomedical application of embryonic stem cells that aim to identify possible strategies for clinical uses.

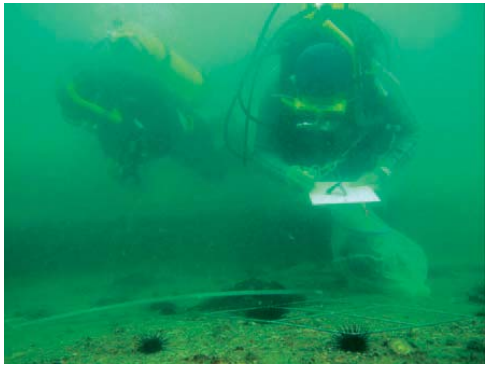


Cancer cells were discovered to be capable of recovering after exposure to a chemical cocktail that triggers programmed cell death. This finding could potentially help the development of new, more effective anti-cancer drugs.

Neuroscience is th e biology of nervous system, which allows us to sense and respond to the external environment. Our neuroscience research actively investigates the pain hypersensitivity, neuronal differentiation, and the pathogenesis of nervous system diseases, for instance, Alzheimer's and Parkinson's Diseases.

Ecology and Environmental Science

One of our research areas is in the discipline of wildlife conservation and habitat restoration. Analyses of ecosystem functioning, bioindicator assemblages, and microbiological status are the key attributes of the desirable ecological changes in terms of the ecosystem integrity and health, which are of primary concern in the ecological restoration. We also investigate vegetation composition and ecological succession on fly-ash lagoons and used municipal landfill sites for better habitat restoration.



Enzymes from fungi and microorganisms are studied for the bioremediation of sites polluted by toxic organic matters. We also study the contaminations of metals and trace organics in the coastal areas and inland waters.

Marine Science

A number of nuclear protein-coding genes are used as DNA markers for resolving the phylogenetic relationships among the decapods crustaceans such as shrimps, lobsters and crabs.

The studies of dolphin, coral communities, and seaweed are underway in local marine parks. Impacts of climate change on marine ecosystems are also of our concerns.

Food & Nutritional Sciences

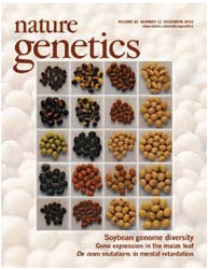
Nutritive food ingredients, like lipids and dietary fibres, and non-nutritive compounds isolated from plant foods are investigated for their potential benefits in the prevention of chronic disease development.

The palatability of food depends on our sensual perception. Key food chemical ingredients interacting with our sensory receptor are investigated.

To tackle diseases that have not yet been cured by modern medicine, several members in the School are working in functional foods and nutraceuticals. The neurological, anti-tumor, and immunomodulatory effects of the active compounds isolated from traditional Chinese medicines and functional foods are examined at gene and protein levels, using pathway guided, genomic and proteomic approaches.

Genomics & Bioinformatics

The Human Genome Project has brought enormous technological breakthroughs in sequencing technology that give rise to a new area of research focusing on the sequence, structural, and functional analysis of the genome of all living organisms. The importance of genomics is best exemplified during the SARS outbreak in 2003. CUHK researchers deciphered the SARS-coronavirus genome isolated from the patients, and investigate how it mutates from the stain in palm civets. A number of professors in our School specialize in different aspects of genomic research such as evolution, population genetics and epigenetics, in a wide-range of living organisms with particular strengths in human, crustacean, and plant genomics.

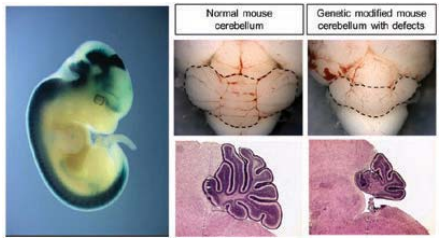


Plant & Agricultural Science

The SKL team and the researchers from the member laboratories at the SKL 2014 Annual Meeting. The current director and deputy director are Prof. Jianhua Zhang and Prof. Hon-Ming Lam (front row, 7th and 9th from left, respectively).

Achieved international excellence and obtained the official approval from The Ministry of Science and Technology of P.R. China, SLS members established the **State Key Laboratory (SKL) of Agrobiotechnology**, in partnership with the prestigious China Agricultural University in 2008. This SKL, comprised 16 principal investigators from CUHK and 5 associate members from other local Universities, has received a support totalled $19M (2011-2016) from the Innovation and Technology Commission. This national-level laboratory has a mission to up-scale China's agricultural technology to the world frontier for increasing agricultural productivity, safeguarding food security in China, improving people's nutrition and promoting cooperation between China and Hong Kong on scientific advancement. Prioritized research areas include the development of stress tolerant, high-quantity, high-quality and high value-added crops via the application of state-of-the-art technologies such as genomics, proteomics, metabolomics and recombinant DNA approaches.

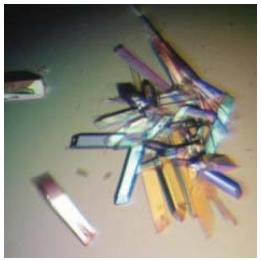
Developmental Biology



How can a single cell (fertilized egg) develop into a multicellular organism with specialized structures and organs? This question also becomes a very important medical question.

A newborn may possess some tragic abnormality when the embryo development goes wrong as shown in the figures as some genes are mutated by genetic engineering technology. The knowledge of normal development is the base for understanding abnormal developmental diseases.

This area of study is made possible by the advanced molecular biology, cell biology, and genetic engineering technology. The mammalian embryonic developmental process is studied with mouse as the model organism.



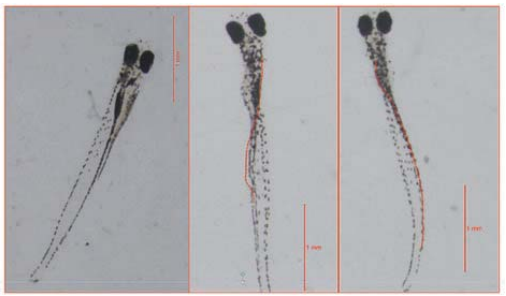
Protein Science

In this post-genomic era, protein structure-function study is of major importance in understanding the molecular basis of cellular pathways and developing therapeutic targets. Our ongoing research projects focus on proteins in cellular signaling and biomedical science, pathogenic microorganisms, and are of biotechnological significance.

Toxicology

The research of toxicology and health centres on liver metabolism and detoxification enzymes of drugs and environmental toxicants, chemical carcinogenesis, and the development of biomarkers of effects from chemical toxicants.

Effects of environmental pollutants, such as metals, pesticides, and trace organics on liver metabolism of fish and rats are investigated. Sophisticated techniques involved in the toxicology research include the differential gene expression and proteomic studies, molecular toxicological approach with the use of gene cloning and DNA array as well as the use of enzyme markers or reporter gene systems for the evaluations of potential health risks of the environmental contaminants including endocrine disruptors. Both mammalian models and fish models are being used for toxicity assessments.



Deformity observed in zebrafish larvae exposed to Brominated Diphenyl Ether (BDE)-47

Research Institutes and Centres

- Centre of Plant Molecular Biology and Agricultural Biotechnology
- Centre for Cell and Developmental Biology
- Centre for Protein Science and Crystallography
- Food Research Centre
- Simon FS Li Marine Science Laboratory

Shiu-Ying Hu Herbarium

Shiu-Ying Hu Herbarium, School of Life Science, CUHK

History

The Herbarium of CUHK was established as a research facility in the Department of Biology in 1968. It was renamed as the Shiu-Ying Hu Herbarium in 2013 to honor the late Prof. Hu's contribution in plant taxonomy and to extend her legacy. The Herbarium collection contains more than 40,000 plant specimens, mostly collected and authenticated by Prof. Hu, and an archive of botanical references and information.

Research platform

The Herbarium is dedicated to documenting plant biodiversity in Hong Kong and the most up-to-date research information. A new research platform of our herbarium was established in 2014 to document plant specimens, multiple botanical images, GPS locations, DNA tissues and Taxonomic Archive System for comprehensive records of local flora.

Taxonomic Archive System

Taxonomic Archive System is a multi-platform database tailor-made with more than 3000 botanical character states for describing every plant species in Hong Kong. This unique archive and its derived educational databases are well recognized by a wide range of users including researchers, teachers, undergraduates, primary and secondary students, as well as the general public. The user interfaces are user-friendly and interactive, which can rapidly link to glossary, species comparison and informative factsheets to facilitate flipped learning.

Ample Opportunities

Training and education

Another important mission of the Herbarium is to nurture trainee botanists. Herbarium archive and expertise enhance the teaching of Hong Kong Flora and Vegetation, a unique course offered by the School of Life Sciences (SLS), CUHK. The Herbarium also offers internship programs for undergraduate students of SLS. It further facilitates the career development of our students who are interested in conservation, environmental education, arboriculture or herbal medicines.

Public education

In addition, various educational activities such as seminars, herbarium visits, campus walks and overseas excursions are organized regularly for the quality enhancement of general education and community services.

Mission and new perspectives

We will continue to dedicate our best efforts to taxonomic research and applications, and explore every opportunity to transfer knowledge and experience to our society through professional training courses, general education and community services. We cherish and thank you for your continued support, participation and collaboration with our Shiu-Ying Hu Herbarium.

Contact

Website: http://syhuherbarium.sls.cuhk.edu.hk/
Tel: (852)3943 6113 / (852) 3943 6141
Fax: (852)2603 7246
Email: syhuherbarium.sls@cuhk.edu.hk

Internship, Scholarship and Other Opportunities

BBSA

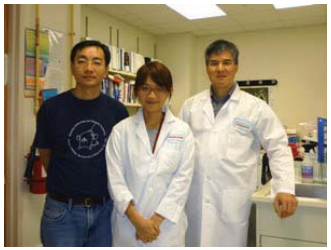
The Berkeley Biosciences Study Abroad (BBSA) Programme was introduced in 2016 to enable upper year students of our School to spend a semester in UC Berkeley. They can take 12 units of upper level Integrative Biology and Molecular & Cell Biology courses there and the credits can be transferred back to CUHK to fulfill their graduation requirements. Selected students will be awarded subsidies for tuition fee in UC Berkeley.

DREAM

The Dedicated Research Exchange And Mentorship (DREAM) Programme provides precious opportunities for our students to expose to the frontiers of biological researches. Our students first participate in a coaching programme, and learn the basic techniques and background information related to the project from a local supervisor in the School. During summer, as sponsored by the School, they travel abroad and conduct research projects in foreign laboratories or corporations. Participating institutions and corporations in 2018 include the Law Offices of Albert Wai-Kit Chan in New York, University of Queensland, Kazusa DNA Research Institute in Japan, Nanyang Technological University in Singapore, Phase Diagnostics and Keck Graduate Institute in California, Institute of Plant and Microbial Biology as well as Biodiversity Research Centre Academia Sinica in Taiwan and Chonnam National University in Korea.

SMART

The new Young Scientist Mentorship And Research Training (SMART) Programme specifically offers a distinguished research experience to first year students. Through individual guidance from Professors in research laboratories, students are able to ignite their inquisitiveness in scientific research at the very beginning of the university journey. Besides, they may also receive up to $3300 as rewards for working in the research laboratory.



Others

Exchange programmes with the following institutions have also been established recently: POSTECH (Pohang University of Science and Technology) in South Korea, University System of Taiwan, Tianjin University as well as Zhiyuan College of Shanghai Jiao Tong University.

University Student Sponsorship Programme

"We would like to thank Ocean Park Conservation Foundation Hong Kong and the University for this valuable opportunity to join the 14-day cetaceans conservation project. We visited Bais City in the Philippines for a 5-day dolphin survey, and were lucky to see more than 300 individuals of spinner dolphins and Indo-Pacific bottlenose dolphins. Beside field survey, we also assisted with the laboratory work and gained practical experience on research. One of the research highlights of the team was the detection of antibiotic resistance of the bacteria isolated from cetaceans; this is significant not only to cetaceans, but also to human health, as the bacteria can be transmitted from cetaceans to human. The most important lesson we learnt from the trip is the "One Health" concept, that is the connection between the health of human, marine mammals and the environment. As the environment and the wildlife living in it are closely related to us, we should take action to protect them."

2019 participants - Chan Ying Tung (BIOL) and Cheng Lok Yiu (BIOL)

"I went to Yushu, Qinghai Province to help with the conservation work of snow leopards. However, their breeding season had made observation difficult; so we switched our focus to monitoring Chinese mountain cats, monitoring birds in forests and grassland management. We followed the researchers and nomads to look for traces of wild animals and to set camera traps. The task was quite harsh because we had to walk a long way on high altitudes and even climb up hills. We also went up to a village at 4700 m to conduct interviews with nomads. Although it was tiring and exhausting, and the condition in the village was bad, we did treasure the chance to interact with the local nomads and to know more about their lifestyles. This trip was unique and fruitful to me: I have learnt so much about different ecosystems and animals; but the best thing I have learnt is how different people cooperate with one another with respect and in harmony. I hope I can utilise all the experiences I have gained when I am doing conservation work in Hong Kong."

2019 participant - Wong Long Ching Elvis (BIOL)

"Thanks to the University Student Sponsorship Programme, we have the chance to visit C3 (Community Centred Conservation) in Philippines and participate in the project titled 'Community-Driven Monitoring and Conservation of Palawan's Threatened Dugongs'. Staying in C3, talking to the staffs and getting involved in some of the projects have made me realise the importance of community based principle in environment management. Environmental management can never be done just by professionals, planners and scientists. It is always the gathered effort from the community to make the management sustainable and truly applicable. Although it may be a hard and long term process to influence others, it is the intrinsically meaningful way to conserve the natural resources. The experience in C3 has made me truly believe, with time, patience, passion, skills and perseverance, our effort will inspire and influence the community to join our team someday."

2019 participant – Kong Ka Wing (ENSC)

Good Internationalization

Every year, the University attracts excellent secondary students both from local and overseas. Currently, the University has close to 2,000 international students from countries and regions: all over the world. The School of Life Sciences admitted 187 students in 2020 entry.

Outstanding Career Prospects

The diverse training by the School prepares our graduates to not only feature in areas related to their studies, but also find their starring paths in areas outside life sciences.

Interviews of Alumni

Biology programme at CUHK was my top choice for my undergraduate study. It offered a broad curriculum as well as special topics in life science that provided me a very good foundation for my graduate study in marine biology as well as the scientific knowledge, training, skills of logical and critical thinking for my career as a Senior Fisheries Officer in the government.

1991 Alumnus (Biology) - Chow Wing-Kuen
Senior Marine Conservation Officer, Agriculture, Fisheries and Conservation Department of the Government of HKSAR

I would like to say thanks to all my teachers for their guidance, support, and also the research opportunities such as the summer research programme and the internship programme that prompted me to apply to graduate school for more intense graduate research training. The study at CUHK not only provided me with a platform to acquire textbook knowledge of biochemistry, but most importantly enabled me to appreciate its beauty of the scientific knowledge. Being a professor at CUHK now, in addition to fostering responsible students and researchers, one of my anticipated roles is to make sure that the knowledge of biochemistry and life sciences can reach different strata of our society, and ultimately everyone can apply scientific knowledge to their work positions and daily lives.

1995 Alumnus (Biochemistry) – Chan Ho-Yin Edwin
Professor, School of Life Sciences, CUHK
Founding member, Hong Kong Young Academy of Sciences
Faculty Exemplary Teaching Awardee
Young Researcher Awardee
Genetics Society of China Thirteenth Ju-Chi Li Animal Genetics Prize winner

The CMB program has offered me a superb learning experience. As a student interested in life science research, not only did I acquire knowledge in a wide range of biological disciplines, I also had the opportunity to join three different laboratories throughout my undergraduate years. These hands-on experiences helped me understand what scientific research is like and allowed me to discover my passion in cell and molecular biology, based on which I made a decision to pursue my future career in this field. Studying CMB has undoubtedly brought me an enriched and meaningful university life.

2017 Alumnus (Cell and Molecular Biology) - Gong Yaoyu Maurice
PhD Candidate, Biomedical Graduate Studies, University of Pennsylvania, USA

I am glad that I chose FNSC at CUHK as my undergraduate major. In addition to the solid knowledge on food science and nutrition from the coursework, the soft skills, like trouble-shooting and communication skills, creativity, and passion benefited my career development. The summer lab and undergraduate final year research programme are something in particular to mention as they allowed me to gain early exposure to food laboratory environment.

1997 Alumnus (Food and Nutritional Sciences) – Leung Arnold
Senior Food Scientist, the Coca-Cola Company

Though there is no direct linkage between my major and my current occupation, the more in-depth knowledge in biological science, environmental science and geography help my understanding and analyses towards issues related to environment and life science. These definitely facilitate the formulation of more thorough news reports.

2000 Alumnus (Environmental Science) – Pun Wai-Lam
Senior Reporter, TVB

Look back the time when I chose my major at CUHK, I believed that following my own personal interests would give no regrets to my life, so I devoted to Science, and MBT was my first choice as I really like the idea of DNA and genes. MBT program has given me wonderful University life, the Professors are inspiring and the lab courses are practical, well-equipped me with scientific knowledge, critical thinking and laboratory techniques. Final year project has also trained me to be a careful, tough, logical and optimistic person. After graduation, I further studied at the CUHK Graduate School, and went to both Canada and USA for a period of post-doc training. Luckily, now I got my faculty position at the Macau University of Science and Technology, and have the opportunities to run my own lab and research projects. After so many years, I am still very proud of being the first year of MBT graduates as it has started my scientific career as a Scientist, and I believed that I had made the best choice.

2001 Alumna (Molecular Biotechnology) - LEUNG Lai Han, Elaine
Associate Professor
Macau Institute for Applied Research in Medicine and Health
Macau University of Science and Technology

I am very glad to study MBT in my bachelor. The knowledge and experience I gained from MBT indeed lead to some of the most amazing and life-changing opportunities including doing a DPhil at Oxford and working as a scientist in Denmark. The trainings offered by MBT are at the world-class standard. Connection is another key characteristic of MBT. It is precious for MBT graduates to be so close to each other. And for those who are joining our family, there are unlimited possibilities in your future careers. Not only restricted to biotechnology, but there are also various chances such as medicine, publication industry, legal practice and business consultancy. Welcome to MBT!

2004 Alumnus (Molecular Biotechnology) - Chu Wai Kit
Assistant Professor, Department of Ophthalmology & Visual Sciences, CUHK

To me, the program offered broad knowledge of fundamental science and ample opportunities to translate what I had learnt into practical research projects. Interactive lab courses, group projects, presentations, and diverse program activities are features of this program, which allowed us to develop independent thinking, teamwork, and effective communication. I believe the program will continue to thrive and foster talents who will shine in different fields.

2002 Alumna (Molecular Biotechnology) – Lam Hung-Ming
Assistant Professor, University of Washington, Seattle
Young Investigator Award, Prostate Cancer Foundation
Career Development Award, Pacific Northwest Prostate Cancer SPORE, NCI/NIH
Idea Development Award (New Investigator), Department of Defense'

I am glad that some 10 years ago I put CUHK Food and Nutritional Sciences programme as my first priority in my JUPAS form. Not mentioning its multi-disciplinary curriculum (including food science and technology, nutrition, biochemistry, biology etc) provided me with solid scientific knowledge, the programme also trained me with a variety of soft skills particularly critical thinking, which are still very useful in my everyday work. In addition, the programme offered a lot of great laboratory research opportunities, especially food technology and product development as well as final year project, which helped me to learn effectively in a practical and fun way!

2003 Alumnus (Food and Nutritional Sciences) – Ma Ka-Ming
Scientific Officer, Food and Environmental Hygiene Department, HKSAR Government

The critical piece of mind acquired from project work and assignment work, comprehensive thinking and good communication/presentation skills obtained from lab report and project works, and persistence and a piece of mind to serve the community learnt from the final year project are some of the critical generic skills that were trained by my major programme. These figured me into an enthusiastic territory educator to inspire students in Science Education of the next generation. I broke my school's 11 years of record with the highest credit rates and full passes for my classes. Some of my graduates have joined the School of Life Sciences at CUHK in these several years.

2005 Alumnus (Biology) – Ho Tik Shun
Head, Department of Science, The Chinese Foundation Secondary School

The curriculum in FNSC at CUHK is not only beneficial to my career but also my life. The series of food safety and microbiology courses built up my knowledge, prepared me well to win the job as a Health Inspector and granted me competitive advantage in my career. On the other hand, the nutrition related ones allowed me to live a healthier life though I was not in that field. Not to mention, the inspiring and heartfelt ways of teaching and interactive learning enabled me to see and think from different angles. Also thanks to the FNS academic visit and excursion programs which have led my eyes beyond the locality and allowed me to exchange the experience with counterparts of food and nutritional sciences in other countries.

2006 Alumnus (Food and Nutritional Sciences) – Chan Yun-kwan
Health Inspector, Food and Environmental Hygiene Department of the Government of HKSAR

Learning interesting facts about food and nutrition, doing labs, cooking for new food products – I would say studying in the FNS programme was one of the most enjoyable time in my life. It has also paved the way for my career of becoming a registered dietitian. FNS teaching staff were supportive and helped me meet all the essential requirements to enroll into the overseas dietetics master's programme. The knowledge acquired from the FNS programme was useful and practical, which enabled me to often excel in the postgraduate study of dietetics. Our FNS dietitian alumni were very helpful too by sharing their experiences in overseas dietetic study and real-life work as a local dietitian. I would like to take this good opportunity to say "thank you" to you all.

2006 Alumna (Food and Nutritional Sciences) –Wong Sze-Man Candy
Dietitian, Hospital Authority
Master of Science in Nutrition and Dietetics, the University of Sydney
Accredited Dietitian, Hong Kong Dietitians Association
Accredited Practising Dietitian, Dietitians Association of Australia

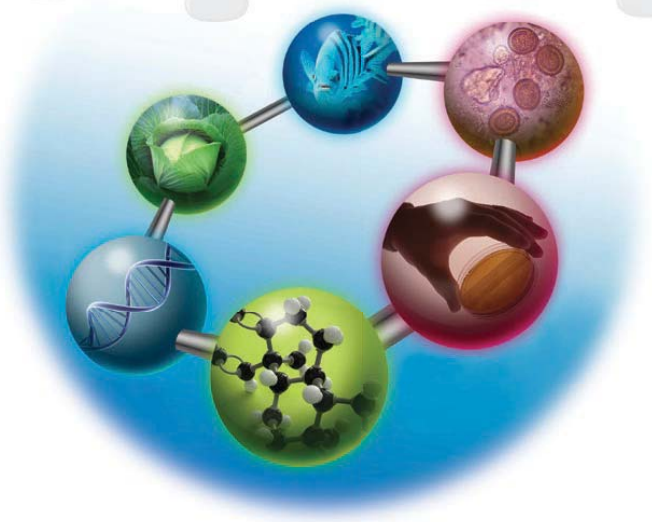
The programme equipped me with knowledge, both theoretical and practical, of current advances in the field and skills for conducting research in life sciences. These prepared me well for the study of M. Phil that facilitated my job hunting in the education field after graduation. The training also allows me to share the current development in the field with students both from the view of researchers as well as public health which is hot in Liberal Studies.

2007 Alumna (Biochemistry) – Ho Lilian
Graduate Master/ Mistress, Holy Trinity College

After graduation, I continued my study in the finance areas, and obtained my Master degree in Finance and the Advanced Diploma in Professional Financial Planning. I am now working in the area of financial planning engaging in the wealth and relationship management. Financial world is full of uncertainties. Strong and independent logical thinking and scientific method I acquired from my undergraduate study benefit my judgment in deciphering the reason and finding out the answers for these uncertainties. I particularly thank the inspiration provided by my programme for the scientific and personal growth.

2007 Alumnus (Biology) – Mok Kai-Cheung Steven
Chief Wealth Management Advisor, Convoy Financial Services Limited
Swiss Privilege – Financial Planning Top 10 Awardee
Hong Kong Institute of Bank – Financial Planning Competition Awardee

Programmes in the School of Life Sciences



Biochemistry
Biology
Cell and Molecular Biology
Environmental Science
Food & Nutritional Sciences
Molecular Biotechnology

Background

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.

In 1971, the University established the Department of Biochemistry (now the Biochemistry programme), and it quickly became a strong programme in teaching and research. The study of Biochemistry in the School comprises a broad array of scientific disciplines, including the chemistry of life processes, bioinformatics, the metabolism of biomolecules and their regulation, energy transformation, the functions of enzymes and the structure-function relationship of enzymes and proteins, genome research and genetic diseases, heredity and evolution, the mechanisms of the nervous, immune and endocrine systems, biotechnology, and biomedical sciences.

Mission

- To provide concepts and mechanisms on the molecular basis of life processes and the significance in human activities and health
- To provide training on the latest biochemical technology
- To cultivate the ability of critical thinking, a proactive and responsible attitude and efficient communication skills for high competitiveness in further study and career development

Career Talks given by Alumni

Curriculum

Biochemistry (BCHE)

Study Focus:

- Bioenergetics and Metabolism
- Biomedical and Health Sciences
- Genetics and Cell Biology
- Independent Research
- Methods in Biochemistry and Molecular Biology
- Proteins and Enzymes

Elective Areas:

- Clinical Biochemistry
- Endocrinology
- Forensic Sciences
- Immunology
- Independent research in Biochemistry
- Laboratory Management and Accreditation
- Neuroscience
- Sport Sciences
- Advanced topics offered by SLS programmes:
  - *Biology:* Microbiology, Animal Physiology, Human Genetics
  - *Cell & Molecular Biology:* Protein Trafficking and Folding, Stem Cell Biology, Cell Biology of Cancer and Neuronal System
  - *Environmental Science:* Biochemical Toxicology, Environmental Health
  - *Food & Nutritional Sciences:* Medical Nutrition Therapy, Nutrition and Human Development
  - *Molecular Biotechnology:* Animal Biotechnology
- *Statistics:* Biostatistics

Curriculum Highlights

- Current topics in biochemistry and molecular biology that have scientific, medical and social significance
- Self-study modules and independent research opportunity

Expected learning outcomes

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

Views of current students

Choosing biochemistry as my major has been one of the best decisions I have ever made. Supported by an excellent and experienced teaching team, we are inspired to look for the hidden mysteries of life. The programme does not only provide us with the opportunity to learn in different research laboratories, but also supports overseas exchange programmes and research opportunities. As one of the committee members of the biochemistry student society, I have organized and participated in numerous activities of the programme. I really enjoy the warm atmosphere of this big family.

Tong Phoebe

My surviving motto is: “Learn Actively and Explore Who You Are!”. Biochemistry curriculum offers a versatile platform to help taste the biological world, from abstract ideas in lectures to practical skills in laboratories. Biochemistry programme also provides seminars, visiting tours, internship and exchange opportunities. With the full support and large flexibility, together with your curiosity and courage, it is an ideal ladder to get involved in the world of emerging science.

Lam Mastech

Biochemistry 40th Anniversary High Table Dinner

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Programme Director:
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Biology

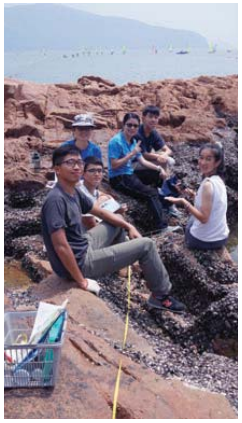
Background

Biology is a broad scientific discipline embracing many different fields of study, including the functioning of living organisms from virus to human. Fundamental to the study of life is unfolding biological organization at its many levels, from molecular architecture to ecosystem services. During the past few decades, new discoveries in biology has have brought significant impact on the way we live. Armed with exciting new research methods and information from genomics of human and other living organisms, biologists are beginning to unravel some of life's most engaging mysteries.

The Department of Biology, now the Biology Programme, was established in 1963, and is one of the oldest departments in the University. Indeed, we are the first biological sciences department in Hong Kong awarded the Area of Excellence by University Grants Committee. We offer a broad range of courses for students to choose from, including genetics, physiology, plant biology, zoology, marine biology, and ecology.

Mission

- To prepare students for careers in biological sciences and related fields
- To provide students with knowledge on the latest advancements in biology
- To promote excellence in teaching and research in all levels of biological sciences from molecular biology to ecology



Stanley Main Beach, HK

Taipo River, HK

Nature Trail of Native Forest in Dasyueshan, Taiwan

Biology students investigate natural enviroments through local and oversea field trips.

Curriculum

Biology (BIOL)

Study Focus:

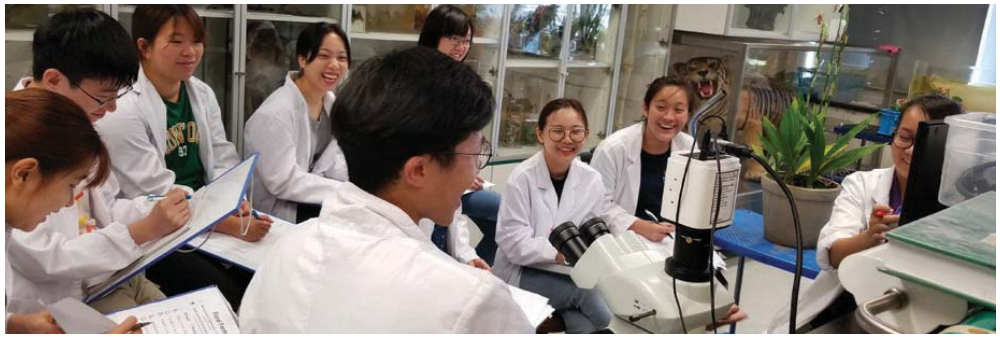
- Ecology
- Genetics
- Evolution
- Biodiversity
- Fundamentals of Biochemistry & Cell Biology

Elective Areas:

- Microbiology
- Marine Biology
- Plant & Animal Biology
- Developmental Biology
- Conservation Biology
- Physiology
- Field Study
- Courses from other programmes:
  Bioenergetics and Metabolism, Molecular Biology, Immunology, Endocrinology, Protein Trafficking and Folding, Stem Cell Biology, Cell Biology of Cancer and Neuronal System, Pollution and Toxicology, Food Microbiology, Molecular Biotechnology, Biostatistics

Curriculum Highlights

Three recommended packages based on the different combinations of the courses offered by Biology Programme: (1) Organismic and Conservation Biology; (2) Human Biology; and (3) Biology for Teaching Career.



Biodiversity Lab – Floral dissection demonstration

Winter Camp

BBQ gathering of students and teachers

Expected learning outcomes

- Acquire basic knowledge in all aspects of biological sciences and in-depth understanding in at least one major area of biology
- Develop skills in scientific problem solving, statistics and information technology
- Understand the latest developments and advancements in biology
- Appreciate the importance of biological conservation and environmental issues

Views of current students

Biology programme offers me diverse opportunities to explore different fields in Biology. From the course HK flora and vegetation, I have learnt the importance of plants in our daily life through fascinating field trips. We can acquire basic knowledge through live specimen observation in biodiversity laboratories, and even animal and flower dissections. I am also grateful to Professor Zhuang for allowing me to do my final year project in her laboratory. It helps me to improve my laboratory skills and know what researchers do. I am joyful for working and HIKING with my lab mates! All these enrich my knowledge and my life!

Wun, Cheuk-ling (Icy)

Biology programme allows me to choose from a variety of elective courses so I can focus on my interest. For example, I chose to study evolutionary science, developmental biology and marine biology according to my own interest. The professors and teaching staff were very helpful. During my senior experimental project, I received guidance from two professors and a few postgraduates which helped me design the project and learn how to do the experiments and analysis.

Biology students love plants and animals. My classmates always go hiking and observe plants, butterflies and birds on their way. They are all very helpful and are willing to share their knowledge with me. We are good friends inside and outside classroom.

Wong, Hiu Kwan (Crystal)

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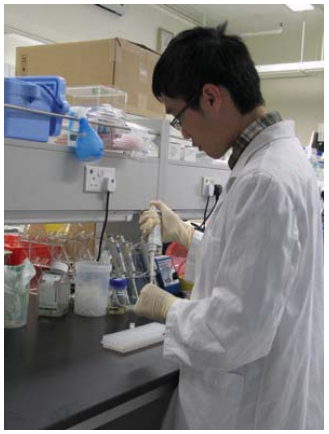
Background

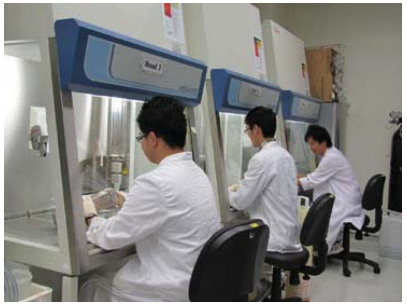
Cell and Molecular Biology (CMB) is an interdisciplinary field that represents the frontiers of biology and medicine. Advances in multi-omics sequencing approaches and imaging techniques have signalled a shift in modern biology to focus on understanding the function of genes at the molecular, cellular and organismic levels.



It is in this background that the University launched the Cell and Molecular Biology programme in 2008. As the first in the region to focus on the study of molecular and cellular biology, the programme offers an integrated curriculum that provides students a solid knowledge base in areas such as stem cell biology, cancer cell biology, organelle dynamics, genomics and more. CMB students receive intensive training in laboratory techniques, knowledge gathering and analysis as well as scientific communication, all with the goal of preparing students for undertaking future research-related work in CMB and beyond.

Mission

- To provide excellent training and education that equip students with a solid foundation for developing a career in biological and biomedical sciences
- To become an internationally recognised education centre in Hong Kong and a regional hub for cutting-edge research in cell and molecular biology



Study Focus

- Research methods and scientific communication
- Stem Cell Biology, Cancer Cell Biology and Neuronal Cell Biology
- Genomics, Transcriptomics & Metabolomics
- Contemporary topics in Cell Biology and Molecular Biology
- Fundamentals in Biochemistry and Genetics

Elective Areas

- Independent research in Cell & Molecular Biology
- Advanced topics offered by other SLS programmes:
  - Biology: Physiology, Developmental Biology
  - Biochemistry: Clinical biochemistry, Neuroscience, Immunology, Molecular Biotechnology: Animal, Plant and Microbial Biotechnology, Genetic Engineering
- Biomedical Engineering offered by the Faculty of Engineering
- Statistics: Biostatistics

Curriculum Highlights

- Student-oriented capstone courses using a one-to-one mentoring approach
- Intensive project-based laboratory training
- An integrated programme covering cutting-edge research topics in cell and molecular biology on top of a solid knowledge base in life sciences
- Communication skills and problem-solving skills essential for further studies, career development and lifelong learning

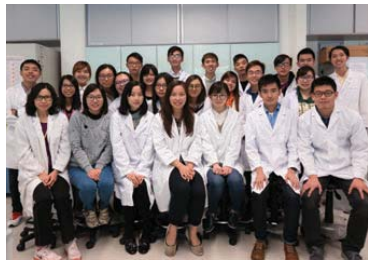
Expected learning outcomes

- Acquire fundamental knowledge in the fields of cell and molecular biology
- Obtain core laboratory skills essential for a successful research career
- Cultivate a strong sense of responsibility and teamwork spirit

Views of current students

The one-to-one mentoring approach in STOT courses provides students with an extraordinary angle to appreciate the wonderful scientific world. The family-like atmosphere in CMB also allows good interactions among teachers, staff and students. The project-based CMB lab courses are fascinating – not only did we learn the essential techniques for molecular cloning, we also worked with plant cells and mammalian cells for our cell biology projects.

MA Tsz-Ching Charlotte



I think the CMB program is perfect for those who dream to become researchers. Not only does it provide us with practical laboratory training, it also sharpens our communication and logical reasoning skills. What's more, studying CMB let me connect and develop lasting friendships with a group of cheerful friends, who share common goals and interests with me. I found studying CMB to be absolutely fun.

TO Ching Yuet Andrew

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Environmental Science

Background

Environmental Science is an integrated science using the basic knowledge and skills of applied biochemistry, biology and chemistry to assess and resolve environmental problems. In response to the growing public concerns about environmental protection and conservation issues, the University established the Environmental Science programme in 1994.

We foster our students with training in ecology, environmental chemistry, pollution control, waste management, biodiversity, conservation, toxicology and health, energy research, environmental impact assessment, and policy development. Our body of lecturing staff comprises professors from the School of Life Sciences and Department of Chemistry, as well as other professionals from related disciplines. In addition, our Advisory Committee, composed of the specialists from the Government, industries, and other academic sectors, also provides precious advice on curricular matters, thus improving the relevance of our graduates to the local need in particular, and that of overseas as well.

Mission

- To provide wide multidisciplinary background in environmental sciences with good communication skills
- To cultivate high level of competence in scientific understanding of environmental issues with creative idea in solving environmental problems
- To train our students with the appropriate professional techniques in addressing different environmental issues

Curriculum

Enviromental Science (ENSC)

Study Focus:

- Ecology
- Environmental Chemistry & Instrumentations
- Environmental Impact Assessments
- Environmental and Biochemical Toxicology
- Environmental Instrumentation Techniques

Elective Areas:

- Chemical Treatment Processes
- Conservation Biology
- Environmental Biotechnology
- Environmental Protection & Pollution Control
- Environmental Health
- Field Study
- Hong Kong Flora and Fauna
- Internship
- Marine Biology
- Electives from other programmes

Curriculum Highlights

- Elective courses from the Department of Geography and Resource Management in Faculty of Social Science and the Public Health Programme in Faculty of Medicine, such as, Urban Environmental Problems, Ecosystem Restoration and Management, Hydrology and Water Resources, Biostatistics, Soil Science, Environment and Health, etc.
- Elective courses from Chemistry and Earth System Science in Faculty of Science, and Energy and Environmental Engineering in Faculty of Engineering, such as Energy Utilization and Human Behavior, Atmospheric Science, Chemistry in Biofuel, etc.

Expected learning outcomes

- Understand the core knowledge covering environmental chemistry, biological conservation, toxicology and environmental impacts
- Develop to be an active researcher and professional in various aspects of environmental science with innovative ideas
- Adapt to fast-changing social environment to stay competitive in job market and be able to join the HKIQEP, Hong Kong Institute of Qualified Environmental Professionals, as a member after graduation.

Views of current students

Being a nature lover, I am interested in the local biodiversity and concerned about the environmental issues, so I found the knowledge learnt in the Environmental Science programme intriguing and practical. The Environmental Science programme has provided me with interdisciplinary knowledge related to environment including toxicology, environmental chemistry, environmental impact assessment as well as environmental protection and conservation. Through lectures, laboratory sessions and field studies, I was equipped with the knowledge and skills that are important to my future development and I became more aware of the current environmental issues.

Lau Ching Yee

"In addition to classroom teaching, the programme offered us laboratory and field work experiences across different areas – from EIA, chemical analysis to ecological field study. A solid foundation in chemistry and research skills is useful for future laboratory work, while the knowledge in biology, law and regulations in conservation and pollution control is advantageous to those who are interested in site surveying, policy assessment, etc.

I was interested in soil and plants. It was great that one could take courses in GRMD and BIOL as electives, and my final year project was about analyzing soil health in farmland. With regard to extra-curricular activities, the faculty would inform us about seminars, internship and volunteering opportunities from time to time, and I chose to work part time in herbarium. I was also engaged in a student co-op for promotion of sustainability on campus which gave me add-on skills in community and educational work."

Wong Hiu Yan

Career prospect

Half of our graduates directly involve in environmental related jobs after graduation. They work in government departments, consulting firms, green groups, and commercial sectors focusing on various aspects of environmental issues, from green purchasing, carbon audit, to environmental impact assessments and tree management. Other graduates become post-graduate students or find jobs in schools as teachers, in the business sectors as administrators or marketing officers.

Contact

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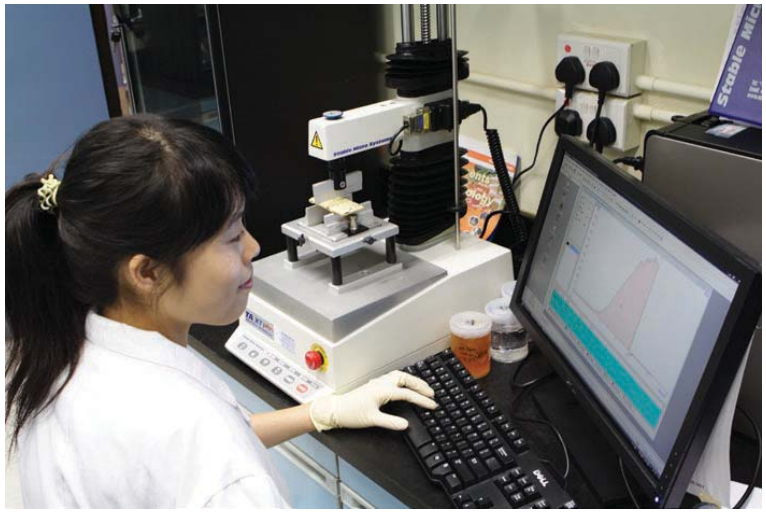
Food & Nutritional Sciences

Background

Food safety and prudent diet safeguarding the quality of our lives have become increasingly important. The rapid advancement of nutrition knowledge and the expansion of the food industry further pose new challenges as well as research opportunities in food and nutritional sciences. In order to cope with the increasing demand of specialists in these areas, the Chinese University of Hong Kong started the offering Food and Nutritional Sciences Programme since 1994. Food provides the source of nutrients to human. Although food science and nutritional science are two different subjects, they are inseparable. Therefore, students admitted to our programme are expected to know these two areas. After completion, they will gain the knowledge in both food and nutritional sciences; this background would allow them to work in the food industry, as well as the nutrition/health field. In addition, our programme also prepares students to pursue further study on dietetics.

Mission

- To provide training to students on modern food and nutritional sciences, with an emphasis on the oriental perspective
- To provide research and development expertise that enhances and sustains the competitiveness of the Hong Kong food industry
- To provide support and training to nutrition and its related professions.



Curriculum

Food and Nutritional Sciences (FNSC)

Study Focus:

- Nutrition & Human Development
- Food Chemistry & Analysis
  Nutritional Biochemistry
- General and Food Microbiology
- Fundamentals of Biochemistry & Cell Biology
- Fundamentals in Organic Chemistry, Mathematics, and Physics

Elective Areas:

- Independent research in Food and Nutritional Sciences
- Community Nutrition and Medical Nutritional Therapy
- Food Technology
  Food Product Development and Quality Control
  Food Safety and Toxicology
  Human and Nutritional Physiology
  Advanced topics offered by other SLS programmes:
- *Biology:* Genetics
- *Biochemistry:* Immunology, Endocrinology
  Environmental Science: Environmental Toxicology
  Molecular Biotechnology: Genetic Engineering
- *Statistics:* Biostatistics

Specialization: Nutritionist Stream + Disciplines of community nutrition, public health as well as nutrition education and promotion

Expected learning outcomes

- Understand the core knowledge and latest issues in food and nutritional sciences that increase the competitiveness of the students in the labor market
- Acquire abilities to access, retrieve and critically evaluate information relevant to food and nutritional sciences
- Apply the knowledge of food and nutritional sciences into real-life situations

VIEWS OF CURRENT STUDENTS

I chose Food and Nutritional Sciences Program as my major because it is more applicable and closely related to our everyday life. It includes the studies of both food and nutrition, which are inseparable but actually two different disciplines. Food science mainly focuses on food itself, including food handling, manufacturing, and safety, while nutrition science investigates the nutrition needs of our body and how our body reacts to the nutrients. After learning those courses, we would be able to understand and explain most of the phenomenon that we usually come across in our daily life, such as the reason why sugar becomes brown in color after heating and why vitamin A is essential to night vision. The broad topics discussed in the program are definitely an inspiring and valuable knowledge base for our future career or postgraduate studies in this field.

CHOOK Chui-Yiu

I am a final year student of Food and Nutritional Sciences. This programme may not be very career-oriented, but I can obtain useful and interesting knowledge for my daily lives.

When hear about this programme, many people may focus only on the 'nutrition' part. I do learn a lot about nutrition with the three-year study of this programme. I can make use of what I have learnt to eat healthier as well as suggesting my family and friends to eat healthier depending on their needs. I can also see the health products critically and judge whether their claims are valid.

Apart from nutrition, I also learn a lot about food. As a food lover, I enjoy knowing some sciences in food, such as the chemical structure of food which gives the unique taste, texture and aroma to the food. In addition, I am currently working as a hygiene coordinator in a hotel, and I can apply my knowledge gained in courses related to food safety and hygiene management.

WONG Wing-Yin Renay

CONTACT

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BACKGROUND

Molecular biotechnology is a revolutionary area of scientific discipline that involves the application of gene and protein technology. This state-of-the-art technology has exerted remarkable contributions to agricultural health, environmental, bioenergy, and other bio- industrial areas. Molecular biotechnology is one of the major driving forces shaping the development of human society in the 21st century.

In view of the current needs of increasing manpower and future prospects of biotechnology, the University launched the Molecular Biotechnology programme in 1998. We target students who are interested in genetic engineering, molecular biology, methods in biochemistry, microbial, plant, and animal biotechnology. Other in-depth knowledge from an array of elective courses covering various aspects of cell & developmental biology, animal and plant physiology, immunology and clinical biochemistry, bioinformatic, genomics and proteomics are also provided for students' selection. In addition, we also address the business and social implications of biotechnology, such as government policy, management, intellectual property, and ethical and public concerns.

MISSION

- To provide theoretical and hands-on training to students on the fundamental knowledge, current development, business and social implications of molecular biotechnology
- To cultivate the ability of logical and critical thinking, and scientific communications

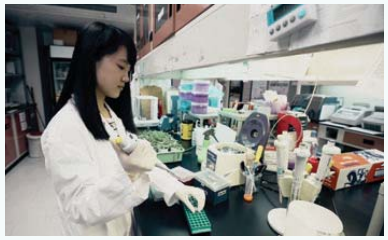
Molecular Biotechnology Programme – 20th Anniversary

Curriculum

Molecular Biotechnology (MBTE)

Study Focus:

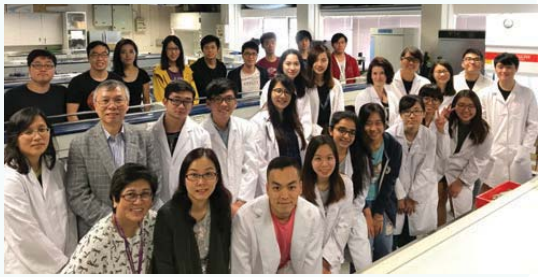
- Molecular Biotechnology in Animals, Plants and Microorganisms
- Business & Social Aspects of Biotechnology
- Methods in Molecular Biotechnology
- Methods in Biochemistry
- Genetics & Genetic Engineering
- Cell Biology & Diversity of Life
- Microbiology
- Fundamentals in Organic Chemistry, Mathematics, and Physics



Elective Areas:

- Independent research in Molecular Biotechnology
- Medical Biotechnology
- Advanced topics offered by other SLS programmes:
  Biochemistry: Protein and Enzymes, Bioenergetics and Metabolism, Immunology, Clinical Biochemistry
  Biology: Physiology, Developmental Biology
  Cell & Molecular Biology: Stem Cell Biology, Cell Biology of Cancer and Neuronal System
- *Statistics:* Biostatistics

Biomedical Engineering offered by the Faculty of Engineering



Curriculum Highlights

- Fundamental knowledge in life science with emphasis on molecular biotechnology
- Hands-on skills through specially designed laboratory courses on methods in molecular biotechnology
- In-depth knowledge in selected areas of your choice. Topics cover various aspects of challenge's fields in biology & biochemistry
- Comprehensive understanding of the business and social implications of biotechnology, such as government policy, management, intellectual property, and ethical and public concerns

Visit biotechnology companies

Career talk given by alumni

Expected learning outcomes

- Gain solid knowledge in life science, with particular emphasis on the principles and potential applications of molecular biotechnology includes genetic engineering, molecular biology, methods in biochemistry, microbial biotechnology, plant biotechnology and animal biotechnology
- Acquire hands-on operational capability in basic skills of molecular biotechnology
- Understand the business and social implications of biotechnology, such as government policy, management, intellectual property, and ethical and public concerns
- Be able to judge the pros and cons of various applications of molecular biotechnology on human society and natural environment
- Acquire hands-on operational capability in basic skills of molecular biotechnology
- Develop competitive quality for future careers in scientific research and development

Alumni Messages

The MBT program gave me a solid foundation in basic molecular biology concepts and opened my eyes to cutting-edge technology of the 21st century. I was able to ask questions and hold discussions with patient, knowledgeable teachers and I had the opportunity to join different research labs during my undergraduate years, including a three-month summer research internship in Canada. In addition, the MBT curriculum made sure I was aware of the booming biotech industry and raised my awareness of patent law and the ethics of genetic engineering. Choosing the MBT program gave me wonderful opportunities to dive deep into the study of molecular biology and to also cast my vision far into the rising biotechnology industry.

Serena Yichen Dai,
the Rhodes Scholar for Hong Kong 2016,
current PhD student in the University of Oxford

Alumni Messages

I have always wanted to contribute to biological science research. However, I just could not seek a particular direction into which I like delving. Fortunately, the MBTE Programme provides not only multidisciplinary life science fields throughout the whole curriculum, but, more importantly, it also furnishes me with tremendous local and overseas opportunities as well as extensive connections with alumni and professors. During my undergraduate years, I was able to participate in different research laboratories and biotech companies such as a study abroad programme at UC Berkeley, a leading University in the U.S. and a full-time R&D internship at a local Start-up in the Science Park. With the diversity of the curriculum, this programme makes me realise the importance of molecular biology in the thriving biotechnology industry, and it becomes an immense inspiration to me to dive deeper into molecular biology research.

Chris Ng Tin Long,
"Gates Cambridge Class of 2021" scholarship
Current PhD student in the University of Cambridge

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Programme Director:
Professor Lam Hon-Ming
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Minimum Admission Requirements

JUPAS Admission

- Students who have taken HKDSE and intend to major in one of the six programmes offered by the School of Life Sciences, i.e. Biochemistry, Biology, Cell and Molecular Biology, Environmental Science, Food and Nutritional Sciences, and Molecular Biotechnology, should apply the SCIENCE broad-based admission scheme (JUPAS Code: JS 4601, Science).

The minimum eligibility to apply is 4 core and 2 elective subjects (4C + 2X OR 4C + M1/M2 + 1X), with the minimum requirements for the 4 core subjects of Chinese Language, English Language, Mathematics, and Liberal Studies at levels 3322 respectively.

JUPAS Catalogue No. / Programme	Elective Requirements (X)		Remarks
	Subject	Level	
JS4601 - SCIENCE	Any **ONE** subject from the following: - Biology - Chemistry - Physics - Combined Science - Integrated Science - Mathematics (Module 1 or 2)	Level 3	Selection Principle: Total score of 5 subjects. Bonus points would be assigned to the 6th and 7th subjects in Category A and Category C.
	Any **ONE** subject in Category A	Level 3	

Non-JUPAS Admission

- Acquire the International Baccalaureate Diploma; OR
- Obtain good grades in Hong Kong Advanced Level (HKAL) Examination or GCE Advanced Level Examination with no less than three Advanced Level subjects; OR
- Possess a qualification which qualifies for university admission in the issuing country (e.g. SAT in USA, UEC/STPM in Malaysia, ATAR in Australia, OSSD in Canada); OR
- Completed an associate degree or higher diploma

Complete and updated information can be found in the webpage of Faulty of Science (http://www.sci.cuhk.edu.hk) Office of Admissions and Financial Aid (http://admission.cuhk.edu.hk/jupas/requirements.html).

SCHOOL OF LIFE SCIENCES | 生命科學學院

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