



Molecular Biology & Biotechnology (MB&B)

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School of Biological Sciences

Faculty of Science, The University of Hong Kong



Kadoorie
Biological
Sciences
Building



School of Biological Sciences

Faculty of Science, The University of Hong Kong

Four majors:

- ✓ **Molecular Biology & Biotechnology Major (MB&B)**
- Biological Sciences Major (BS)**
- Food & Nutritional Science Major (F&NS)**
- Ecology & Biodiversity Major (E&B)**

All under programme 6901 Bachelor of Science

School of Biological Sciences

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Molecular Biology & Biotechnology (MB&B)

Missions:

- To expose students to the cutting-edge biotechnologies of the 21st century
- To provide hands-on laboratory trainings and experimental based projects
- To equip students with skills in translation of basic knowledge into modern industrial and medical applications

36 graduates in June, 2017

**ASIA'S
GLOBAL
UNIVERSITY**

THE NEXT DECADE
Our vision for 2016-2025

Why did you choose Science?

Interest?

Career Goal?

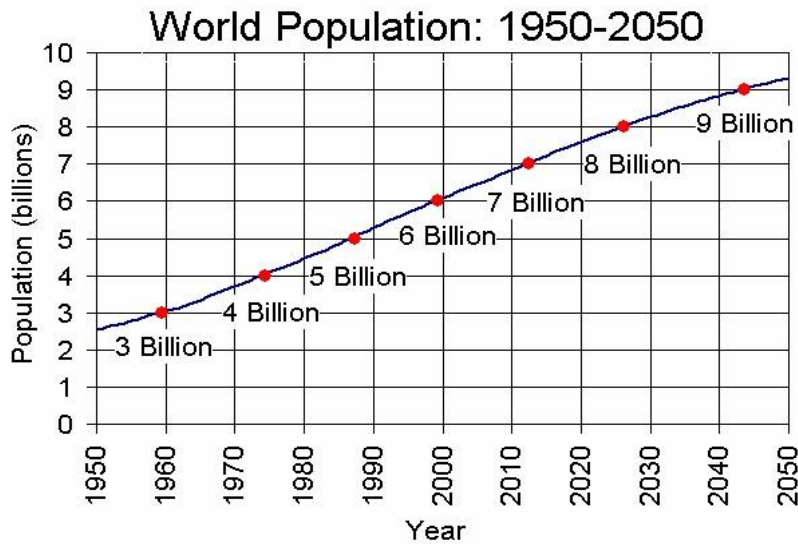
No Other Choice?

Do Not Know?

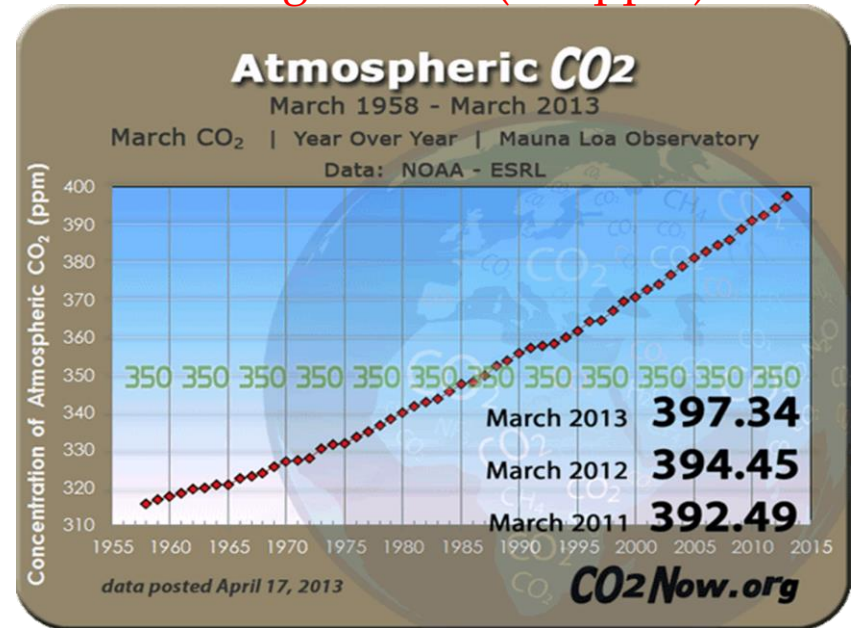
Why Biotechnology is important to human welfare?

- What problems are you facing?

9th August 2018 (410 ppm)



Source: U.S. Census Bureau, International Data Base, June 2009 Update.



Food supply

Global Warming

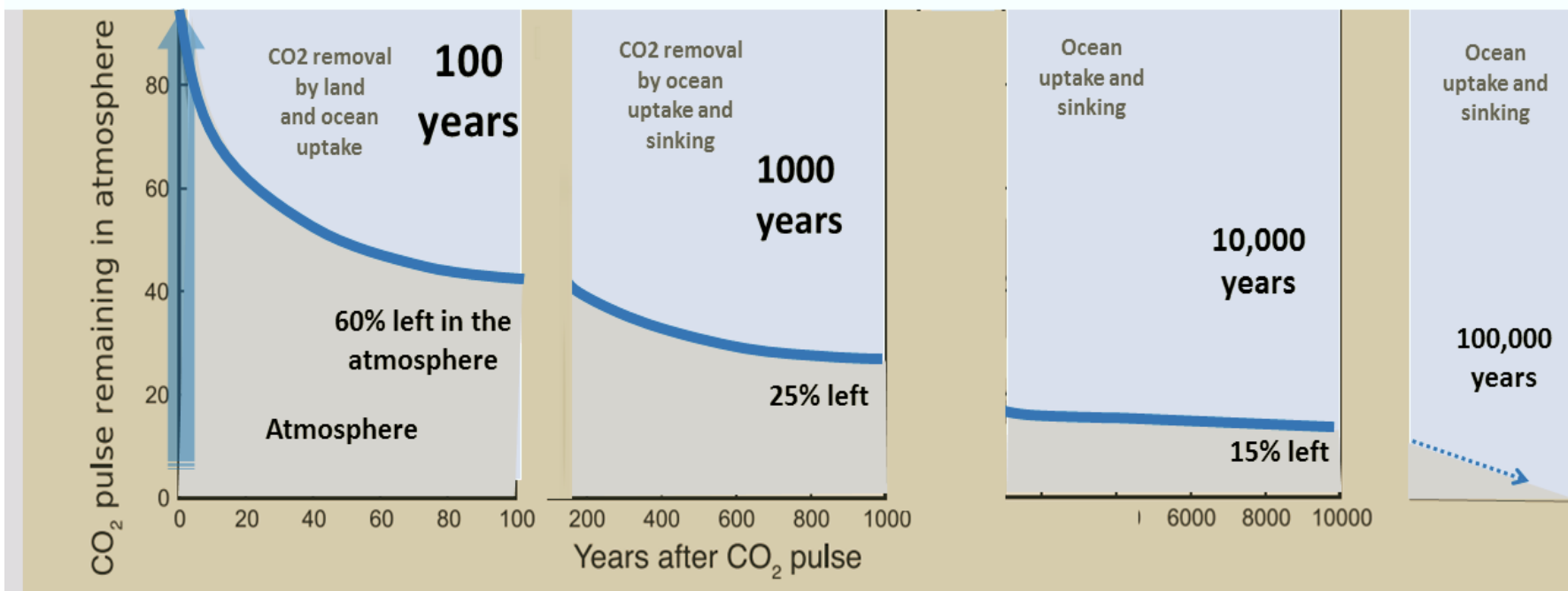
<http://www.co2.earth>

The removal of all the human-emitted CO₂ from the atmosphere by natural processes will take a few hundred thousand years (high confidence) (AR5 Box 6.1)

CO₂ is forever (David Archer 2008)

The atmospheric lifetime of CO₂ is 100,000 years

**1000 years after emissions 25% of CO₂ is left in the atmosphere
...heating the earth surface and acidifying the oceans**



Percentage of emitted CO₂ remaining in the atmosphere in response to an instantaneous CO₂ pulse emitted to the atmosphere

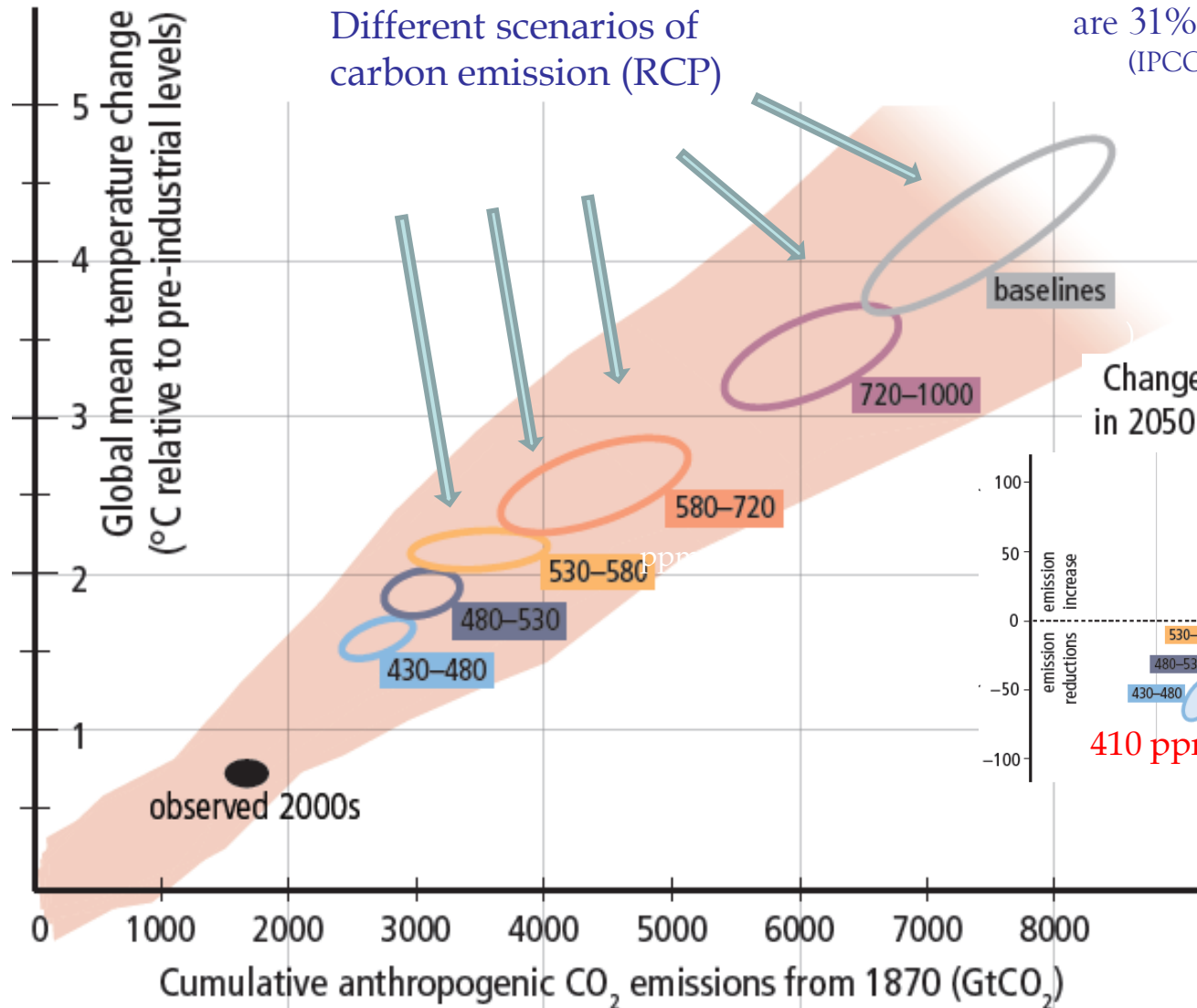
from IPCC AR5 WG1 Box 6.1, Figure 1

Peter Carter

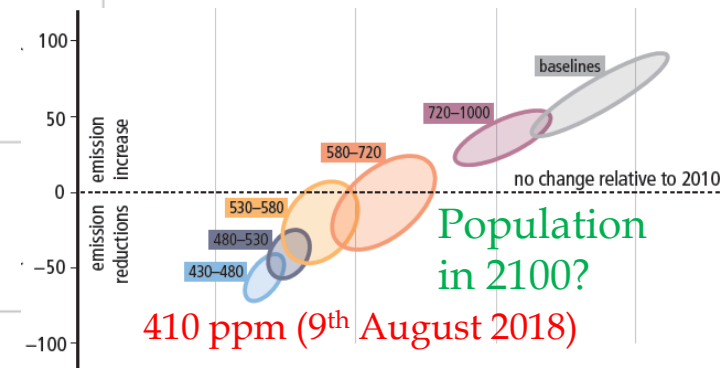
CO₂ absorbed by ocean causes acidification!

Use of fossil fuels increases CO₂ emission and global temperature

The global 2010 GHG emissions are 31% above the 1990 emissions (IPCC AR5 Synthesis Report, 2014, Table SPM.1)

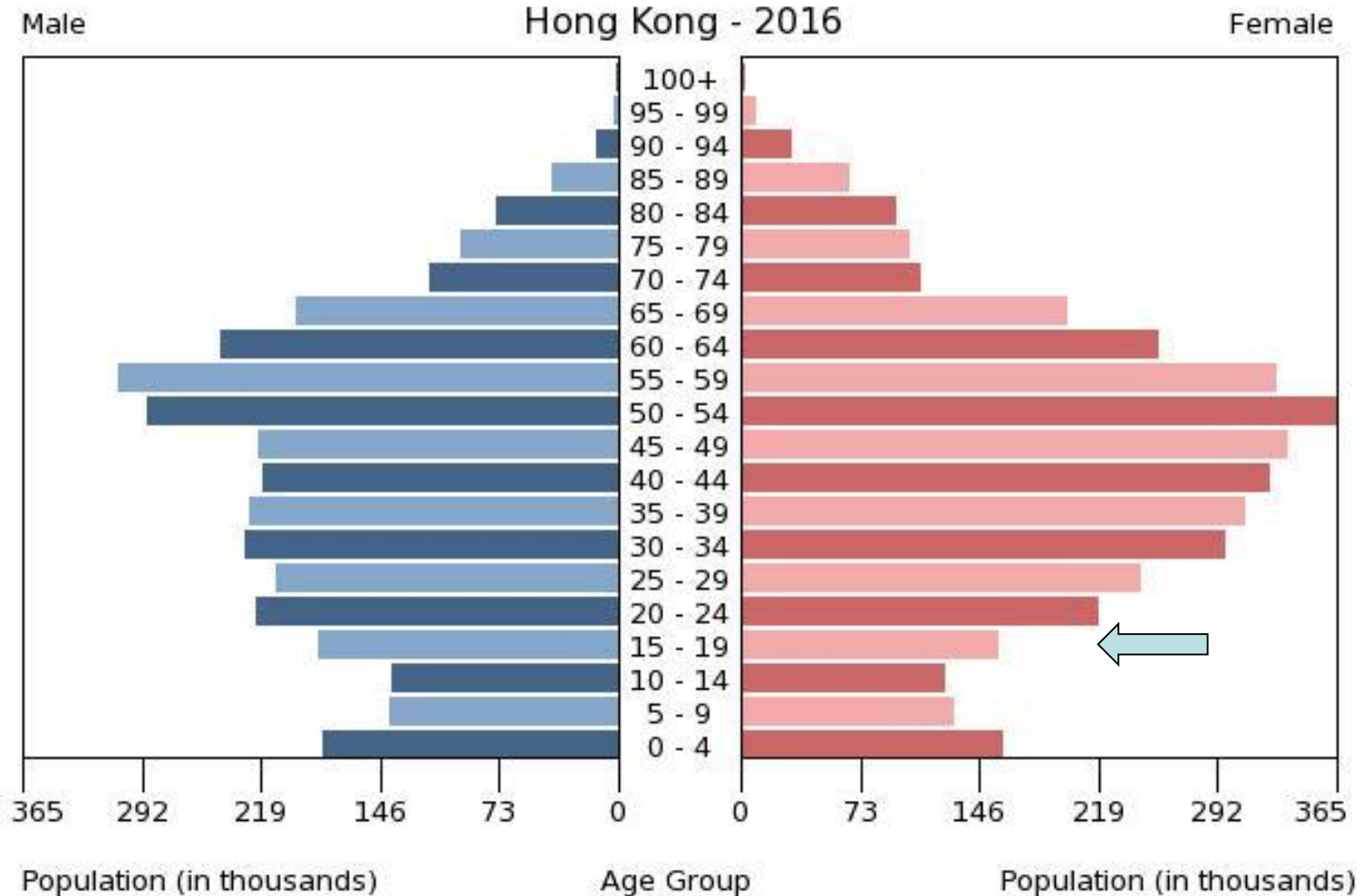


Change in annual GHG emissions in 2050 (% relative to 2010 levels)



(IPCC AR5 Synthesis Report, 2014, Fig. SPM.10)

Why Biotechnology is important to human welfare?



Aging: Healthcare Biotechnology

MBB Curriculum (Major)

Year 1/2

Required courses (96 credits)

1. Introductory level courses (42 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111 Scientific method and reasoning (6)

SCNC1112 Fundamentals of modern science (6)

Disciplinary Core Courses (24 credits)

BIOL1110 From molecules to cells (6)

BIOL2102 Biostatistics (6)

BIOL2103 Biological sciences laboratory course (6)

BIOL2220 Principles of biochemistry (6)

OR

BIOC2600 Basic biochemistry (6)

Disciplinary Electives (6 credits)

BIOL1309 Evolutionary diversity (6)

OR

BIOL2306 Ecology and evolution (6)

MBB Curriculum

Year 2/3/4

2. Advanced level courses (48 credits)

Disciplinary Core Courses (24 credits)

BIOL3401	Molecular biology (6)
BIOL3402	Cell biology and cell technology (6)
BIOL4411	Plant and food biotechnology (6)
BIOL4415	Healthcare biotechnology (6)

Disciplinary Electives (24 credits)

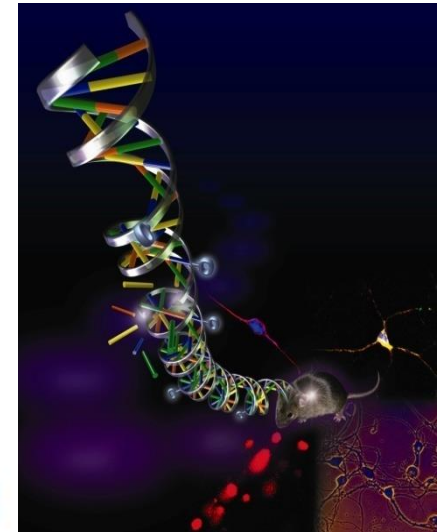
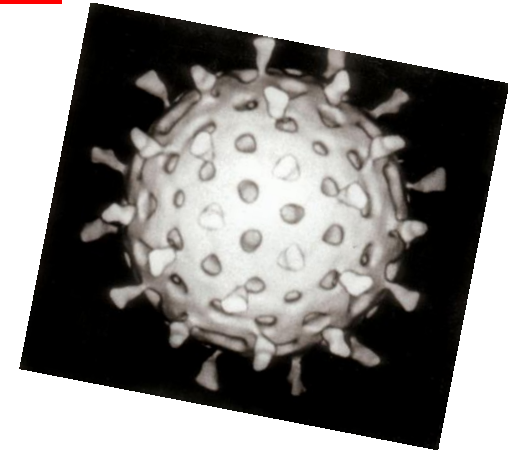
At least 24 credits selected from the following courses:

BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3408	Genetics (6)
BIOL3508	Microbial physiology and biotechnology (6)
BIOL4401	Medical microbiology and applied immunology (6)
BIOL4409	General virology (6)
BIOL4416	Stem cells and regenerative biology (6)
BIOL4417	'Omics' and systems biology (6)
ENVS4110	Environmental remediation (6)

3. Capstone requirement (6 credits)

At least 6 credits selected from the following courses:

BIOL3993	Directed studies in Molecular biology & biotechnology (6)
BIOL4963	Molecular biology & biotechnology internship (6)
BIOL4993	Molecular biology & biotechnology project (12)



HKU Faculty of Science obtains Royal Society of Biology accreditation for two Majors

28 Jan 2018

The 6901 Bachelor of Science Programme, offered by the Faculty of Science of the University of Hong Kong (HKU), has been conferred accreditation of its Ecology & Biodiversity and Molecular Biology & Biotechnology Majors by the Royal Society of Biology (RSB), UK, for the purpose of meeting in part the academic and experience requirement for the Membership and Chartered Biologist (CBiol).

The Ecology & Biodiversity Major is the first programme of its type accredited by RSB in Asia.

Enhancement of the two Majors will be reflected in the

curriculum starting from September 2018, and the intake of cohort 2018-19 will be able to apply for the accredited options of these two Majors.



The Majors of Ecology & Biodiversity and Molecular Biology & Biotechnology at HKU School of Biological Sciences have obtained accreditation from the Royal Society of Biology (RSB), UK.

Graduates from accredited programmes will receive one year of guest membership of the Royal Society of Biology at Associate level.

May progress to Chartered Biologist (CBiol) in UK

MBB Curriculum (Intensive Major)

Year 1/2

(96 → 144 credits)

Introductory level courses (66 credits) (42 for ordinary major)		
Disciplinary Core Courses: Science Foundation Courses (12 credits)		
SCNC1111	Scientific method and reasoning (6)	
SCNC1112	Fundamentals of modern science (6)	
Disciplinary Core Courses (42 credits)		(24 for ordinary major) + 3 courses
BIOL1110	From molecules to cells (6)	
BIOL2102	Biostatistics (6)	
BIOL2103	Biological sciences laboratory course (6)	
BIOL2409	Biotechnology Industry and Entrepreneurship (6)	Quota 40, students major in MBB has priority
BIOL2220	Principles of biochemistry (6)	Take either BIOL2220 or BIOC2600, but not both.
or	BIOC2600	Basic biochemistry (6) Take either BIOL2220 or BIOC2600, but not both.
CHEM1042	General chemistry I (6)	
CHEM1043	General chemistry II (6)	
Disciplinary Electives (12 credits)		(6 for ordinary major) + 1 course
Biol 2408	Green earth-plants and mankind (6)	
BIOL2306	Ecology and evolution (6)	May take either BIOL1309 or BIOL2306, but not both.
BIOL1309	Evolutionary diversity (6)	May take either BIOL1309 or BIOL2306, but not both.
COMP1117	Computer programming (6)	
MATH1011	University mathematics I (6)	
MATH1013	University mathematics II (6)	

MBB Curriculum (Intensive Major)

Year 3/4

2	Advance level courses (66 credits)	(48 for ordinary major)
Disciplinary Core Courses (30 credits)		(24 for ordinary major)
	BIOL3401	Molecular biology (6)
	BIOL3402	Cell biology and cell technology (6)
	BIOL4411	Plant and food biotechnology (6)
	BIOL4415	Healthcare biotechnology (6)
	BIOL4417	"Omics" and system biology (6)
Disciplinary elective (36 credits)		(24 for ordinary major)
	BIOL3107	Plant physiology (6)
	BIOL3205	Human physiology (6)
	BIOL3403	Immunology (6)
	BIOL3404	Protein structure and function (6)
	BIOL3406	Reproduction & reproductive biotechnology (6)
	BIOL3408	Genetics (6)
	BIOL3508	Microbial physiology and biotechnology (6)
	BIOL4401	Medical microbiology and applied immunology (6)
	BIOL4409	General virology (6)
	BIOL4416	Stem cells and regenerative biology (6)
	ENVS4110	Environmental remediation (6)
3	Capstone requirement (12 credits)	
	BIOL4993	Molecular biology & biotechnology project (12) Need GPA > or = 3.0

+ 1 course

+ 2 courses

FYP

Final Year Project

(12 credits) (cGPA 3.0 or above)

Intensive write-up of a topic based on laboratory research

Need a supervisor and required to work in his/her lab

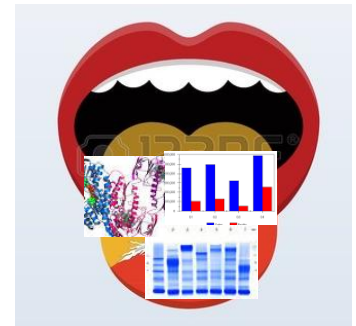
Come up with conclusions based on lab work and other published results

News about SBS seminars:
SBS web → News & Events

Assessments

FYP:

1. Written report 9000-12000 words (by April)
2. Oral presentation 15- 20 min (in early May)
3. Attending 2 postgrad or guest seminars at SBS (during the semesters)



Biotechnology industry and entrepreneurship
Overview of the biotech industry, case studies and start-up

Teachers	Topics	Basic concepts	Companies
Lecture 1 Lim	Introduction 4P in Biotechnology IP rights – Major assets	Business model IP rights PE/PEG/Pipeline	Assignment 1 Team Building
Lecture 2 Lim	Licensing Technology Transfer Office How to raise fund?	Patents & Licensing Business plan	Assignment 2
Lecture 3 Lim	Agrobiotech Business Green Technologies	Plant Biotech Biofuels	Monsanto Syngenta
Lecture 4 Law	How to prepare your business venture -1	Design Thinking Lean Startup	
Lecture 5 Law	How to prepare your business venture -2	Business Model Generation	
Lecture 6 Lim	Diagnostics business T-CAR, Cancer Therapy, Quiz 1	NGS	BGI, GRAIL Quest Diagnostics Kite Pharma
Lecture 7 Dr. Ng	Pharmaceutical Industry Drug Development	Clinical trials	GILEAD Sciences
Lecture 8 Dr. Ng	Clinical Research Organization		WuXi App Tech
Lecture 9 KYY	Stem Cell Biotechnology Quiz 2	Stem Cell	
Lecture 10 BLL	Company Visit to Science Park	Stem Cell Molecular diagnostics	Science Park
Lecture11 BLL	Company Visit to Diagcor	Molecular diagnostics	Diagcor/BGI
Lecture 12/13	Company Presentation		



Dr. Rocky Law
Minor in
Entrepreneurship

Experiential Learning

- **Exchange study programmes** in overseas universities in the UK, USA, Canada, Australia and Europe



- **Internship** (Biological Sciences Internship)
 1. Local and foreign universities
 2. Departments and statutory bodies of the HKSAR
 3. Local biotechnology companies

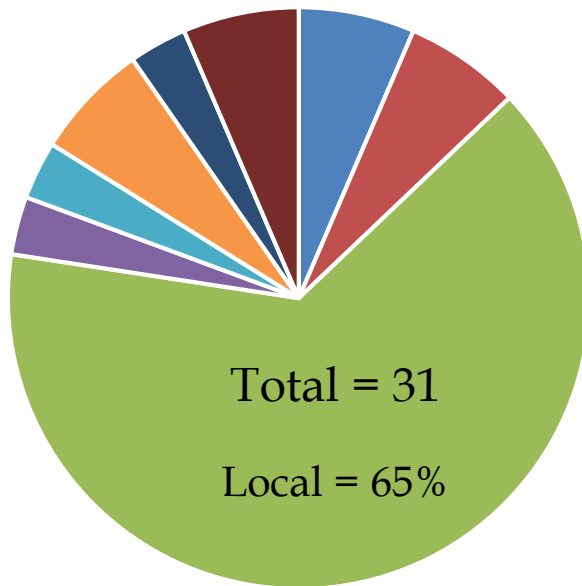


- **Research projects**
 1. Final Year Project (FYP) : Publications
 2. Directed Studies in Biological Sciences
 3. Summer Research Fellowship (SRF)
 4. Overseas Research Fellowship (ORF)



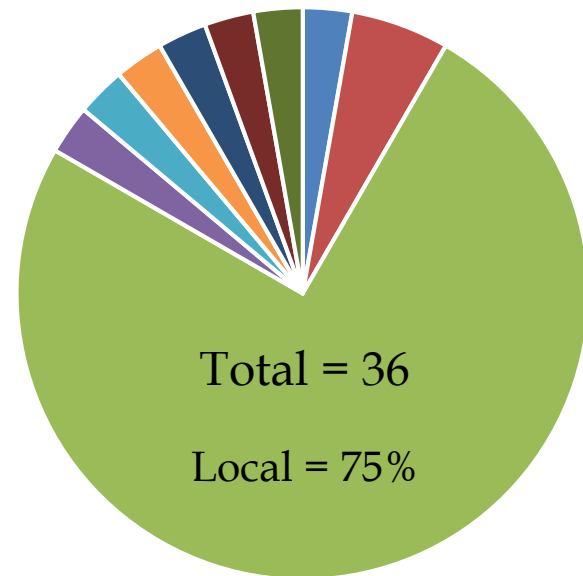
Nationality of MBB graduates

2016



■ Bangladesh ■ China ■ HK ■ India
■ Korea ■ Macau ■ Malaysia ■ USA

2017



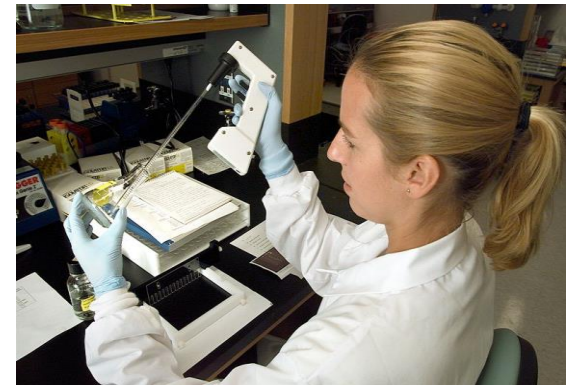
■ Bangladesh ■ China ■ HK
■ India ■ Indonesia ■ Japan
■ Kazakhstan ■ Philippines ■ U.K.

The Job Market

There are plenty of positions available in the job market, and they are not restricted to biotechnology companies, but also many other types of organizations, both in the public and private sector.

HKSAR Government

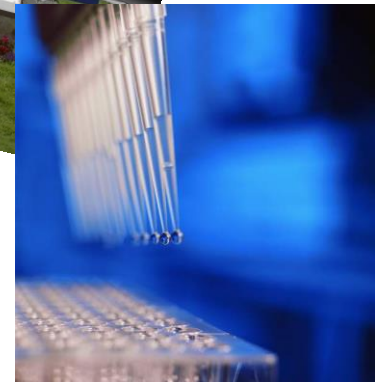
1. The Agriculture, Fisheries and Conservation Department
2. Environmental Protection Department
3. Food and Environmental Hygiene Department
4. Department of Health
5. Hospital Authority
6. Secondary and tertiary educational institutions



- **Commerce, industry and community/personal/social services**
 1. Biotechnology companies (e.g. CK Life Science International Inc.)
 2. Health products companies (e.g. Vita Green Health Products Company Ltd.)
 3. Pharmaceutical industries (e.g. Novartis Pharmaceuticals Ltd.)
 4. Private medical laboratories (e.g. PathLab Medical Laboratories Ltd.)
 5. Research institutes (e.g. Genome Centre, HKU)

Positions include:

- Health product consultants
- Laboratory technicians
- Medical sales representatives
- Quality control officers
- Research scientists
- Sales and marketing executives
- Secondary school teachers
- Teaching/research assistants



Major & Minor options

- Major/Double Major in MBB
- Intensive major in MBB
- Minor in MBB
- Minor in other science subject
- Minor in other Faculties (Business, Social Sciences, Arts, Engineering, etc).

Non-academic skills

- Good Language ability (Oral, Listening)
- Common sense (Know this world!)
- Communication skills (Do not be shy!)
- Mature/Easy characters
- Academic Exchange/Leadership in ECA
- Independent thinking
- Self-motivated learning

I wish you enjoy your study at HKU!!

MBB Student Peer Advisers (SPAs)

- General roles
 - to **offer advice** in relation to academic studies to freshmen; and
 - to **facilitate** freshmen's **smooth transition** from secondary to university education
- Matching between **Student Peer Advisers (SPAs)** and freshmen starting from 2019-20
- You are highly encouraged to contact the following SPAs if you have any questions about your study (their contacts can be found at the Faculty's website)
 - Mr CHIN Honston T (BSc Year 2)
 - Miss CHIN Tsz Ching (Karie) (BSc Year 3)
 - Miss LIM Hui Yuan (BSc Year 3)
 - Miss POON Hoikiu (Kailee) (BSc Year 3)

<https://www.scifac.hku.hk/current/ug/academic/aa/spa>



**Let's talk
to our
SPAs!**

Laboratories

