

Major Title Major in Molecular Biology & Biotechnology (Intensive)

Offered to students admitted to Year 1 in **2020**

Objectives:

Recent advancements in Molecular Biology & Biotechnology have not only cracked important and fundamental problems in life sciences, but also emerged as a mainstay of science and technologies of the 21st century. Innovations from advances in these fields have substantially transformed our daily lives, society and environment. This Major aims to provide comprehensive training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications. Students will be able to gain an understanding of cutting edge molecular biology and biotechnological applications, ranging from exploitation of bioactive substances, genetic engineering for agricultural production, fisheries and aquaculture, biomedical researches for pharmaceutical and clinical purposes, biofuels as alternative energy sources, bioremediation for cleaning up contaminated environments, and wastewater treatment. Built upon a sound theoretical foundation, students will further develop various essential skills in molecular biology and biotechnology through hands-on laboratory trainings and experimental biology-based projects. A feature of this major is to provide key transferable skills by engaging students in inquiry, critical thinking, and problem solving in their learning.

The intensive major involves additional coursework and research/capstone experience. It is designed for students with interest on a fuller scope of the discipline or planning to pursue research studies for a higher degree in any area of life science.

This intensive major has been accredited 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).

Learning Outcomes:

By the end of this programme, students should be able to:

- PLO 1 : describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
- PLO 2 : apply laboratory techniques essential to modern molecular science (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
- PLO 3 : communicate in written and oral communication skills and collaborate with other students effectively (by means of coursework, research-based learning and presentation opportunities in the curriculum)
- PLO 4 : acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
- PLO 5 : gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment (by means of coursework, laboratory-based and experiential learning in the curriculum)
- PLO 6 : equip with knowledges in chemistry, mathematics, statistics, or computer programming, with sufficient depth and breadth to apply these knowledges within a biological context (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)
- PLO 7 : solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically (by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)

Impermissible Combinations:

Major in Biological Sciences

Major in Molecular Biology & Biotechnology

Minor in Molecular Biology & Biotechnology

Required courses (144 credits)

1. Introductory level courses (66 credits)

Disciplinary Core Courses: Science Foundation Courses (12 credits)

SCNC1111 Scientific method and reasoning (6) (Note 1)

SCNC1112 Fundamentals of modern science (6) (Note 1)

Disciplinary Core Courses (42 credits)

BIOL1110 From molecules to cells (6) (Note 1)

CHEM1042 General chemistry I (6)

CHEM1043 General chemistry II (6)

BIOL2102 Biostatistics (6) (Note 1)

BIOL2103 Biological sciences laboratory course (6) (Note 1)

BIOL2220 Principles of biochemistry (6) *Take either BIOL2220 or BIOC2600 to fulfill this 42 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive. (Note 1)*

BIOL2409 Biotechnology industry and entrepreneurship (6)

BIOC2600 Basic biochemistry (6) *Take either BIOL2220 or BIOC2600 to fulfill this 42 credits requirement, but not both. BIOL2220 and BIOC2600 are mutually exclusive. (Note 1)*

Disciplinary Electives (12 credits)

Plus at least 12 credits selected from the following courses:

BIOL1309	Evolutionary diversity (6)	<i>May take either BIOL1309 or BIOL2306 to fulfill this 12 credits requirement, but not both.</i>
BIOL2306	Ecology and evolution (6)	<i>May take either BIOL1309 or BIOL2306 to fulfill this 12 credits requirement, but not both.</i>
BIOL2408	Green earth-plants and mankind (6)	
COMP1117	Computer programming (6)	
MATH1011	University mathematics I (6)	
MATH1013	University mathematics II (6)	

2. Advanced level courses (66 credits)

Disciplinary Core Courses (30 credits)

BIOL3401	Molecular biology (6)	<i>(Note 1)</i>
BIOL3402	Cell biology and cell technology (6)	<i>(Note 1)</i>
BIOL4411	Plant and food biotechnology (6)	<i>(Note 1)</i>
BIOL4415	Healthcare biotechnology (6)	<i>(Note 1)</i>
BIOL4417	'Omics' and systems biology (6)	

Disciplinary Electives (36 credits)

Plus at least 36 credits selected from the following courses:

BIOL3205	Human physiology (6)
BIOL3403	Immunology (6)
BIOL3404	Protein structure and function (6)
BIOL3406	Reproduction and reproductive biotechnology (6)
BIOL3408	Genetics (6)
BIOL3508	Microbial physiology and biotechnology (6)
ENVS3202	Plant physiology and climate change (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)
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Notes:

1. These are core courses in the regular Molecular Biology and Biotechnology Major (96 credits) curriculum.

2. Candidates who have been admitted to Year 1 in 2020-21 (and thereafter) and have achieved any one of the following qualifications are exempted from taking SCNC1111. It is optional for them to take this course. Those who do not take this course should take a 6-credit disciplinary elective course of the science major in lieu.

- Level 4 or above in Mathematics Extended Part Module 1 or 2 in the Hong Kong Diploma of Secondary Education (HKDSE)
- Level 5 or above in Mathematics Higher Level in International Baccalaureate (IB)
- Grade B or above in Mathematics and Further Mathematics in General Certificate of Education Advanced Level (GCEAL)
- Mathematics qualification in Gao Kao will be considered on a case-by-case basis

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the selected primary science major in order to satisfy the degree graduation requirements.