School of Life Sciences

Program of Biological Sciences for International Students (2023)

I. Introduction

Life science has been central to the development of the 21st century natural sciences, and its development is related to people's health and well-being. Today, life and health industry has become a new driving force to promote the development of the world economy. Therefore, the central and local governments set the strategic priorities to foster advancing emerging life science related industries.

Life science is one of the key disciplines of the Southern University of Science and Technology (SUSTech). Founded in 2012, the Department of Biology is among the first established academic departments in the university. The College of Life Sciences was established in 2020. Since its founding, the school has assembled groups of faculty members with diverse research interests and expertise to tackle fundamental problems of life science. All of the faculty members had prior research experience at top internationally-acclaimed universities before joining SUSTech and some of them had been awarded tenures in these universities or research institutions worldwide.

The faculty of the school are supported by the state-of-the-art scientific research platform facilities and talent recruitment programs, such as the Guangdong Provincial Key Laboratory of Cellular Microenvironment and Disease Research, Key Laboratory of Molecular Design for Plant Cell Factory of Guangdong Higher Education Institutes, Guangdong Provincial "Pearl River Talent Program" for Innovation and Entrepreneurship, Cryo-EM Center, Plant and Food Research Institute, SUSTech-UQ Joint Centre for Neuroscience and Neural Engineering and Experimental Animal Center. Concentrated on a number of major areas, namely molecular cell biology, neurobiology, plant biology, systems biology and structural biology, chemical biology, immunology and microbiology, their research focuses on the frontiers of life science and high-impact human health issues, with cross-disciplinary approaches.

The life science program in the school was approved as a key discipline at the provincial level (Guangdong) in 2016. In 2018, the school was authorized to confer doctorate and master's degrees to graduate students, and was designated as a postdoctoral workstation in 2019. These developments set the school on track to be developed as a top-tier academic institution of

Guangdong province.

On this basis, we established a major in Biological Sciences, aiming to inspire students to understand the nature of life at different levels, such as molecules, cells, individuals, etc., through extensive basic training in modern biology and a research-oriented learning environment, while improving students' ability to solve problems by means of scientific methods. What's more, the major of Biological Sciences was approved as a national first-class undergraduate major construction site in 2022.

Program code: 071001

II. Objectives and Learning Outcomes

1. Objectives

In teaching, the major emphasizes the core basic concept of biological science and the concept of applied science, and applies modern scientific methods to encourage students to study biochemistry, microbiology, molecular biology, cell biology, genetics, and animal physiology through theoretical courses, experiments and seminars. Meanwhile, students will learn how to critically evaluate original research literature by means of paper reading and class discussion. Through various ways of learning, students will master valuable analytical, organizational, and communication skills to become professionals who will be competent in a variety of careers or continue their studies.

2. Learning Outcomes

(1) Mastering the basic theoretical knowledge of mathematics, physics, chemistry and life science, and forming a relatively systematic scientific world view and methodology.

(2) Having the ability to write scientific and technological papers in English and to do academic presentations in English.

(3) Understanding the latest developments in the biological science and carrying out scientific research in the laboratory.

(4) Having the comprehensive ability to apply the theoretical knowledge and skills and engaging in research in biological science and related sciences.

III. Study Length, Degree, and Graduation Requirements

1．Study length: 4 years.

2．Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Science

3．The minimum credit requirement for graduation: 151 credits. The specific requirements are as follows.

Module		**Category**	**Minimum Credit Requirement**
General Education Courses	Chinese Language and Culture Module	Chinese Language and Culture	16
	Arts and Physical Education Module	Physical Education	4
		Arts	2
	Competence Development Module	Computer Programming	3
		Writing	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
		Chinese Studies	2
	Mathematics and Natural Sciences Module	Mathematics	12
		Physics	10
		Chemistry	4
		Geoscience + Life Science	3
	GE to Majors Bridging Module	Introduction to Majors	2
Major Courses	Major Required Courses	Major Foundational Courses	19
		Major Core Courses	14
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	12
	Major Elective Courses	Major Elective Courses	26
Total			151
Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module（Foreign Languages & Writing）, Humanities and Social Sciences Module, and GE to Majors Bridging Module.			

IV. Course Requirements for the Mathematics and Natural Sciences Module and Computer Programming

Category	Course Code	Course Name		Requirement	Credits	Terms	Prerequisite	Dept.
Mathematics	MA101a	Mathematical Analysis I	Category A	Required Choose one set from three sets	5	1/Fall	None	Department of Mathematics
	MA102a	Mathematical Analysis II			5	1/Spr	Mathematical Analysis I	
	MA117	Calculus I	Category B		4	1/Fall	None	
	MA127	Calculus II			4	1/Spr	Calculus I	
	MA118	Single-variable Calculus	Category C		4	1/Fall	None	
	MA128	Multivariable Calculus			4	1/Spr	Single-variable Calculus	
	MA107	Advanced Linear Algebra I		Required Choose one from two	4	2/Fall	None	
	MA113	Linear Algebra			4	2/Fall	None	
Physics	PHY101	General Physics I	Category A	Required Choose one set from two sets	5	1/Fall	None	Department of Physics
	PHY102	General Physics II			5	1/Spr	General Physics I	
	PHY105	College Physics I	Category B		4	1/Fall	None	
	PHY106	College Physics II			4	1/Spr	College Physics I	
	PHY104B	Experiments of Fundamental Physics		Required	2	2/Spr	None	
Chemistry	CH103	General Chemistry		Required	4	1/Fall	None	Department of Chemistry
Geoscience + Life Science	BIO103	Principles of Biology		Required	3	1/Fall	None	Department of Biology
Computer Programming	CS109	Introduction to Computer Programming		Required Choose one from five	3	1/Fall	None	Dept. of Computer Science and Engineering
	CS110	Introduction to Java Programming			3	1/Fall	None	
	CS111	Introduction to C programming			3	1/Fall	None	
	CS112	Introduction to Python Programming Python			3	1/Fall	None	
	CS113	Introduction to Matlab Programming			3	1/Fall	None	

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name		Prerequisite
Declare major at the end of the first academic year	MA101a	Mathematical Analysis I	Choose one from three	None
	MA117	Calculus I		None
	MA118	Single-variable Calculus		None
	MA102a	Mathematical Analysis II	Choose one from three	Mathematical Analysis I
	MA127	Calculus II		Calculus I
	MA128	Multivariable Calculus		Single-variable Calculus
	CH103	General Chemistry		None
	BIO103	Principles of Biology		None
Declare major at the end of the second academic year	MA101a	Mathematical Analysis I	Choose one from three	None
	MA117	Calculus I		None
	MA118	Single-variable Calculus		None
	MA102a	Mathematical Analysis II	Choose one from three	Mathematical Analysis I
	MA127	Calculus II		Calculus I
	MA128	Multivariable Calculus		Single-variable Calculus
	CH103	General Chemistry		None
	BIO103	Principles of Biology		None
	PHY101	General Physics I	Choose one from two	None
	PHY105	College Physics I		None
	PHY102	General Physics II	Choose one from two	General Physics I
	PHY106	College Physics II		College Physics I

Note:

1. If the number of students entering a major at the end of the first academic year in the department is greater than or equal to the total number of the teaching-research faculty (PI)*2*60%, all majors in the department may implement the prerequisites for major declaration at the end of the second academic year.
2. If the number of students entering a major at the end of the first academic year in the department is less than the total number of the teaching-research faculty (PI)*2*60%, all majors in the department do not implement the prerequisites for major declaration at the end of the second academic year.
3. Suppose the number of students applying for a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), then the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).
4. For departments that do not implement prerequisites for major declaration at end of the second academic year, if the cumulative number of students applying for a major at the end of the second academic year and the number of students who have entered a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Biological Sciences

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	BIO104	General Biology Laboratory	2	2	1/Spr	Principles of Biology	BIO
	CH106	Organic Chemistry B	3		1/Spr	General Chemistry	CH
	BIO201	Biochemistry（Macromolecules）	3		2/Fall	Principles of Biology, General Chemistry	BIO
	BIO203	Microbiology	3		2/Fall	None	BIO
	BIO202	Biochemistry II（Metabolism）	3		2/Spr	Biochemistry（Macromolecules）	BIO
	BIO222	Biochemistry and Molecular Biology Laboratory	2	2	2/Spr	General Biology Laboratory, Biochemistry（Macromolecules）	BIO
	BIO210	Biostatistics	3		2/Spr	Mathematical Analysis I or Calculus I or Single-variable Calculus	BIO
	Total		19	4			
Major Core Courses	BIO301	Genetics	3		2/Spr	None	BIO
	BIO206	Cell Biology	3		3/Fall	Principles of Biology	BIO
	BIO208	Cell Biology Laboratory	2	2	3/Fall	Cell Biology	BIO
	BIO 311-14	Animal Physiology	3		3/Fall	None	BIO
	BIO320	Molecular Biology	3		3/Spr	Biochemistry（Macromolecules）	BIO
	Total		14	2			
Practice-based Courses	BIO492	Thesis	12	12	4/Fall-Spr.	None	BIO
	Total		12	12			
Total			45	18			

Note：
CH106 Organic Chemistry I can be equivalent to CH 203 Organic Chemistry B.

Table 2: Major Elective Courses

Program of Biological Sciences-Restricted, 6 credits

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
BIO481	Integrated Laboratory Research Training--Plant Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO482	Integrated Laboratory Research Training--Immunology & Microbiology	6	6	2,3/Fall-Spr.	None	BIO
BIO483	Integrated Laboratory Research Training--Systems Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO484	Integrated Laboratory Research Training--Chemical Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO485	Integrated Laboratory Research Training--Neuroscience	6	6	2,3/Fall-Spr.	None	BIO
Total		30	30			
Note: Only after passing the course of “Biological Integrated Laboratory Research Training”, students can choose BIO492 “Thesis”.						

Program of Biological Sciences-Elective, 20 credits

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Elective Courses offered by Department of Non-Biology						
CH102-15	General Chemistry Laboratory	2	2	1/Spr	General Chemistry	CHEM
CH208	Organic Chemistry Laboratory	2	2	2/Fall	General Chemistry Laboratory	CHEM
CH216	Analytical Chemistry Ⅰ	3		2/Fall	General Chemistry	CHEM
CH217	Analytical Chemistry Laboratory I	2	2	2/Fall	General Chemistry	CHEM
CH313	Chemical Biology	3		3/Fall	General Chemistry	CHEM
CH317	Medicinal Chemistry	3		4/Fall	None	CHEM
ESE313	Introduction to Ecology	3		3/Fall	None	ESE
OCE203	Marine Biology	3		2/Spr	None	OCE
Major Elective Courses offered by Department of Biology						
BIOS201	Genome, why we are different?	2	2	1/ Smr	None	BIO
BIO205	Microbiology Laboratory	2	2	2/Fall	General Biology Laboratory	BIO
BIO207-15	Plant Physiology	3		2/Fall	Principles of	BIO

					Biology	
BIO209-15	Plant Physiology Laboratory	2	2	2/Fall	General Biology Laboratory	BIO
BIO217	Biological Psychology	3		2/Fall	Principles of Biology	BIO
BIO303	Genetics Laboratory	2	2	2/Spr	Genetics, Biochemistry and Molecular Biology Laboratory	BIO
BIO308	Frontier in Life Sciences Seminar and Journal Club	2		2/Spr	None	BIO
BIO309	Computational Biology	3	1	3/Fall	None	BIO
BIO313-15	Animal Physiology Laboratory	2	2	3/Fall	General Biology Laboratory	BIO
BIO336	The Biology of Cancer	3		3/Fall	None	BIO
BIO340	Protein Engineering	3		3/Fall	Biochemistry (Macromolecules)	BIO
BIO347	Basic Principles of Biophysics	3		3/Fall	Biochemistry (Macromolecules)	BIO
BIO401-16	Genetic Engineering	3		3/Fall	Biochemistry (Macromolecules)	BIO
BIO302	Modern Biotechnology	3		3/Spr	Biochemistry (Macromolecules)	BIO
BIO304	Systems Biology	3		3/Spr	Principles of Biology, Biostatistics or Probability and Statistics	BIO
BIO305	Model Organism and Developmental Biology	3		3/Spr	Principles of Biology	BIO
BIO306	Bioinformatics	4	2	3/Spr	None	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	3/Spr	General Biology Laboratory	BIO
BIO310	Neurobiology	3		3/Spr	Biochemistry (Macromolecules)	BIO
BIO331	Protein Structure and Function	3	1	3/Spr	Biochemistry (Macromolecules)	BIO
BIO344	Modern Biotechnology Laboratory	2	2	3/Spr	General Biology Laboratory	BIO
BIO346	Bioseparations	3	1	3/Spr	Biochemistry II (Metabolism)	BIO
BIO350	Genomics	3		3/Spr	Principles of Biology	BIO
BIO405	Immunology	3		4/Fall	Cell Biology	BIO
BIO348	Scientific Writing and Communication	1		4/Spr	None	BIO
BIO470	Summer Off-Campus Internship	2	2	1,2,3/Smr	None	BIO

BIO471	Field Trips I	1	1	1/Smr	None	BIO
BIO472	Field Trips II	1	1	2,3/Smr	None	BIO
BIO473	Field Trips III	1	1	3/Smr	None	BIO
Total		91	29			

Note:
A minimum of 20 credits (include at least 4 lab credits) MUST be taken to fulfill Major Requirements.

Table 3: Overview of Practice-based Learning

Program of Biological Sciences

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CS109	Introduction to Computer Programming	3	1	1/Fall	None	CSE
CS110	Introduction to Java Programming	3	1	1/Fall	None	CSE
CS111	Introduction to C programming	3	1	1/Fall	None	CSE
CS112	Introduction to Python Programming Python	3	1	1/Fall	None	CSE
CS113	Introduction to Matlab Programming	3	1	1/Fall	None	CSE
CH102-15	General Chemistry Laboratory A	2	2	1/Spr	General Chemistry	CHEM
CH208	Organic Chemistry Laboratory	2	2	2/Fall	General Chemistry Laboratory A, Organic Chemistry B	CHEM
CH217	Analytical Chemistry Laboratory I	2	2	2/Fall	Analytical ChemistryI	CHEM
PHY104B	Experiments of Fundamental Physics	2	2	2/Spr	None	PHY
BIO104	General Biology Laboratory	2	2	1/Spr	Principles of Biology	BIO
BIOS201	Genome, why we are different?	2	2	1/ Smr	None	BIO
BIO205	Microbiology Laboratory	2	2	2/Fall	General Biology Laboratory	BIO
BIO209-15	Plant Physiology Laboratory	2	2	2/Fall	General Biology Laboratory	BIO
BIO222	Biochemistry and Molecular Biology Laboratory	2	2	2/Spr	General Biology Laboratory, Biochemistry（Macromolecules）	BIO
BIO303	Genetics Laboratory	2	2	2/Spr	Genetics, Biochemistry and Molecular Biology Laboratory	BIO

BIO208	Cell Biology Laboratory	2	2	3/Fall	Cell Biology	BIO
BIO309	Computational Biology	3	1	3/Fall	None	BIO
BIO313-15	Animal Physiology Laboratory	2	2	3/Fall	General Biology Laboratory	BIO
BIO306	Bioinformatics	4	2	3/Spr	None	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	3/Spr	General Biology Laboratory	BIO
BIO331	Protein Structure and Function	3	1	3/Spr	Biochemistry (Macromolecules)	BIO
BIO344	Modern Biotechnology Laboratory	2	2	3/Spr	General Biology Laboratory	BIO
BIO346	Bioseparations	3	1	3/Spr	Biochemistry II（Metabolism）	BIO
BIO470	Summer Off-Campus Intenrship	2	2	1,2,3/Smr	None	BIO
BIO471	Field Trips I	1	1	1/Smr	None	BIO
BIO472	Field Trips II	1	1	2,3/Smr	None	BIO
BIO473	Field Trips III	1	1	3/Smr	None	BIO
BIO481	Integrated Laboratory Research Training--Plant Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO482	Integrated Laboratory Research Training--Immunology & Microbiology	6	6	2,3/Fall-Spr.	None	BIO
BIO483	Integrated Laboratory Research Training--Systems Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO484	Integrated Laboratory Research Training--Chemical Biology	6	6	2,3/Fall-Spr.	None	BIO
BIO485	Integrated Laboratory Research Training--Neuroscience	6	6	2,3/Fall-Spr.	None	BIO
BIO492	Thesis	12	12	4/Fall-Spr.	None	BIO
Total		102	84			

Curriculum Structure of Biological Sciences