Department of Biology

Program of Biological Sciences for International Students (2021)

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. Since its founding, the Department 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 department 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 five major areas, namely molecular cell biology, neurobiology, plant biology, system biology and structural biology, their research focuses on the frontiers of life science and high-impact human health issues, with cross-disciplinary approaches.

The Department of Biology's life science program was approved as a key discipline at the provincial level (Guangdong) in 2016. In 2018, the Department 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 department 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.

II. Objectives and Learning Outcomes

(I) 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.

(II) Requirements

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 and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Science

The minimum credit requirement for graduation: 138 credits (not including English courses);

Category	Module	Minimum Credit Requirement
General Education (GE) Required Courses (48 credits)	Science	28
	Physical Education	4
	Chinese Languages & Culture	16
General Education (GE) Elective Courses (14 credits)	Humanities	4
	Social Sciences	4
	Arts	2
	Science	4
Major Course (76 credits)	Major Foundational Courses	19
	Major Core Courses	17
	Major Elective Courses	30
	Internship and Undergraduate Thesis / Projects	10
Total (not including English courses)		138

IV. Discipline

Biological Sciences

V. Main Courses

For details please refer to Major Required Course (Foundational and Core Courses) (Table 1).

VI. Practice-Based Courses

See Table 3

VII. Pre-requisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of First Year	MA101B	Calculus I A	
	MA102B	Calculus II A	MA101B
	CH101A	General Chemistry A	
	BIO103	Principles of Biology	
	BIO104	General Biology Laboratory	BIO102B or MED101
Declare major at the end of Second Year	PHY103B	General Physics B (I)	
	PHY105B	General Physics B (II)	PHY103B
	CS102B	Introduction to Computer Programming B	
	BIO201	Biochemistry（Macromolecules）	BIO103，CH101A
	BIO203	Microbiology	

Note:
In addition to the above courses, a major application form and assessment are required when students declare major at the end of First Year.
Students need to complete all the courses above (include the pre-requisites for Major Declaration at the end of First Year) when they declare major at the end of Second Year.

VIII. Requirements for GE Required Courses

(I) Science Module

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Instruction Language	Prerequisite	Dept
MA101B	Calculus I A	4		4	Spr/Fall	B/E	NA	MATH
MA102B	Calculus II A	4		4	Spr/Fall	B/E	MA101 B	MATH
PHY103B	General Physics B (I)	4		4	Spr/Fall	B/E	NA	PHY
PHY105B	General Physics B (II)	4		4	Spr/Fall	B/E	PHY10 3B	PHY
PHY104B	Experiment of Foundamental Physics	2	2	4	Spr/Fall	B/E	NA	PHY
CH101A	General Chemistry A	4		4	Spr/Fall	B/E	NA	CHEM
CS102B	Introduction to Computer Programming B	3	1	4	Spr/Fall	B/E	NA	CSE
BIO103	Principles of Biology	3		3	Spr/Fall	B/E	NA	BIO
Total		28	3					

(II) Physical Education

Course Code	Course Name	Credits	Hours/week	Terms	Instruction language	Prerequisite	Dept.
GE131	Physical Education I	1	2	Fall	C	NA	PE Center
GE132	Physical Education III	1	2	Spr	C	NA	
GE231	Physical Education III	1	2	Fall	C	NA	
GE232	Physical Education IV	1	2	Spr	C	NA	
GE331	Physical Education V	0	2	Fall	C	NA	
GE332	Physical Education Ⅵ	0	2	Spr	C	NA	
Total		4	12				

GE131、GE132、GE231、GE232、GE331、GE332 are required PE courses offered by Center For Physical Education. Students are required to select a specific sport program each semester. Student who meets the exemption conditions stated in "SUSTech Physical Education Course Exemption Regulation" can apply for exemption from GE331 and GE332.

(III) Chinese Languages & Culture

Course Code	Course Name	Credit	Hours/week	Term	Language Instruction	Prerequisite	Dept.
CLE008	Elementary Chinese I	2	4	1/Fall	B	NA	CLE
CLE009	Elementary Chinese II	2	4	1/Spr	B	CLE008	
CLE027	Intermediate Chinese I	2	4	2/Fall	B	CLE009	
CLE028	Intermediate Chinese II	2	4	2/Spr	B	CLE027	
CLE031	Advanced Chinese I	2	4	3/Fall	B	CLE028	
CLE032	Advanced Chinese II	2	4	3/Spr	B	CLE031	
CLE033	Chinese Culture	2	2	Spr/Fall	B/E	NA	CLE/ HUM/ SSC
CLE034	Chinese History	2	2	Spr/Fall	B/E	NA	

(IV) English Language

Students will undertake the English Placement Test and be placed into three levels according to the result of the test and their performance in the National College Entrance Exam. Students at different levels are required to take the courses with a different credit value in total.

Level A: 8 credits; SUSTech English III, English for Academic Purposes and 2-credit CLE elective course

Level B: 12 credits; SUSTech English II, SUSTech English III, English for Academic Purposes, and 2-credit CLE elective course

Level C: 14 credits; SUSTech English I, SUSTech English II, SUSTech English III, and English for Academic Purposes.

List of English Language Courses

Course Code	Course Name	Credit	Hours/week	Language Instruction	Prerequisite	Dept	Notes
CLE021	SUSTech English I	4	4	E	NA	CLE	Required
CLE022	SUSTech English II	4	4	E	CLE021		
CLE023	SUSTech English III	4	4	E	CLE022		
CLE030	English for Academic Purposes	2	2	E	CLE023		
/	(at least one 2-credit CLE elective course)	2	2	E	CLE030		Level A & B Required

IX Requirements for GE Elective Courses

(I) Students are required to complete 4 credits for the Humanities Module and Social Sciences Module respectively, and 2 credits for the Music and Art Module. (Information about the available courses and the instruction language will be announced before the course selection session)

(II) Students are required to complete 4 credits for Science Module.

Course Code	Course Name	Credit	Lab Credits	Hours / week	Term	Language Instruction	Prerequisite	Dept
BMEB131	Introduction to Biomedical Engineering	2		2	Fall	B	NA	BMEB
CH102-17	General Chemistry Laboratory A	1.5	1.5	3	Spr	B	CH101A	CHEM
ESE202	Introduction to Environmental Sciences	2		2	Spr/ Fall	E	NA	ESE
ESE331	Conservation in the Anthropocene	3		3	Spr	E	ESE313	ESE
MA107B	Linear Algebra B	4		4	Spr/ Fall	B/E	NA	MATH
MA212	Probability and Statistics	3		3	Spr/ Fall	B/E	MA102a or MA102B	MATH
Total		15.5	1.5					

X. Major Course Arrangement

Table 1: Major Required Course (Foundational and Core Courses)

Course Category	Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Advised term to take the course	language Instruction	Prerequisite	Dept
Major Foundational Courses	BIO104	General Biology Laboratory	2	2	4	Spr/Fall	1/Spr	B/E	BIO102B or MED101	BIO
	CH106	Organic Chemistry B	3		3	Spr/Fall	1/Spr	B/E	CH101A	CH
	BIO201	Biochemistry（Macromolecules）	3		3	Spr/Fall	2/Fall	B/E	BIO103 CH101A	BIO
	BIO203	Microbiology	3		3	Spr/Fall	2/Fall	B/E	NA	BIO
	BIO202	Biochemistry II（Metabolism）	3		3	Spr/Fall	2/Spr	B/E	BIO201	BIO
	BIO222	Biochemistry and Molecular Biology Laboratory	2	2	4	Spr	2/Spr	B/E	BIO104 BIO201	BIO
	BIO210	Biostatistics	3		3	Spr/Fall	3/Spr	E	BIO103	BIO
	Total		19	4						
Major Core Courses	BIO301	Genetics	3		3	Spr/Fall	2/Spr	B/E	NA	BIO
	BIO303	Genetics Laboratory	2	2	4	Spr	2/Spr	B/E	BIO222 BIO301	BIO
	BIO206-15	Cell Biology	4		4	Spr/Fall	3/Fall	B/E	BIO103	BIO
	BIO208	Cell Biology Laboratory	2	2	4	Spr/Fall	3/Fall	B/E	BIO206-15	BIO
	BIO 311-14	Animal Physiology	3		3	Spr/Fall	3/Fall	B/E	NA	BIO
	BIO320	Molecular Biology	3		3	Spr/Fall	2/Fall	B/E	BIO201	BIO
	Total		17	4						
Practice-based Courses	BIO480A17	Projects of Science and Technology Innovation I	2	2	4	Fall/Spr/Smr	1/Smr	B/E	NA	BIO
	BIO490	Thesis	8	8	16	Spr	4/Spr	B/E	NA	BIO
			10	10						

Note:
CH106 Organic Chemistry I can be equivalent to CH 203 Organic Chemistry B.
Projects of Science and Technology Innovation accept students to start their laboratory training from the 2nd to the 10th semesters.

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
Major Elective Courses offered by Department of Non-Biology									
CH208	Organic Chemistry Laboratory	2	2	4	Fall	2/Fall	B	CH102-17 CH106	CHEM
CH216	Analytical Chemistry I	3		3	Fall	2/Fall	B	CH101A	CHEM
CH217	Analytical Chemistry Laboratory I	2	2	4	Fall	2/Fall	B	CH216	CHEM
CH313	Chemical Biology	3		3	Fall	3/Fall	B	CH101B	CHEM
CH317	Medicinal Chemistry	3		3	Fall	4/Fall	C	CH206 or CH 106	CHEM
ESE313	Introduction to Ecology	3		3	Fall	3/Fall	E	ESE202	ESE
OCE203	Marine Biology	3		3	Spr	2/Spr	B	NA	OCE
Major Elective Courses offered by Department of Biology									
BIOS201	Genome, why we are different?	2	2	4	Smr	1/ Smr	B	NA	BIO
BIO211	Basic Synthetic Biology and Laboratory	2	1	3	Smr	1/ Smr	B	BIO103	BIO
BIO205	Microbiology Laboratory	2	2	4	Spr/Fall	2/Fall	B/E	BIO104	BIO
BIO207-15	Plant Physiology	3		3	Fall	2/Fall	B	BIO103	BIO
BIO209-15	Plant Physiology Laboratory	2	2	4	Fall	2/Fall	B	BIO104	BIO
BIO217	Biological Psychology	3		3	Fall	2/Fall	B	BIO103	BIO
BIO308	Frontier in Life Sciences Seminar and Journal Club	2		2	Spr	2/Spr	B	NA	BIO
BIO350	Genomics	3		3	Spr	2/Spr	B	BIO103	BIO
BIO309	Computational Biology	3	1	4	Fall	3/Fall	B	NA	BIO
BIO313-15	Animal Physiology Laboratory	2	2	4	Fall	3/Fall	B/E	BIO104	BIO
BIO340	Protein Engineering	3		3	Fall	3/Fall	B	BIO201	BIO
BIO401-16	Genetic Engineering	3		3	Spr/Fall	3/Fall	B/E	BIO201 or BIO301	BIO
BIO302	Modern Biotechnology	3		3	Spr	3/Spr	B	BIO201	BIO
BIO304	Systems Biology	3		3	Spr	3/Spr	B	BIO103 MA212	BIO
BIO305	Model Organism and Developmental Biology	3		3	Spr	3/Spr	B	BIO103	BIO
BIO306	Bioinformatics	4	2	6	Spr	3/Spr	B	BIO309	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	2	Spr	3/Spr	B	BIO104	BIO
BIO310	Neurobiology	3		3	Spr/Fall	3/Spr	B/E	BIO201	BIO
BIO323	Advanced Cell Biology	2		2	Spr	3/Spr	B	BIO206-15	BIO

BIO331	Protein Structure and Function	3	1	4	Spr	3/Spr	B	BIO201	BIO
BIO344	Modern Biotechnology Laboratory	2	2	4	Spr	3/Spr	B	BIO208	BIO
BIO346	Bioseparations	3	1	4	Spr	3/Spr	B	BIO202	BIO
BIO348	Scientific Writing and Communication	1		1	Fall	4/Fall	E	NA	BIO
BIO405	Immunology	3		3	Fall	4/Fall	E	BIO206-15	BIO
BIO471	Field Trips I	1	1	2	Smr		B	NA	BIO
BIO472	Field Trips II	1	1	2	Smr		B	BIO471	BIO
BIO473	Field Trips III	1	1	2	Smr		B	BIO472	BIO
BIO480 B17	Projects of Science and Technology Innovation II	2	2	4	Fall/Spr/ Smr		B/E	BIO480A17	BIO
BIO480 C17	Projects of Science and Technology Innovation III	2	2	4	Fall/Spr/ Smr		B/E	BIO480B17	BIO
Total		87	28	115					
Note: A minimum of 30 credits (include at least 4 lab credits) MUST be taken to fulfill Major Requirements.									

Table 3: Overview of Practice-Based Courses

Course Code	Course Name	Credits	Lab Credits	Hours / week	Term	Advised term to take the course	Instruction language	Prerequisite	Dept.
CS102B	Introduction to Computer Programming B	3	1	4	Spr/Fall	1/Fall	B/E	NA	CSE
CH102-17	General Chemistry Laboratory A	1.5	1.5	3	Spr	1/Spr	B	CH101A	CHEM
CH208	Organic Chemistry Laboratory	2	2	4	Fall	2/Fall	B	CH102-17 CH106	CHEM
CH217	Analytical Chemistry Laboratory I	2	2	4	Fall	2/Fall	B	CH216	CHEM
PHY104B	Experiment of Foundamental Physics	2	2	4	Spr/Fall	2/Spr	B/E	NA	PHY
BIO104	General Biology Laboratory	2	2	4	Spr/Fall	1/Spr	B/E	BIO102B or MED101	BIO
BIOS201	Genome, why we are different?	2	2	4	Smr	1/ Smr	B	NA	BIO
BIO211	Basic Synthetic Biology and Laboratory	2	1	3	Smr	1/Smr	B	BIO103	BIO
BIO205	Microbiology Laboratory	2	2	4	Spr/Fall	2/Fall	B/E	BIO104	BIO
BIO209-15	Plant Physiology Laboratory	2	2	4	Fall	2/Fall	B	BIO104	BIO
BIO222	Biochemistry and Molecular Biology Laboratory	2	2	4	Spr	2/Spr	B/E	BIO104 BIO201	BIO
BIO303	Genetics Laboratory	2	2	4	Spr	2/Spr	B/E	BIO222 BIO301	BIO
BIO208	Cell Biology Laboratory	2	2	4	Spr/Fall	3/Fall	B/E	BIO206-15	BIO
BIO309	Computational Biology	3	1	4	Fall	3/Fall	B	NA	BIO
BIO313-15	Animal Physiology Laboratory	2	2	4	Fall	3/Fall	B/E	BIO104	BIO
BIO306	Bioinformatics	4	2	6	Spr	3/Spr	B	BIO309	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	2	Spr	3/Spr	B	BIO104	BIO
BIO331	Protein Structure and Function	3	1	4	Spr	3/Spr	B	BIO201	BIO
BIO344	Modern Biotechnology Laboratory	2	2	4	Spr	3/Spr	B	BIO208	BIO
BIO346	Bioseparations	3	1	4	Spr	3/Spr	B	BIO202	BIO
BIO471	Field Trips I	1	1	2	Smr		B	NA	BIO
BIO472	Field Trips II	1	1	2	Smr		B	BIO471	BIO
BIO473	Field Trips III	1	1	2	Smr		B	BIO472	BIO
BIO480A17	Projects of Science and Technology Innovation I	2	2	4	Fall/Spr/ Smr	1/Smr	B/E	NA	BIO

BIO480B17	Projects of Science and Technology Innovation II	2	2	4	Fall/Spr/ Smr		B/E	BIO480A17	BIO
BIO480C17	Projects of Science and Technology Innovation III	2	2	4	Fall/Spr/ Smr		B/E	BIO480B17	BIO
BIO490	Thesis	8	8	16	Spr	4/Spr	B/E	NA	BIO
Total		61.5	51.5	112					

Table 4: Overview of Course Hours and Credits

Course Category	Total Course Hours	Total Credits	Credit Requirements	Percentage of the Total*
General Education (GE) Required Courses (not including English courses)	1072	48	48	34.8%
General Education (GE) Elective Courses			14	10.1%
Major Foundational Courses	368	19	19	13.8%
Major Core Courses	336	17	17	12.3%
Major Elective Courses	1840	87	30	21.7%
Research Projects, Internship and Undergraduate Thesis/Projects	320	10	10	7.2%
Total (not including English courses)	3936	181	138	100%

* Percentage of the total= Credit requirements of each line / Total credit requirements

Curriculum Structure of Biological Sciences