

Department of Biology

Biological Sciences

I. Introduction

Biological sciences are the study of living organisms to address many of the most important and fundamental questions about the world. Originated from the study of natural environment, plants, and animals, contemporary biological sciences are concerned the molecular structures and processes of cellular life and their roles in the function, reproduction, and development of living organisms.

This major at SUSTech is designed for students seeking a broad-based training in modern biology. The curriculum covers a broad range of courses, including biochemistry, molecular biology, cell biology, genetics, bioinformatics, developmental biology, microbiology, immunology, animal physiology, plant physiology, neurobiology as well as theory-guided experimental practice. Students graduating from this program will have a deep understanding of modern biology, gain a deep appreciation of the workings of life and the natural world, and will also be able to acquire valuable experimental skills as well as skills in analysis, organization, and communication.

II. Objectives

Graduates from the Biological Sciences programs will have demonstrated:

- a. A clear understanding of the major biological concepts and awareness of how these are connected to various areas of the biological sciences and are applicable to everyday life.
- b. An ability to develop and critique hypotheses and to design experiments, models, and/or calculations to address these hypotheses.

- c. The problem solving, analytical, and communication skills.
- d. An ability to read, evaluates, interpret, and apply numerical and general scientific information.
- e. An ability to read, write, and communicate in English.
- f. A familiarity with, and application of safety in good laboratory practices.

Careers – The undergraduate major in biological sciences is an excellent first step towards exciting careers in biology and health sciences. Students who complete our degree programs will be well prepared for professional careers in the health sciences as well as for careers in research and education in the basic biological and biomedical fields, and in many other professions.

III. Period of Study and Degree Requirement

Time length: 4 years

Degree conferred: Bachelor of Science

The minimum credit requirement for graduation: 151.5 credits

IV. Discipline

Biological Sciences

V. Main Courses

For details please refer to General Education Required Courses, Major Required Courses (Table 1), Major Elective Courses (Table 2).

VI. Practice-Based Courses

See Table 3

VII. Course Structure and Credit Requirements

General Education (GE) Required Courses: 66.5 credits;

General Education (GE) Elective Courses: 10 credits;

Major Foundational Courses: 16 credits;

Major Core Courses: 14 credits;

Major Elective Courses: 35 credits;

Undergraduate Thesis/Projects, Research Projects: 10 credits;

The minimum credit requirement for graduation: 151.5 credits.

VIII. Course Arrangement

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

Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Instruction language Advised term to take the course	Prerequisite	Dept.
BIO104	General Biology Laboratory	2	2	4	Spr.	1/Spr.	CH/ EN	BIO
BIO201	Biochemistry (Macromolecules)	3		3	Fall	2/Fall	CH/ EN	BIO
BIO203	Microbiology	3		3	Fall	2/Fall	CH/ EN	BIO
BIO202	Biochemistry (Metabolism)	3		3	Spr.	2/Spr.	CH/ EN	BIO102 BIO201
BIO204	Biochemistry and Molecular Biology Laboratory	2	2	4	Spr.	2/Spr.	CH/ EN	BIO102 BIO201 BIO203 BIO202
BIO320	Molecular Biology	3		3	Spr.	2/Spr.	CH/ EN	BIO
Total		16	4	20				
BIO206	Cell Biology	4		4	Fall	3/Fall	CH/ EN	BIO
BIO301	Genetics	3		3	Fall	3/Fall	CH/ EN	BIO
BIO303	Genetics Laboratory	2	2	4	Fall	3/Fall	CH/ EN	BIO301
BIO311	Animal Physiology	3		3	Fall	3/Fall	CH/ EN	BIO
BIO208	Cell Biology Laboratory	2	2	4	Spr.	3/Spr.	CH/ EN	BIO102 BIO201 BIO203 BIO206
Total		14	4	18				
BIO480*	Projects of Science and Technology Innovation	2	2	4				BIO
BIO490	Thesis	8	8	16				BIO

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours /week	Terms	Instruction language	Prerequisite	Dept.
Elective Courses in Chemistry								
CH104	General Chemistry Laboratory	1	1	2	1/ Spr.			CHEM
CH203	Organic Chemistry I	4		4	2/Fall			CHEM
CH206	Organic Chemistry II	4		4	2/Spr.			CHEM
CH205	Analytical Chemistry	4		4	2/Fall			CHEM
CH313	Chemical Biology	3		3	3/Fall			CHEM
CH317	Medicinal Chemistry	3		3	4/Fall			CHEM
Elective Courses in Math and Physics								
MA204	Probability and Mathematical Statistics	3		3	2/Spr.		GE101 GE102 GE103b	MATH
Elective courses in Biomedical Engineering								
BIO106	Introductory to Biomedical Engineering	2		2	1/Spr.			BME
BIO214	Biomedical Instrumentation	4	2	6	2/Spr.			BME
Elective Courses in Biology								
BIO211	Basic Synthetic Biology and Laboratory	2	1	3	1/Smr.	CH/EN	BIO102	BIO
BIO207	Plant Physiology	3		3	2/Fall	CH/EN	BIO102	BIO
BIO209	Plant Physiology Laboratory	2	2	4	2/Fall	CH/EN	BIO207	BIO
BIO205	Microbiology Laboratory	2	2	4	2/Fall	CH/EN	BIO102 BIO104 BIO203	BIO
BIO308	Frontier in Life Sciences Seminar and Journal Club	2		2	2/Spr.	CH/EN		BIO
BIO309	Computational Biology	3	1	4	3/Fall	CH/EN		BIO
BIO313	Animal Physiology Laboratory	2	2	4	3/Fall	CH/EN	BIO104 BIO311	BIO
BIO331	Protein Structure and Function	3	1	4	3/Fall	CH/EN	BIO201	BIO
BIO305	Model Organism and Developmental Biology	3		3	3/Fall	CH/EN	BIO102	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	2	3/Fall	CH/EN	BIO104 BIO305	BIO
BIO323	Advanced Cell Biology	2		2	3/Spr.	CH/EN	BIO206	BIO
BIO302	Modern Biotechnology Modern Biotechnology	3	1	4	3/Spr.	CH/EN	BIO104 BIO201 BIO204	BIO

							BIO206 BIO301	
BIO304	Systems Biology	3		3	3/Spr.	CH/EN	GE103 BIO102 BIO201 BIO206 (or MA202)	BIO
BIO306	Bioinformatics	4	2	6	3/Spr.	CH/EN	BIO309	BIO
BIO310	Neurobiology	3		3	3/Spr.	CH/EN	BIO102 BIO201 BIO202 BIO206 BIO305	BIO
BIO332	Stem Cell and Regenerative Medicine	2		2	3/Spr.	CH/EN	BIO305	BIO
BIO327	Molecular Cell Biology Laboratory	1	1	2	3/Smr.	CH/EN	BIO102 BIO201 BIO203 BIO206 BIO208 BIO204	BIO
BIO330	Biomolecular Crystallography	2	1	3	3/Smr.	CH/EN	BIO331	BIO
BIO334	Advanced Techniques in Biological Microscopy	2		2	3/Smr.	CH/EN		BIO
BIO401	Genetic Engineering	3		3	4/Fall	CH/EN	BIO201 BIO202 BIO203 BIO206 BIO301	BIO
BIO411	Dynamical Systems Simulation in Biology	3		3	4/Fall	CH/EN	BIO102 BIO206 BIO201 GE101 GE102 GE103b	BIO
BIO403	Molecular Pharmacology	3		3	4/Fall	CH/EN		BIO
BIO405	Immunology	3		3	4/Fall	CH/EN	BIO201 BIO202 BIO203 BIO206 BIO301	BIO
Total		85	18	103				

A minimum of 35 credits MUST be taken to fulfill Major Requirements.

Table 3: Overview of Practice-Based Courses

Course Code	Course Name	Credits	Lab Credits	Hours /week	Terms	Instruction language	Prerequisite	Dept.
CH104	General Chemistry Laboratory	1	1	2	1/Spr.	CH/E N		CHEM
BIO104	General Biology Laboratory	2	2	4	1/Spr.	CH/E N		BIO
BIO211	Basic Synthetic Biology and Laboratory	2	1	3	1/Smr.	CH/E N	BIO102	BIO
BIO209	Plant Physiology Laboratory	2	2	4	2/Fall	CH/E N	BIO207	BIO
BIO205	Microbiology Laboratory	2	2	4	2/Fall	CH/E N	BIO102 BIO104 BIO203	BIO
BIO222	Biochemistry and Molecular Biology Laboratory	2	2	4	2/Spr.	CH/E N	BIO102 BIO201 BIO203 BIO202	BIO
BIO303	Genetics Laboratory	2	2	4	3/Fall	CH/E N	BIO301	BIO
BIO307	Model organism and Developmental Biology Laboratory	1	1	2	3/Fall	CH/E N	BIO104 BIO305	BIO
BIO309	Computational Biology	3	1	4	3/Fall	CH/E N		BIO
BIO313	Animal Physiology Laboratory	2	2	4	3/Fall	CH/E N	BIO104 BIO311	BIO
BIO331	Protein Structure and Function	3	1	4	3/Fall	CH/E N	BIO201	BIO
BO208	Cell Biology Laboratory	2	2	4	3/Spr.	CH/E N	BIO102 BIO201 BIO203 BIO206	BIO
BIO302	Modern Biotechnology	3	1	4	3/Spr.	CH/E N	BIO104 BIO201 BIO204 BIO206 BIO301	BIO

							BIO301	
BIO306	Bioinformatics	4	2	6	3/Spr.	CH/E N	BIO309	BIO
						CH/E N		
BIO330	Biomolecular Crystallography	2	1	3	3/Smr.	CH/E N	BIO331	BIO
BIO327	Molecular Cell Biology Laboratory	1	1	2	3/Smr.	CH/E N	BIO102 BIO201 BIO203 BIO206 BIO208 BIO204	BIO
BIO480	Research Projects	2	2	4				BIO
BIO490	Undergraduate Thesis/Projects	8	8	16				BIO
Total		44	34	84				

Table 4: Overview of Course Hours and Credits

Course Category	Total Course Hours	Total Credits	The Minimum Credit Requirement
General Education (GE) Required Courses	1168	66.5	66.5
General Education (GE) Elective Courses	3144	182.5	10
Major Foundational Courses	320	16	16
Major Core Courses	288	14	14
Major Elective Courses	1698	86	35
Undergraduate Thesis/Projects, Research Projects,	416	10	10
Total	7034	385	151.5