



2024-2027

SEQUENCE PLAN



Department of Biological Sciences
Bachelor of Science Degrees
(Biomedical Emphasis; Zoology Emphasis)

WELCOME to the Department of Biological Sciences

On behalf of the entire faculty and Staff of the Department of Biological Sciences, I welcome you to the University of the Southern Caribbean (USC) located in Maracas Valley, Trinidad.

Biology is the Science of life: therefore, anyone interested in the world around him/her, will be interested in biology. Biology supports an application to many degrees, including medicine, veterinary science, dentistry and physiotherapy. It also supports careers in industry, local government, the health services, and teaching at secondary schools or higher education institutions.

In the Department of Biological Sciences, everything we do is directed towards academic excellence and student success. Students are provided the support and encouragement so necessary to help them attain their goals- and the overwhelming majority of those who do - are successful in their future education or professional pursuits.

The Department of Biological Sciences at USC is truly a family and we strive to sustain an environment in which all students feel valued and are nurtured spiritually, personally and intellectually.

Again let me welcome you with these words of wisdom:

["If you can imagine it, you can achieve it; if you can dream it, you can become it.](#)

Just keep trying, never give up because the only person that can stop you is you."

Welcome,

*Dr. Camille Mitchell
Chair
Department of Biological Sciences*

Biology Advisors:

First & Second year students: Advisement Center

Third & Four year students: Biology Faculty

Each advisor will see students whose **last name** begins with letters assigned to them.

Name	Letters	Office
Angelle Bullard-Roberts	A-B	SC 2nd Floor
Davley-Ann Wilson	C-I	SC 2nd Floor
Dwayne Lawrence	J-P	SC Ground Floor
Camille Mitchell	Q-Z	SC Ground Floor

Course Overload

Students with good performance in their studies may be allowed to take extra credits with the approval from the School Deans, according to the following guidelines:

<u>Overall GPA</u>	<u>Course Load</u>
3.00 - 3.49	17 credits
3.50 - 3.89	18 credits
3.90 - 4.00	19 credits

Before a student can register for an overload, he/she should collect an Overload Form from the Registrar's Office and obtain all of the necessary signatures for approval. Students will **NOT** be allowed to do an overload if they do not have the required GPA.

COURSE SEQUENCE

BACHELOR OF SCIENCE IN BIOLOGY (*BIOMEDICAL EMPHASIS*)

COURSE SEQUENCE

1st Year (Freshman)

31 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL165	Foundations of Biology I	4
CHEM131	General Chemistry I	4
ENGL125	Academic Writing I	3
MATH167	Pre-calculus Trigonometry	3
IDSC110	College Success and Career Planning	1
	Total Credits	15

Second Semester		
BIOL166	Foundations of Biology II	4
CHEM132	General Chemistry II	4
IDSC205 or MUHL220 or MUPF	Introduction to Fine Arts or Music Appreciation or Ensemble (must be the same course)	2
RELT100	God and Human Life	3
COMM104	Communication Skills	3
	Total Credits	16

2nd Year (Sophomore)

33 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL373	Cellular and Molecular Biology	3
PHYS141	General Physics I	4
CHEM231	Organic Chemistry I	3
CHEM241	Organic Chemistry Laboratory I	1
CPTR100	Introductory Computer Tools	3
EDTE354	Philosophy of Education	2
	Total Credits	16

Second Semester		
BIOL374	Genetics	3
ENGL225	Academic Writing II	3
RELT250	Personal Spirituality and Faith	3
PHYS142	General Physics II	4
CHEM232	Organic Chemistry II	3
CHEM242	Organic Chemistry Laboratory II	1
	Total Credits	17

3rd Year (Junior)

37 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL417 or BIOL3800	Immunology or Hematology	3
BIOL348	General Ecology	3
BIOL392 or BIOL425	Epidemiology or Parasitology	3
BIOL453	Research Methods I	1
PEAC110 <i>or</i> PEAC130	Personal Physical Fitness <i>or</i> Special Activities	1
BIOL495	Independent Reading/Research	3
	Total Credits	14

Second Semester		
ZOOL316 <i>or</i> BIOL302	Human Embryology <i>or</i> Biostatistics	2
HLED220	Community & Environmental Health	3
BIOL420	Pharmacology <i>or</i> Medical Botany	3
RELB210	Jesus In His Time and Ours	3
TCED285 <i>or</i> HMEC129	Upholstery <i>or</i> Social & Professional Ethics	1
BIOL454	Research Methods II	1
PSYC101	Introduction to Psychology	3
	Total Credits	16

Third Semester (Summer)		
BOT470	Plant Physiology	4
BIOL499	Internship	3
	Total Credits	7

4th Year (Senior)

26 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL460 or ZOOL465	Human Anatomy or Histology	3
BIOL375 or BIOL475	Microbiology <i>or</i> Biology of Bacteria	3
BCHM421 or BCHM423	Biochemistry or Clinical Biochemistry	4
FREN101 <i>or</i> SPAN101	Conversational French <i>or</i> Conversational Spanish	3
	Total Credits	13

Second Semester		
ZOOL464	Systems Physiology	4
BIOL449	Historical & Philosophical Biology	3
HIST104 <i>or</i> HIST105 <i>or</i> HIST147	World Civilizations I <i>or</i> World Civilizations II <i>or</i> West Indian History	3
RELT340	Religion and Ethics in Modern Society	3
	Total Credits	13

BACHELOR OF SCIENCE IN BIOLOGY (*ZOOLOGY EMPHASIS*)

COURSE SEQUENCE

1st Year (Freshman)

32 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL165	Foundations of Biology I	4
CHEM131	General Chemistry I	4
ENGL125	Academic Writing I	3
MATH167	Pre-calculus Trigonometry	3
IDSC110	College Success and Career Planning	1
	Total Credits	15

Second Semester		
BIOL166	Foundations of Biology II	4
CHEM132	General Chemistry II	4
ENGL225	Academic Writing II	3
RELT100	God and Human Life	3
COMM104	Communication Skills	3
	Total Credits	17

2nd Year (Sophomore)**32 credit hours**

Course Code	Course Title	Credits
First Semester		
BIOL373	Cellular and Molecular Biology	3
PHYS141	General Physics I	4
CHEM231	Organic Chemistry I	3
CHEM241	Organic Chemistry Laboratory I	1
CPTR100	Introductory Computer Tools	3
EDTE354	Philosophy of Education	2
	Total Credits	16

Second Semester		
BIOL374	Genetics	3
IDSC205 or MUHL220 or MUPF	Introduction to Fine Arts or Music Appreciation or Ensemble (must be the same course)	2
RELT250	Personal Spirituality and Faith	3
PHYS142	General Physics II	4
CHEM232	Organic Chemistry II	3
CHEM242	Organic Chemistry Laboratory II	1
	Total Credits	16

3rd Year (Junior)

37 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL348	General Ecology	3
BIOL425 or ZOOL465	Parasitology or Histology	3
BIOL453	Research Methods I	1
ZOOL315 or ZOOL459	Animal Development or Entomology	3
PEAC110 <i>or</i> PEAC130	Personal Physical Fitness <i>or</i> Special Activities	1
BIOL495	Independent Reading/Research	3
Total Credits		14

Second Semester		
ZOOL316	Human Embryology	2
HLED220	Community & Environmental Health	3
BIOL487 <i>or</i> ZOOL484	Biogeography <i>or</i> Animal Behavior	3
RELB210	Jesus In His Time and Ours	3
TCED285 <i>or</i> HMEC129	Upholstery <i>or</i> Social & Professional Ethics	1
BIOL454	Research Methods II	1
PSYC101	Introduction to Psychology	3
Total Credits		16

Third Semester (Summer)		
BOT470	Plant Physiology	4
BIOL499	Internship	3
Total Credits		7

4th Year (Senior)

30 credit hours

Course Code	Course Title	Credits
First Semester		
BIOL460	Human Anatomy	3
BIOL375 <i>or</i> BIOL475	Microbiology <i>or</i> Biology of Bacteria	3
BCHM421 <i>or</i>	Biochemistry NOTE: STUDENTS MUST DO EITHER BCHM421 OR BOT475	4
RELT340	Religion & Ethics in Modern Society	3
FREN101 <i>or</i> SPAN101	Conversational French <i>or</i> Conversational Spanish	3
Total Credits		16

Second Semester		
ZOOL464	Systems Physiology	4
BOT475	Biodiversity of Vascular Plants NOTE: STUDENTS MUST DO EITHER BOT475 OR BCHM421	4
BIOL449	Historical & Philosophical Biology	3
HIST104 <i>or</i> HIST105 <i>or</i> HIST147	World Civilizations I <i>or</i> World Civilizations II <i>or</i> West Indian History	3
Total Credits		14

PLEASE TAKE NOTE OF THE COURSES WHICH HAVE PRE-REQUISITES.

COURSES

CREDITS

Students must earn a minimum grade of C in all prerequisites.

BIOLOGY

BIOL091 Preliminary Biology I

4

BIOL091 is the first part of a two-semester course and provides basic preparation towards Zoology and Botany content so as to give students some background in biological principles. This first part consists of four units: The Principles of Cellular Life (Chemical and Cellular Biology), Genetics, The Principles of Evolution, and The Diversity of Life. This course cannot be taken for credit by Biology Majors but can be used as a pre-requisite for BIOL092 in the absence of the external requirement.

Weekly: two lectures and one 2-hour lab.

BIOL092 Preliminary Biology II

4

Prerequisite: BIOL091

BIOL092 is the second part of a two-semester course that provides basic preparation towards Zoology and Botany content so as to give students some background in biological principles. This second part consists of three units: Plant Anatomy and Physiology, Animal Anatomy and Physiology, and Ecology. This course cannot be taken for credit by Biology Majors but can be used along with BIOL091, as a pre-requisite for BIOL165 in the absence of the external requirement.

Weekly: two lectures and one 2-hour lab.

BIOL107 Concepts of Environmental Science

3

BIOL107 Concepts of Environmental Science is an online class designed for students that do not have a prior knowledge of science. It provides them with the scientific knowledge and understanding that is needed to review environmental issues more objectively. Basic ecological principles, the interrelationships of the natural world, and the application of ecological principles to human activities from a global perspective are covered. Class assignments deal with contemporary environmental issues, maintaining a sustainable environment, and developing positive environmental ethics and Christian stewardship. *There is no lab component for this class.*

BIOL111 Anatomy and Physiology I

4

BIOL111 is the study of cell biology, functional anatomy and control of each organ system of the human being. This course is required for Nursing and Allied Health Majors but can also be taken to satisfy the general education science requirement for non-science majors. *Weekly: two lectures and one 3-hour lab.*

BIOL112 Anatomy and Physiology II

3

Prerequisite: BIOL111

BIOL112 is the second-part of a course on cell biology, functional anatomy and organ system control in human beings. This course is required for Nursing and Allied Health Majors. *Weekly: two lectures and one 3-hour lab.*

BIOL165 Foundations of Biology I**4****Prerequisite:** BIOL092 or CSEC Biology Grade I-II or its equivalent

BIOL165 is the first part of the two-semester foundation course, which provides students with general content in Zoology and Botany, and is designed to form the platform for students majoring in Biology. The course consists of six units: Introduction to Biology, Biochemistry, Cell Biology, Bioenergetics, Genetics, and Evolution. The course is a core requirement for Freshman Biology Majors. *Weekly: three lectures and one 3-hour lab.*

BIOL166 Foundations of Biology II**4****Prerequisite:** BIOL165

BIOL166 is the second part of the two-semester foundation course, which provides students with general content in Zoology and Botany, and is designed to form the platform for students majoring in Biology. The course introduces students to classroom and laboratory studies of The Structure and Life Processes of Plants and Animals, The Diversity of the Plant and Animal Kingdom, and The Concepts of Ecology and Animal Behaviour. This course is also a core requirement for Freshman Biology Majors. *Weekly: three lectures and one 3-hour lab.*

BIOL208 Principles of Environmental Science**4**

BIOL208 is the study of basic ecological principles, how organisms interact with their environment, and the application of ecological principles to human activities. Discussions deal with contemporary environmental issues. Laboratory exercises include a mix of field trips and experiments. This course may be used to fulfil the general education science requirement for non-science majors. *Weekly: three lectures and one 3-hour lab.*

BIOL245 Natural History of Trinidad and Tobago**3**

A course designed to survey the geography, climate, geological history, natural ecosystem, and the flora and fauna of Trinidad and Tobago. This course may be used to fulfil the general education science requirement for non-science majors. *Weekly: two lectures and one 3-hour lab.*

BIOL260 General Microbiology**4**

BIOL260 includes the study of the history, morphology, classification, control, growth, transmission, and pathogenicity of selected bacteria, viruses, rickettsia, fungi, and parasites. It covers the nature of host defences against pathogens, including the acquisition of specific immunity and immune disorders. This course cannot be taken for credit by Biology Majors. *Weekly: three lectures and one 3-hour lab.*

BIOL302 Biostatistics**2****Prerequisite:** STAT120

This course introduces statistical concepts and analytical methods as applied to data encountered in biomedical sciences. It emphasizes the basic concepts of experimental design, quantitative analysis of data, and statistical inferences. Topics include probability theory and distributions; population parameters and their sample estimates; descriptive statistics for central tendency and dispersion; hypothesis testing and confidence intervals for means, variances, and proportions; the chi-square statistic; categorical data analysis; linear correlation and regression model; analysis of variance; and nonparametric methods. The course provides students a foundation to evaluate information critically to support research objectives and product claims and a better understanding of statistical design of experimental trials for biological products/devices. *Weekly: two lectures.*

BIOL348 General Ecology**3****Prerequisite:** BIOL166

BIOL348 is the study of ecological principles as applied to individuals, populations, communities, and ecosystems' levels of organization. Labs feature the characterization of ecological systems using standard field and lab techniques. *Weekly: two lectures and one 3-hour lab.*

BIOL373 Cellular and Molecular Biology**3****Prerequisites:** BIOL166, CHEM132

BIOL373 covers the basic properties of cells and cell organelles. This course examines properties of differentiated cell systems and tissues and how cells produce energy and photosynthesize. Cell organelles are studied to determine how cells function in harmonious ways while molecular biology examines how genetic information is passed on and how genes create and control the structure of living cells. *Weekly: two lectures and one 3-hour lab.*

BIOL374 Genetics**3****Prerequisite:** BIOL373

BIOL374 provides an in-depth, background in all areas of classic Mendelian genetics, population and evolutionary genetics and molecular genetics. The final goal for the student who successfully completes this course is to be conversant in all areas of genetics. *Weekly: two lectures and one 3-hour lab.*

BIOL375 Microbiology**3****Prerequisite:** BIOL166

BIOL375 is designed to convey general concepts, methods, as well as applications of microbiology and the role of microorganisms in the environment and in human disease. Topics include: immunology, bacteriology, virology, and mycology; the morphology, biochemistry, and physiology of microorganisms including bacteria, viruses, and fungi; the diseases caused by these microorganisms and their treatments, and the immunologic, pathologic, and epidemiological factors associated with diseases. The laboratory component of the course provides first-hand experiences that inform, illustrate, expand, and reinforce major concepts discussed in lecture. *Weekly: two lectures and one 3-hour lab.*

BIOL380 Hematology**3****Prerequisite:** BIOL166

The course addresses the structure and function of blood cells, mechanisms and disorders of blood clotting, the use of blood typing and transfusion, detection and the treatment of hematological disorders. Discussions focus on all major blood group systems, antibody characteristics and problems, accepted use of blood components, donor screening, evaluation of transfusion reactions, and prenatal testing. *Weekly: 2 lectures and one 3-hour lab.*

BIOL392 Epidemiology**3****Prerequisite:** BIOL166

The course introduces students to the field of epidemiology, emphasizing methods for assessing factors associated with the distribution and etiology and disease, with emphasis on current, real-world health issues. *Weekly: 2 lectures and one 3-hour lab.*

- BIOL417 Immunology** **3**
Prerequisite: BIOL166
 An introduction to the organization and function of the immune system including the basic properties of hormonal and cell-mediated immune responses, the reactions of antigens and antibodies, the cellular and molecular basis of immunity and changes within the immune system in response to selected diseases. *Weekly: 2 lectures and one 3-hour lab.*
- BIOL420 Pharmacology** **3**
Prerequisite: BIOL166
 General principles of drug action, drugs acting on the autonomic nervous system, and drugs used in treating infectious diseases and cancer. The mode of action, pharmacogenetics, physiologic effects, therapeutic indications, and adverse reactions to these drugs. *Weekly: 2 lectures and one 3-hour lab.*
- BIOL449 Historical and Philosophical Biology** **3**
 BIOL449 involves the examination of biological, paleontological, and geological concepts central to the study of historical events in biological systems. The course considers the interactions of data, theories, and extra scientific concepts in historical biology, within the particular context of a biblical worldview. *Weekly: three lectures.*
- BIOL453 Research Methods I** **1**
 This course draws together all the processes involved in biological research: hypothesis development, hypothesis testing, and communication of results. Students learn quantitative and qualitative methods of analysis using proprietary (e.g., Microsoft Excel) software.
- BIOL454 Research Methods II** **1**
Prerequisite: BIOL453
 An introduction to scientific research with a focus on data analysis. Topics include scientific epistemology, hypothesis formation, probability, normal distributions, sampling, descriptive statistics, graphing, statistical inference, t-tests, analysis of variance, correlation, linear regression, and chi-square analysis.
- BIOL460 Human Anatomy** **3**
Prerequisite: BIOL166
 Human Anatomy is designed for the development of an understanding of the human body. Students will learn the anatomical position, terms, planes, and region pertaining to the human body. A regional approach will be used to cover the following seven topics: general concepts, upper extremity, head and neck, back, thorax, abdomen and pelvis, and lower extremity. *Weekly: 2 lectures and one 3-hour lab.*
- BIOL475 Biology of Bacteria** **3**
Prerequisite: BIOL166
 BIOL475 is the study of the properties of bacteria and illustrates their functions and relationships with other living systems. Topics include: Structure and Function, Classification, and Interaction with the Environment. *Weekly: two lectures and one 3-hour lab.*

- BIOL487 Biogeography** 3
Prerequisite: BIOL166
 BIOL487 is the study of the distribution of plants and animals in relation to their environment, and includes consideration of major biogeographical regions of the world, as well as the role of distribution in adaptive change and diversification of life in the past and present. *Weekly: two lectures and one "Conference Period" or Field Trip*
- BIOL495 Independent Readings/Research** 3
Prerequisite: Approval by Chair
 Independent readings or research in Biology is done through selection of a topic for literature or laboratory research, which is approved by the Chair and carried out under the direction of a member of faculty. **Weekly: As agreed with faculty supervisor.**
- BIOL499 Internship** 2
Prerequisites: BIOL372, Junior standing or above, approval by Chair
 Internships with participating organizations provide students with the opportunity to gain valuable work experience and/or research exposure in their field of study. This practicum course is designed to encourage students to utilize the acquired knowledge and skills toward real life situations, and are approved by the Chair and carried out under the direction of a member of faculty. The internships provide learning opportunities and additional skills that may not be readily available in the normal courses. *Weekly: As agreed with faculty supervisor.*
- BOT349 Medical Botany** 3
Prerequisite: BIOL166
 An integrated study of medicinal plants, exploring botanical structure, products, taxonomical identification of medicinal plants, the historical and cultural uses in relation to therapeutic applications, pharmaceutical products, psycho-activity and toxicity of plants products; human anatomy, health and impacts of medicinal plants. *Weekly: two lectures and one 3-hour lab.*
- BOT468 Marine Botany** 4
Prerequisite: BIOL166
 BOT468 is a systematic study and survey of marine plants, with emphasis on tropical marine species. This course includes a special project, the details of which are determined through consultation with the Course Lecturer. *Weekly: two lectures and one 3-hour lab.*
- BOT470 Plant Physiology** 3
Prerequisite: BIOL166
 BOT470 is a study of plant functions and includes Water Relations, Metabolic Pathways, Growth Regulators, and Photo-morphogenesis. *Weekly: two lectures and one 3-hour lab.*
- BOT475 Biodiversity of Vascular Plants** 3
Prerequisite: BIOL166
 BOT475 is the taxonomic and morphological study of vascular plants, with particular emphasis on plants that are found within Trinidad and Tobago. *Weekly: two lectures and one 3-hour lab, which may involve field trips.*

- ZOOL315 Animal Development** 3
Prerequisite: BIOL166
 ZOOL315 is a study of the cellular and tissue-level events that result in the development of integrated organisms. Vertebrate development is emphasized in using frog and chicken models. *Weekly: two lectures and one 3-hour lab.*
- ZOOL316 Human Embryology** 2
Prerequisite: BIOL166
 Acquaints students with the process of human development and embryology. *Weekly: two lectures.*
- ZOOL425 Parasitology** 3
Prerequisite: BIOL166
 ZOOL425 focuses on “common parasites” that affect humans and animals, with particular attention given to the ecological factors that are related to host-parasite contact, pathogenicity and pathology, as well as treatment and effect on parasitized populations. *Weekly: two lectures and one 3-hour lab.*
- ZOOL454 Vertebrate Zoology** 3
Prerequisite: BIOL166
 ZOOL454 covers the various specialties of Vertebrate Biology, to include Herpetology, Ornithology, and Mammalogy. *Weekly: two lectures and one 3-hour lab.*
- ZOOL459 Entomology** 3
Prerequisite: BIOL166
 ZOOL459 is the study of the fundamental aspects of insect biology, with emphasis on the anatomy, physiology, behaviour, life cycles, ecology and the impact of insects on other organisms. *Weekly: two lectures and one 3-hour lab.*
- ZOOL464 Systems Physiology** 4
Prerequisite: BIOL373
Co-requisite: CHEM132
 ZOOL464 is the study of functional processes used by animals in adjusting to their external environment and controlling their internal environment. Labs involve first-hand analysis of selected aspects of major functional systems. *Weekly: two lectures and one 3-hour lab.*
- ZOOL465 Histology** 3
Prerequisites: BIOL166, BIOL373
 ZOOL465 is the study of the microscopic anatomy, cytology, and the ultrastructure of tissues and organ systems, to include their correlation with functionalities. Emphasis is placed on the “normal” tissues of vertebrates. *Weekly: two lectures and one 3-hour lab.*
- ZOOL484 Animal Behaviour** 3
Prerequisite: BIOL166
 ZOOL484 is the study of the behaviour of animals, to include considerations of social interactions, learning processes, instinct and motivation. Experimental methods examine the behaviour patterns that are characteristic of various species. *Weekly: two lectures and one 3-hour lab.*