

BIOLOGY

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The Biology Department (<https://www.njcu.edu/academics/schools-colleges/william-j-maxwell-college-arts-sciences/departments/biology/>) provides numerous academic options to students desiring either Bachelor of Science (BS) or Bachelor of Arts (BA) degrees in Biology and related fields:

1. Broad-based, BS and BA programs in general biology that provide sound preparation for successful entry to employment, graduate school, and/or professional school;
2. Teacher certification programs for students pursuing careers as K–12 teachers with academic interests in biology;
3. Joint and collaborative programs with the University of Medicine and Dentistry of New Jersey and Jersey Shore Medical Center leading to BA or BS degrees and certifications in Clinical Laboratory Sciences and Allied Health Technology; and
4. Graduate and professional affiliated programs designed to prepare high-performing students for careers in research or professional careers in medicine, dentistry, podiatry or osteopathic medicine.

Faculty advisors assist students in selecting appropriate courses for careers in research, education, government, industry, the medical professions, and other related fields. The Biology Department sponsors the Biology Club, the Nu Pi chapter of Beta Beta Beta Biology Honor Society, and a tutoring service for its majors.

Ethan Prosen, Chairperson

Associate Professor of Biology
College of Saint Scholastica, B.A., Southwest Missouri State University, M.A., University of Louisiana, Ph.D.

Cindy Jo Arrigo

Associate Professor of Biology
New Jersey City University, B.S.; University of Medicine and Dentistry of New Jersey, Ph.D.

Shirley Bartido

Adjunct Faculty

Meriem Bendaoud

Assistant Professor of Biology
Dental Surgeon Diploma; New Jersey City University, B.S.; Rutgers, The State University of New Jersey, Ph.D.

Reed Carroll

Associate Professor of Biology
Cornell University, B.A.; Harvard University, Ph.D.

Natalia Coleman

Associate Professor of Biology
St. Petersburg State Agricultural University, B.S., M.S., Ph.D.

Allison Fitzgerald

Assistant Professor of Biology
University of Maryland, B.S.; Stony Brook University, M.S.; CUNY Graduate Center, NYC, and College of Staten Island, Ph.D.

Laine Giovanetto

Associate Professor of Biology
College of Lake County, A.S., Southern Illinois University, A.S., B.S., Florida Institute of Technology, M.S., Ph.D.

John Grew

Professor of Biology
University of Massachusetts-Lowell, B.S., M.S.; New York University, Ph.D.

Kristina Harb

Adjunct Faculty

Carlos Morales

Adjunct Faculty

Laura Pannaman

Professor of Biology
Brooklyn College, B.A., M.A.; The Graduate Center, City University of New York, Ph.D.

Programs

Various discipline-specific concentrations that will prepare students for multiple fields of employment or areas of additional undergraduate/graduate study are noted below. Course requirements for each concentration are explained in detail. The requirements for graduation, in addition to completion of the major area, are listed on "Undergraduate Degree Requirements (<https://catalog.njcu.edu/undergraduate/undergraduate-degree-requirements/>)."

- Biology, B.A. (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/biology-ba/>)
- Biology, B.S.
- Biology (NJCU) and Biomedical Engineering (NJIT), Dual Degree (3 + 2) Program, B.S. (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/biology-biomedical-engineering-dual/>)
- Biology, B.S./Doctor of Dental Medicine Dual Degree with Rutgers School of Dental Medicine (RSDM) (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/doctor-of-dental-medicine-dual-bs/>)
- Biology, B.S./Doctor of Podiatric Medicine Dual Degree with New York College of Podiatric Medicine (NYCPM) (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/doctor-of-podiatric-medicine-dual-bs/>)
- Biology - Medical Imaging Science—Cardiovascular Sonography and Diagnostic Medical Sonography Specialization, Joint-Degree Program, B.S.
- Biology - Medical Laboratory Science Joint-Degree Programs, B.S. (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/medical-laboratory-science-joint-degree-bs/>)
- Biology, Minor (<https://catalog.njcu.edu/undergraduate/arts-sciences/biology/biology-minor/>)

Anthony Esposito (aesposito@njcu.edu)

Assistant Professor of Biology
City University of New York - College of Staten Island, B.S.; Rutgers University, Ph.D.

Biology (BIOL)

BIOL 1XX Biology Transfer Credit (0 Credits)

BIOL 2XX Biology Transfer Credit (0 Credits)

BIOL 100 General Biology (3 Credits)

This is an introductory lecture course in contemporary biology designed for the non-scientist.

BIOL 106 Practical Nutrition (3 Credits)

This course explores the application of nutritional principles to daily health maintenance by developing awareness of personal consumption and governmental recommendations of nutrients, eating behaviors, values, attitudes and beliefs. Topics include different classes of nutrients, eating disorders, and global nutrition.

BIOL 107 Urban Environment (3 Credits)

BIOL 110 Biodiversity And Extinction (3 Credits)

This course integrates concepts of Ecology with patterns of species distribution and reasons for extinction.

BIOL 130 Principles Biology I (4 Credits)

This lecture/lab course introduces the basic building blocks of life through the scientific investigation. Topics include the scientific method, basic chemistry, the cell and its structure, function, metabolism and reproduction, and nucleic acid structure and function.

Co-Requisite(s): ENGL 101 or ESL 101 and MATH 106 or MATH 112

BIOL 131 Principles Biology II (4 Credits)

This lecture/lab course is a continuation of the basic concepts of life. Topics include Mendelian genetics, evolution and an overview of microorganisms, fungi, animals and plants, with selected topics for concentrated study.

Pre-Requisite: BIOL 130 Principles of Biology I

BIOL 140 Scientific Inquiry (3 Credits)

This course will enable students to gain insight into how scientific understanding of the 'natural world' emerges. Students will develop scientific inquiry, communication and information literacy skills.

BIOL 203 Biology of the Environment (4 Credits)

Course offers a study of the relationship between humans and their environment. Basic ecological concepts are developed in lectures and applied in field work.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 217 Life In The Sea (3 Credits)

This course will give a broad overview of marine biology and ecology, including flora and fauna found in the seas, and ecological processes of the seashore and open ocean.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 220 Professorial Assistant (1 Credit)

BIOL 224 The Human Body (3 Credits)

A study of the human body as a unit; its tissues, organs, and organ systems. Correlation of function and structure is emphasized. Interrelationship of organs and systems are explored in the context of homeostasis.

Pre-Requisite(s): ENGL 101 or ESL 101

BIOL 225 Human Sexual Biology (3 Credits)

This course provides students an opportunity to demonstrate basic knowledge of human reproductive anatomy and physiology, pregnancy and in utero development, contraception and reproductive disorders, and to explore the evolution of research into human sexual expression.

Co-Requisite(s): ENGL 101 or ESL 101

BIOL 230 Cell Biology (4 Credits)

Cell biology studies the structure and function of the cell. Topics covered include cell division and specialization, cell communication, membrane composition and function, protein trafficking, and cellular energy transformation. Case studies and laboratory exploration allow students to critically and analytically investigate core concepts.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 231 Comparative Anatomy (4 Credits)

This course studies the major steps in chordate evolution through a comparison of structure, function, and adaptation in selected chordates. Emphasis is placed on vertebrates. Lecture/Recitation/Laboratory.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 232 Invertebrate Zoology (4 Credits)

This course examines the anatomy and physiology of invertebrates. Lecture/Laboratory/ Field Trips.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 233 Principles of Botany (4 Credits)

This course studies the structure, development and life cycles of algae and plants, with emphasis on adaptations to the environment and evolutionary trends and relationships.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 236 Anatomy & Physiology I (4 Credits)

This is a comprehensive study of the structure and function of the human body including the skeletal, muscular, endocrine and nervous systems. This is a required course for medical technology students and is recommended for nursing and paramedical students.

Pre-Requisite(s): BIOL 130 and BIOL 131

BIOL 237 Anatomy & Physiology II (4 Credits)

This course is a continuation of the study of the structure and function of the human body including the nervous, endocrine, cardiovascular, respiratory, digestive, urinary and reproductive systems.

Pre-Requisite(s): BIOL 236

BIOL 240 Scientific Reasoning (3 Credits)

In this class we will learn how scientists investigate the world, asking certain types of questions, generating empirical evidence, applying logical rigor in answering those questions and subsequently communicating the results of those investigations to different audiences.

Pre-Requisite(s): ENGL 101 and ENGL 102

BIOL 250 Biology Research (1 Credit)

This is a course individually designed to provide the undergraduate training in biological research. Students work on projects under the guidance and supervision of a faculty member. Written reports and a final paper are required.

Pre-Requisite(s): Permission of instructor, permission of chairperson, and junior or senior status

BIOL 252 Evolution: A Biological and Geological Approach (3 Credits)

This course explores the major concepts of evolution, and the experimental and analytical methods used to study evolutionary change.

Pre-Requisite(s): BIOL 131 or GEOS 241

BIOL 301 General Physiology (4 Credits)

General Physiology examines human body function from the level of molecules to the whole organism. It is an integrated lecture/laboratory course in which students study of the biological control and coordination of body function, and how disruption of normal body processes lead to illness and disease.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106.

BIOL 302 Plant Physiology (4 Credits)

This course studies the maintenance, growth, and reproduction of plants. Laboratories include techniques used to study matter and energy relationships in plants.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106

BIOL 303 Microbiology (4 Credits)

Microbiology is the study of microorganisms, including microbial metabolism, structure, and function. The course emphasizes core concepts in microbial physiology, genetics, and pathogenesis. The lab exercises familiarize students with aseptic techniques, bacterial staining, microscopy, and antimicrobial susceptibility testing through inquiry-based lab investigations.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106

BIOL 304 Genetics (4 Credits)

Genetics is the study of inherited variation. This course reinforces and extends genetics and molecular concepts taught in Principles of Biology I and II and General Chemistry. Students apply laboratory methods and theory to individual research questions.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106

BIOL 305 Histology (4 Credits)

Histology is the science of microscopic anatomy. It employs light microscopy, transmission- & scanning-electron microscopy, histochemistry, immunohistochemistry and cytochemistry. Students correlate histology with gross anatomy, physiology and pathology.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106

BIOL 308 Plant Taxonomy (4 Credits)

This course studies the diversity of plants and their identification, naming, classification, and evolution. Activities include field trips, field collection, and preparation of an herbarium.

Pre-Requisite(s): BIOL 233 and CHEM 106 and CHEM 1106

BIOL 311 Pathophysiology (3 Credits)

This course is designed to introduce the student to pathophysiologic concepts related to altered biological processes affecting individuals across the lifespan and is built on the general principles of health maintenance. A global approach to disease will be emphasized. The course builds on principles from anatomy, physiology, and chemistry. **Co-Requisites:** NURS 300 and NURS 303 and NURS 304 and NURS 305 and NURS 466

BIOL 312 Endocrinology (3 Credits)

Pre-requisite: BIOL 230 and CHEM 106 and CHEM 1106

BIOL 332 Field Ecology (4 Credits)

This course is a comparative community ecology course which includes a one week field trip. Students will learn about the ecological factors responsible for the control and dynamics of the plant and animal communities in the Appalachian Mountains. Emphasis is on field study of the biotic communities in the Appalachian Mountains. A field fee is required for this course. Lecture/Recitation/Laboratory/Field Trip.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106

BIOL 335 Essential Concepts in Neuroscience (3 Credits)

This course introduces essential concepts in neuroscience, ranging from cellular and molecular processes of neural function and communication, to neural systems, and the higher level processing underlying cognition and learning. The course will explore both anatomical and physiological processes through discussion, hands on laboratory demonstrations and analysis of foundational research literature.

Prerequisites: BIOL 230 and CHEM 106 and CHEM 1106

BIOL 350 Biology Research (2 Credits)

Supervised by a faculty mentor, each student is introduced to essential elements of scientific research. Students will develop skills in areas which may include literature analysis, research techniques, data analysis and scientific communication.

Pre-Requisite(s): Permission of instructor, permission of chairperson, and junior or senior status

BIOL 354 Professional Assistant (2 Credits)

Supervised by a faculty mentor, each student will contribute to the design, preparation, execution and instruction of laboratory components of courses. Applied experience in a laboratory setting and peer mentoring support students' development of laboratory, communication, and organizational skills.

Pre-Requisite(s): Permission of instructor, Permission of chairperson, and sophomore, junior or senior status

BIOL 401 Developmental Biology (4 Credits)

This course studies the fundamental concepts underlying the process of development in animals. Patterns and processes of early development as well as the mechanisms of cell differentiation are covered. Lecture/Recitation/Laboratory.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 231 or BIOL 236.

BIOL 402 Ecology (4 Credits)

This course deals with general ecological concepts relevant to all habitats. Emphasis is on field study of biotic communities in various habitats.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and INTD 180 or MATH 140 or MATH 190 or PSYC 230

BIOL 403 Radiation Biology (4 Credits)

This course studies the biological effects of ionizing radiations. Laboratories include work with radionuclides and the effects of radiation on plants and animals.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and PHYS 101 or PHYS 130.

BIOL 404 Immunology (3 Credits)

This lecture course discusses the mammalian immune system and immune responses to infection, with particular emphasis on the human. An overview of immune cells, tissues and organs leads to a detailed discussion of the functions of each type of immune molecule and cell. The immune responses to infectious disease and cancer are examined.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 237 or BIOL 301 or BIOL 303.

BIOL 406 Molecular Genetics (4 Credits)

This course focuses on the physical and biological properties of nucleic acids. Gene structure and function at the molecular and systems levels are studied and advanced through computational and synthetic biology approaches.

Pre-Requisite(s): BIOL 230 and BIOL 304 and CHEM 106 and CHEM 1106; CHEM 307 recommended.

BIOL 407 Advanced Cell Biology (4 Credits)

Advanced Cell Biology explores detailed topics in cellular structure and physiology with emphasis on molecular composition of organelles, regulation of cell division, and mechanisms of cellular metabolism, integrity and motility. Laboratory exercises investigate selected cellular processes and characteristics through techniques and assays important in the cellular research environment.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 301 or BIOL 303 or BIOL 305.

BIOL 409 Biological Chemistry (3 Credits)

This course is an overview of the chemical basis of life, with emphasis on biochemical processes. The structures of biomolecules and their nutrient precursors are introduced. Enzymes, nutrient utilization and photosynthesis are considered. Lecture.

Pre-Requisite(s): BIOL 230 and BIOL 301 or BIOL 407 and CHEM 106 and CHEM 1106

BIOL 410 Electron Microscopy (4 Credits)

This course offers an overview of scanning and transmission electron microscopes and their use in biological research. Laboratories include use of the instruments and related techniques.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 301 OR BIOL 303 or BIOL 305.

BIOL 418 Scanning Electron Microscopy (4 Credits)

This hands-on course offers the theory and practical applications of Scanning Electron Microscopy (SEM) in biological research. Students will develop and apply SEM skills in the surface exploration of cells, tissues, and other biological materials.

Pre-Requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 301 or BIOL 303 or BIOL 305.

BIOL 419 Transmission Electron Microscopy (4 Credits)

This hands-on course offers the theory and practical applications of Transmission Electron Microscopy (TEM) in biological research, especially in examining cellular ultrastructure. Students will develop and apply TEM skills in the operation of the TEM to achieve optimum imaging performance.

Pre-requisite(s): BIOL 230 and CHEM 106 and CHEM 1106 and BIOL 301 and BIOL 303 or BIOL 305.

BIOL 440 Biology Seminar (1 Credit)

In group discussions, students select a current problem not covered in existing course offerings, build a hypothesis, evaluate evidences from other sources, and attempt a solution. Guest speakers and biology department members who have expertise in the topic under discussion participate. Course pre-requisite: Five Major Biology courses above 100 level.

Pre-Requisite(s): Five Biology Major Classes above 100 Level.

BIOL 450 Biology Research (3 Credits)

Supervised by a faculty mentor, each student selects a research topic, completes a literature review, designs and conducts experiments, analyzes data, and prepares a research presentation. Students will learn valuable research skills, apply knowledge to scientific problems, and develop methods of effectively communicating experimental results.

Pre-Requisite(s): Permission of instructor, permission of chairperson, and junior or senior status

BIOL 454 Professorial Assistant (3 Credits)

Supervised by a faculty mentor, each student will contribute to the design, preparation, execution and instruction of laboratory components of courses. Applied experience in a laboratory setting and peer mentoring support students' development of laboratory, communication, and organizational skills.

Pre-Requisite(s): Permission of instructor, permission of chairperson and sophomore, junior or senior status

BIOL 492 Independent Study in Biology (3 Credits)**BIOL 1492 Independent Study in Biology (2 Credits)****BIOL 2492 Independent Study in Biology (1 Credit)**