This minor is intended for students who wish to incorporate a study of biology into their academic background. In addition to the freshman Biological Principles sequence, the recommended list of courses provides the opportunity to explore various specialties within the field of Biology.

### About Academic Minors

Farmingdale State College students are invited to enhance their studies with an "Academic Minor." A minor is a cluster of thematically related courses drawn from one or more departments. In addition to department based minors (e.g. computer programming & info systems), interdisciplinary minors are also available (e.g. legal studies).

Academic minors are approved by the College-Wide Curriculum Committee and the Provost. Students must make application for an academic minor through the department offering the minor in conjunction with the Registrar's Office. Specific course work must be determined in consultation with a faculty member in the department offering the minor. A statement of successful completion of the academic minor will appear on the student's transcript at the time of graduation.

- A minor is considered to be an optional supplement to a student's major program of study.
- Completion of a minor is not a graduation requirement and is subject to the availability of the courses selected. However, if the requirements for a minor are not completed prior to certification of graduation in the major, it will be assumed that the minor has been dropped. Consequently, the student will only be certified for graduation in their primary major.
- Only students in 4 year baccalaureate programs can apply for a minor.
- A minor should consist of 15 to 21 credits, with the exception of the Chemistry and Air Force ROTC minors which require 22 credits.
- At least 12 credits must be in courses at the 200 level or higher.
- At least 9 credits must be residency credits.
- Specific requirements for each minor are determined by the department granting the minor.
- Students must maintain a minimum cumulative GPA of at least 2.0 in their minor. Some minors may require a higher GPA.
- Students are prohibited from declaring a minor in the same discipline as their major (e.g. one cannot combine an applied math minor with an applied math major).

**Academic minors may not apply to all curricula.**

- Students are permitted to double-count courses.
- Students are only permitted to take more than one minor with appropriate written approval of their department chair or curriculum Dean.

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Fall 2018- Subject to Revision
Required:

Students MUST take the following two courses:

- BIO 130 Biological Principles I 4
- BIO 131 Biological Principles II 4

Students must earn at least 12 additional credits, including at least one additional laboratory course, at the 200-level or above with appropriate prerequisites satisfied, selected from the following:

- BIO 210 Introduction to Bioscience 3
- BIO 212 Bioscience Laboratory Practices 2
- BIO 220 Medical Microbiology 4
- BIO 240 Bioethics 3
- BIO 270 Anatomy & Physiology I 4
- BIO 271 Anatomy & Physiology II 4
- BIO 330 Principles of Ecology 4
- BIO 340 Biopharmaceutical Regulation 3
- BIO 343 Principles of Genetics 3
- BIO 353 Essentials of Plant Pathology 3
- BIO 354L Essentials of Plant Pathology Laboratory 1
- BIO 355 Ecological Topics 4
- BIO 365 Neurology of Pain 3

Total Credits: 20

Course Descriptions

**BIO 130 Biological Principles I**
This course deals with biological processes primarily at the molecular and cellular level, and develops the foundations of evolutionary and ecological concepts. There is a study of cell structure, and an examination of cellular composition and metabolic processes including enzyme activity, respiration, and photosynthesis. Principles of genetics are studied at the cellular and molecular level, with reference to current techniques in molecular biology. Evolutionary mechanisms are introduced and ecological concepts are presented as a unifying theme. Note: BIO 130 is the first course in the required two-semester introductory sequence in the Bioscience Curriculum Core. It is also approved in the Natural Sciences General Education Competency Area and can serve as a lower-level laboratory science elective within the Liberal Arts. Note: the laboratory course, BIO 130L is a part of your grade for this course. Corequisite(s): BIO 130L Credits: 4

**BIO 131 Biological Principles II**
This course deals with biological processes primarily at the organismal level, and examines the diversity of living things. The origins and adaptations of the Prokaryota, Protista, and Fungi are explored, with emphasis on their ecological roles, economic value, and medical significance. Plant life cycles are introduced, and plant structure, physiology, and utilization are studied.
The evolution and adaptations of various animal phyla are presented, with a consideration of structure and function in each; organ systems are studied with emphasis on humans as representative vertebrates. Note: BIO 131 is the second course in the required two-semester introductory in the Bioscience Curriculum Core. It is also approved in the Natural Sciences General Education Competency Area and can serve as a lower-level laboratory science elective within the Liberal Arts. Note: the laboratory course, BIO 131L is a part of your grade for this course. Prerequisite(s): BIO 130 Corequisite(s): BIO 131L Credits: 4

**BIO 210 Introduction to Bioscience**  
Moving beyond the basic concepts of general biology, this class explores how biology is used in both academic and commercial settings within the fields of biotechnology, pharmaceutical and clinical sciences. Topics will include: applications of biotechnology in microbes, plants, and animals, the human genome project and its relation to medical biotechnology, DNA forensics, and pharmaceutical drug discovery, delivery, and FDA approval. The debate surrounding subjects such as cloning, stem cells, and genetically modified foods will also be discussed. Prerequisite(s): BIO 130 with a grade of C- or higher Credits: 3

**BIO 212 Bioscience Laboratory Practices**  
This course is designed to enable students to develop understanding of and proficient technical ability in basic bioscience laboratory practices. There is an in-depth presentation of laboratory safety standards, utilization of material safety data sheets, and the theoretical basis for a full range of preparatory and analytical methods and the opportunity to develop expertise in these methods with a variety of laboratory equipment. Students are required to maintain a laboratory notebook, analyze and display data in graphic form, and report results in a standard format. Prerequisite(s): BIO 130 with a grade of C- or higher Corequisite(s): BIO 212L Credits: 2

**BIO 220 Medical Microbiology**  
The role of microbes as causative agents of disease in human hosts; the morphological characterization of pathogenic species, classification of communicable diseases and epidemiological aspects. Host-parasite relationship, infection, and host-resistance mechanisms; sero-diagnostic methods in medical practice. Chemotherapy, mode of action of antibiotics, sterilization, disinfection methods and contamination control. Note: the laboratory course, BIO 220L is a part of your grade for this course. Prerequisite(s): BIO 166 or 170 or 171 or 130 or 131 Corequisite(s): BIO 220L Credits: 4

**BIO 240 Bioethics**  
This course will cover ethical issues raised as a result of modern advances in biotechnology which directly affect the quality of human life. Bioethics comprises every possible aspect of health care: medical, moral, political, religious, legal and financial. It scrutinizes outmoded laws and deals with the enormous growth in available medical services. It takes into account our views of ourselves as members of a humane society. Note: This course is also offered as a writing intensive course at the discretion of the department. Students cannot get credit for BIO 240 and BIO 240W. Prerequisite(s): One course of college biology with a C- or higher; for the writing intensive version, EGL 101 with a grade of C or higher is also required. Credits: 3

**BIO 270 Anatomy & Physiology I**  
BIO 270 is a course in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate for students with a strong foundation in basic biological principles. Anatomy and Physiology I includes: anatomical and directional terminology, histology, and the integumentary, skeletal, muscular, nervous, and endocrine systems. Note: The required course sequence for nursing students is BIO 170 and 171. Students may not receive credit for both BIO 170 and BIO 270. Note: the laboratory course, BIO 270L is a part of your grade for this course. Prerequisite(s): BIO 130 or equivalent with a C- or higher Corequisite(s): BIO 270L Credits: 4

**BIO 271 Anatomy & Physiology II**
BIO 271 is a course in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate for students with a strong foundation in basic biological principles. Anatomy & Physiology II includes: the cardiovascular, respiratory, digestive, urinary, reproductive, and immune systems, metabolism, and acid-base balance. Note: The required course sequence for nursing students is BIO 170 and 171. Students may not receive credit for both BIO 171 and BIO 271. Note: the laboratory course, BIO 271L is a part of your grade for this course. Prerequisite(s): BIO 130 or equivalent with a C- or higher Corequisite(s): BIO 271L Credits: 4

BIO 330 Principles of Ecology
The course introduces the student to the nature of ecosystems, community organization and dynamics, and population growth and regulation through the understanding and use of modern ecological techniques. The laboratory will be primarily focused on the analysis of field data collected by students. Note: the laboratory course, BIO 330L is a part of your grade for this course. Prerequisite(s): MTH 110, BIO 131 with a C- or higher and Junior Status Corequisite: BIO 330L Credits: 4

BIO 340 Biopharmaceutical Regulation
This course introduces the student to Current Good Laboratory Practice (cGCP), Current Good Clinical Practice (cGCP) and Current Good Manufacturing Practice (cGMP) as defined in the Code of federal Regulations Title 21. These regulations apply to all aspects of testing, clinical trials and manufacturing of Biopharmaceutical products under the authority of the Food and Drug Administration. The course will examine the application of these regulations to the bioprocessing, pharmaceutical, nutraceutical, cosmeceutical and allied industries. Prerequisite(s): BIO 210 with grade of a C- or higher Credits: 3

BIO 343 Principles of Genetics
Students will understand and be able to apply basic principles of genetic analysis. These principles include the Mendelian laws of inheritance, factors that contribute to modification of Mendelian patterns, chromosome organization, genetic variation, the structure of selected eukaryotic and prokaryotic genomes and the analysis of the genetic makeup of populations. Note: Bioscience and/or MLT students taking BIO 343 must also take BIO 344L either during the same semester or after completion of BIO 343L Prerequisite(s): (BIO 130, 131, 210, 212, and MTH 110) or (BIO 130, MLT 227 and MTH 110) all with a grade of C- or higher Credits: 3

BIO 353 Essentials of Plant Pathology
The study of the development of plant diseases caused by Plants, Animals, Fungi, Protists, Bacteria, Viruses and Viroids. Major diseases of economically important plants are emphasized. The disease process and disease cycles for representative pathogens are covered in relation to plant disease control methods. Prerequisite(s): BIO 192 with a grade of C- or higher and Junior Status Corequisite(s): BIO 354L Credits: 3

BIO 354L Essentials of Plant Pathology Laboratory
The laboratory is designed to enable the student to acquire skills in collection and examination methods used for the diagnosis of plant diseases produced by biotic and abiotic agents, using microbial isolation and culturing techniques where applicable. The student will learn to recognize and identify (directly or indirectly) biotic plant pathogens among the Plants, Animals, Fungi, Protists, Bacteria, Viruses and Viroids. Prerequisite(s): BIO 192 with a grade of C- or higher and Junior Status Corequisite(s): BIO 353 Credits: 1

BIO 355 Ecological Topics
This course introduces students to basic ecological concepts as they relate to the biotic and abiotic environment. It stresses the diversity of life and the impact that man, other organisms and environment have on each other. Laboratory exercises and field work will investigate the effects organisms have on each other as well as the effects of environmental conditions on growth and development. Students will also characterize the nature of selected site(s) in terms of species diversity using plot sampling techniques. Seminar type discussions require individuals or small groups to explore environmental issues.
Topics for these discussions will be submitted to the instructor for appropriateness and approval. Students will be required to research and prepare a paper as well as make a presentation to the class. The class will be given the opportunity to question each speaker following that individual's presentation. Note: the laboratory course, BIO 355L is a part of your grade for this course. Prerequisite(s): BIO 131 or BIO 192 or BIO 198 with a grade of C- or higher and Junior Status. Corequisite(s): BIO 355L Credits: 4

BIO 365 Neurology of Pain
BIO 365 is a comprehensive study of the various neurogenic mechanisms central to the study and understanding of pain is the focus of this lecture-based course. In addition, Clinical neuroanatomy and physiology will be reviewed. Emphasis will be placed on organic/root causes of pain pertaining to symptom specific generators. Also, a broad base review will be aimed at exploring the psychodynamic components of pain. This includes, but is not limited to topics in addiction, brain reward cascades, and arousal mechanisms. The final portion of this course includes discussion of the various methods of pain mitigation and measurement. Strong clinical applications will be emphasized throughout the course. Prerequisite(s): (BIO 130 or BIO 170 with a grade of C- or higher) and (Junior Status or BIO 220 with a grade of C- or higher) Credits: 3

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.