

# BIOLOGICAL SCIENCES

## Courses

### **BISC 1000. Life on the Planet Earth. (3 Credits)**

A course designed for non-majors. A survey of animal and plant biology evolutionary history, ecology and conservation biology. Lectures complemented by experiments, demonstrations and slide presentations.  
**Attributes:** BESN, BIOE, ENST, ESLS, ESNS, LSCI.

### **BISC 1001. Human Biology. (3 Credits)**

A course designed for non-majors. The biology of humans, emphasizing cells and molecules, reproduction and development, structure and function of the body, inheritance and evolution. Lectures are complemented by scheduled laboratory work.  
**Attributes:** BESN, BIOE, LSCI.

### **BISC 1002. Ecology: A Human Approach. (3 Credits)**

A course designed for non-majors. Ecological concepts and how they relate to critical contemporary issues: air and water pollution, radiation, energy, world hunger. Includes experiments, demonstrations and field trips.  
**Attributes:** AMST, APPI, ASHS, BESN, BIOE, ENST, ESLS, ESNS, INST, ISIN, LSCI, PJEN, PJST, SOIN, URST.

### **BISC 1005. Aids: A Conspiracy of Cells. (3 Credits)**

A course designed for non-majors. Emphasizes the biological roots of acquired immunodeficiency syndrome (AIDS). The disease is discussed in the context of genetics, cell biology, and evolution. Consideration is given to fundamental aspects of infection, immunology and virology. Laboratory exercises center on agents of opportunistic infection and the body's response to them.  
**Attribute:** CO09.

### **BISC 1008. The Finch, the Seed, and the Storm: Adventures in Contemporary Evolution. (3 Credits)**

Students will learn about the theory of evolution, with a focus on evolutionary ecology, selection, adaptation, and contemporary evolution, and will use this theory as a way of understanding the process of science and biological principles. Students will learn to think, write and speak scientifically and about science.  
**Attribute:** MANR.

### **BISC 1010. Foundations of Biology. (3 Credits)**

In this introductory course for non-science majors, a general survey of the characteristics of life is presented, including such topics as cellular biology, metabolism, organ systems, genetics, development, evolution, behavior, and ecology. All forms of life will be studied, with emphasis on the human body and human evolutionary history.  
**Attributes:** BESN, BIOE, LSCI.

### **BISC 1403. Introductory Biology I. (3 Credits)**

An introduction to the chemistry of life; the structure, function and metabolism of the cell; heredity and molecular aspects of genetics; principles of evolution; biology of bacteria; protists and fungi; and plant evolution.  
**Attributes:** BESN, ENST, ENVS, ESLS, ESNS, NEUR.  
**Corequisite:** BISC 1413.  
**Mutually Exclusive:** NSCI 1403, NSCI 1423.

### **BISC 1404. Introductory Biology II. (3 Credits)**

An introduction to the biology of flowering plants and a systematic study of the major animal phyla involving aspects of their biology which suit them to their environment. Emphasizes the life support systems of mammals and humans, and addresses interactions among organisms; as well as between them and their environment.  
**Attributes:** ENST, ENVS, ESLS, ESNS, NEUR.  
**Prerequisites:** BISC 1403 and BISC 1413.  
**Corequisite:** BISC 1414.  
**Mutually Exclusive:** NSCI 1404, NSCI 1424.

### **BISC 1413. Introductory Biology Lab I. (2 Credits)**

A laboratory course designed to illustrate topics discussed in BISC 1403. Lab fee.  
**Attributes:** ENVS, NEUR.  
**Corequisite:** BISC 1403.  
**Mutually Exclusive:** NSCI 1413, NSCI 1433.

### **BISC 1414. Introductory Biology Lab II. (2 Credits)**

A laboratory course designed to illustrate topics discussed in BISC 1404. Lab fee.  
**Attributes:** ENVS, NEUR.  
**Prerequisites:** BISC 1403 and BISC 1413.  
**Corequisite:** BISC 1404.  
**Mutually Exclusive:** NSCI 1414, NSCI 1434.

### **BISC 2539. General Genetics. (3 Credits)**

A study of the gene in all its aspects; its structure, its informational nature; how this information is inherited unchanged; how this information is expressed in terms of an organism's structure and function; how this information can be altered; and how expression of this information is regulated so that environmentally appropriate responses are made. The unifying position of genetics in the study of biology is emphasized.  
**Attributes:** ENSE, ENVS, GEAB, NECM, NEUR.  
**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.  
**Corequisite:** BISC 2549.  
**Mutually Exclusive:** NSCI 3133.

### **BISC 2549. General Genetics Lab. (2 Credits)**

A laboratory course designed for a hands-on experience in the usage of various scientific methodologies and experiments in the field of basic genetics. Lab fee.  
**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.  
**Corequisite:** BISC 2539.  
**Mutually Exclusive:** NSCI 3833.

### **BISC 2561. Ecology. (3 Credits)**

An introduction to the theories and applications of ecology including evolution, resources, population dynamics, life histories, competition, community structure, ecosystem processes, island biogeography, human impacts on ecosystems and conservation. An introduction to the theories and applications of ecology including evolution, resources, population dynamics, life histories, competition, community structure, ecosystem processes, island biogeography, human impacts on ecosystems and conservation.  
**Attributes:** ENST, ENVS, ESLS, ESNS, GEAB, INST, ISIN.  
**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.  
**Corequisite:** BISC 2571.

**BISC 2571. Ecology Lab. (2 Credits)**

Laboratory and field studies designed to provide hands-on experience with habitats and organisms, ecological experiments, and data analysis. (4 hour field trips).

**Attributes:** ENVS, GEAB.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 2561.

**BISC 3000. Environmental Science. (3 Credits)**

This course covers the biological, chemical, and geological components of world ecosystems. The causes of both air and water pollution will also be covered. The interactions between the atmosphere, lithosphere, hydrosphere, and biosphere will be described. The relationship between global change and the effects of human activities will be addressed as well.

**Attributes:** BIEL, ENST, ESNS, ESPS, INST, ISIN.

**Prerequisites:** BISC 1404 and BISC 1414 or (NSCI 1404 and NSCI 1414) and CHEM 1322 or NSCI 1322.

**BISC 3010. Scientific Communication. (4 Credits)**

Students develop skills in written and oral communication needed to produce scientific articles, monographs and presentations that are accomplished in both form and content. The course covers both the use of LaTeX to produce work that meets the highest standards of design and typography, and the techniques of writing, organization, and scholarly citation needed to ensure that this work accurately embodies, effectively communicates, and professionally documents the author's scientific thought. Students will learn the ins and outs of generating and using copyright material, and how to present data in forms of pictures, tables, graphs, or schematics. Four-credit courses that meet for 150 minutes per week require three additional hours of class preparation per week on the part of the student in lieu of an additional hour of formal instruction.

**BISC 3132. Human Physiology. (3 Credits)**

The basics of human body functions from cellular to organ system levels. A review of the general principles of whole body regulation is included. Internal responses to various physical stresses will also be discussed.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3142.

**BISC 3142. Human Physiology Lab. (2 Credits)**

Laboratory exercises demonstrating principles of the human cardiovascular, nervous, respiratory and urinary systems. Brief review of human anatomy and histology. An introduction to some of the diagnostic instrumentation and procedures used in medicine.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3132.

**BISC 3221. Human Anatomy. (3 Credits)**

A lecture course which examines cell, tissue, and gross anatomy of the major organ systems of the human body as they relate to life processes in health and disease.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3231.

**BISC 3231. Human Anatomy Lab. (2 Credits)**

A laboratory course employing slides, models and gross dissection to study the structure of the major organ systems of the human body.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3221.

**BISC 3244. Evolutionary Biology. (3 Credits)**

The course covers both Micro-and Macro-Evolution ranging in focus from population, genetics and molecular evolution to the fossil record and major patterns of organismal diversity. Other topics include natural and sexual selection, the ecological context of adaptation, genomic and developmental mechanisms of evolutionary innovation, speciation, phylogeny reconstruction, and human evolution.

**Attributes:** BIEL, ENSE, ENVS, GEAB.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**BISC 3405. Plant Biology. (3 Credits)**

A survey of the major groups of plants and related organisms. Topics include physiology, morphology, ecology, taxonomy and systematics and human uses of plants.

**Attributes:** BIEL, ENVS, GEAB.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3415.

**BISC 3415. Plant Biology Lab. (2 Credits)**

A laboratory and field course that uses hands-on experience and student-directed research to explore current issues in plant biology. Laboratory activities will emphasize plant physiology, morphology, and taxonomy and systematics. Field trips will highlight human uses of plants, and plant diversity and ecology in urban settings.

**Attribute:** ENVS.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3405.

**BISC 3466. Urban Ecology & Evolution. (3 Credits)**

Most humans now live in cities, and urban environments are an increasingly important influence on the Earth. Urbanization has large effects on the physical environment and ecology of organisms that live in cities. This course examines ecology in cities (e.g., what species live in cities, how these species interact with one another, and how urban populations differ from nonurban populations), the ecology of cities (e.g., how biology, infrastructure, and human communities interact as an urban socio-ecological system), and ecology for cities (e.g., how we can use ecological knowledge to produce a more sustainable and equitable future for urban residents). A recent surge of evidence has also indicated that urbanization influences the evolution of populations within cities. In this course we will investigate both nonadaptive and adaptive evolution of urban-dwelling organisms. Given Fordham's Rose Hill location, course content will highlight how urban ecology and evolution relate to the Bronx and the broader New York City area. Students will visit New York City field sites and participate in hands-on urban ecology activities with community partners.

**Attributes:** BIEL, ENSE, ENVS, SL.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Mutually Exclusive:** NSCI 1322, NSCI 1332, NSCI 1404, NSCI 1433, NSCI 1434.

**BISC 3521. Biochemistry. (3 Credits)**

A lecture course on the principles of biochemistry and molecular biology. Topics include the chemistry and function of carbohydrates, lipids, proteins, and nucleic acids; enzymology; metabolism; bioenergetics; and gene structure and expression.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** (BISC 2539 and BISC 2549 and CHEM 2522) and (CHEM 2532 or CHEM 2542).

**BISC 3643. Microbiology. (3 Credits)**

Detailed study of microbial metabolism and physiology; microbial roles in maintaining earth's ecosystems and human health; global environmental change and effects on emerging infectious diseases, epidemiology, and public health.

**Attributes:** BIEL, ENSE, ENV5, GEAB.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3653.

**BISC 3653. Microbiology Lab. (2 Credits)**

Laboratory exercises are designed to develop skills in: sterile culture techniques for isolating bacteria and fungi from natural substrates; microscopy and staining techniques for visualization, identification and quantification of microbes.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Corequisite:** BISC 3643.

**BISC 3752. Molecular Biology. (3 Credits)**

Principles and regulation of gene expression; nucleic acid structure/function, replication, transcription, RNA processing, translation; experimental and recombinant DNA methodologies and approaches.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**Mutually Exclusive:** NSCI 4176.

**BISC 3754. Cell Biology. (3 Credits)**

Presents fundamental principles of cell structure and function important to an understanding of cellular interactions in the development, maintenance, and reproduction of multicellular organisms. Aberrations of cell structure and function that contribute to human disease are discussed extensively.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Mutually Exclusive:** NSCI 3154.

**BISC 3893. Introduction to Virology. (3 Credits)**

An introduction to the significance of viruses as agents of disease, and as tools to understand basic life processes. The course will cover the structural and biochemical properties of viruses, viral replication strategies virus-cell interactions, viral pathogenesis and host immune reactions. Emphasis will be on animal viruses but the properties and replication strategies of prokaryotic and plant viruses will also be explored.

**Attributes:** BIEL, GEAB.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**BISC 4035. Ecology and Economics of Food Systems. (4 Credits)**

This course begins with a historical analysis of food as a catalyst for social and economic development. The associated costs of food production from both ecological and economic prospects are investigated with particular emphasis placed on important global food crops. Major discussions will include the ability to balance global equitability of food distribution and environmental sustainability. Note: Four-credit courses that meet for 150 minutes per week require three additional hours of class preparation per week on the part of the student in lieu of an additional hour of formal instruction.

**Attributes:** BESN, ENST, ESEC, ESEL, ESHC, GLBL, ICC, SL, URST.

**BISC 4530. Cancer Biology and Signaling. (3 Credits)**

Course covers the basic biology of cancer at the cellular and molecular levels with special emphasis on aberrant signal transduction pathways in cancer cells.

**Attributes:** BIEL, GEAB.

**Prerequisite:** BISC 3754.

**BISC 4532. Neuroscience. (3 Credits)**

Study of the anatomy, biochemistry and physiology of neurons and neural pathways that comprise the peripheral and central nervous systems and their relationship to behavior.

**Attributes:** BIEL, GEAB, NEUR.

**Prerequisites:** BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**Mutually Exclusive:** NSCI 2030, NSCI 4630.

**BISC 4575. Conservation Biology. (4 Credits)**

Theory and practice of conservation biology. Topics will include maintenance of species diversity, design of reserves, captive management, genetic considerations, and factors affecting extinction rates. Four-credit courses that meet for 150 minutes per week require three additional hours of class preparation per week on the part of the student in lieu of an additional hour of formal instruction.

**Attributes:** BIEL, ENSE, ENST, ENV5, ESEL.

**Prerequisites:** BISC 1404 and BISC 1414 and BISC 2539 and BISC 2549 and CHEM 1322 and CHEM 1332.

**BISC 4642. Animal Behavior. (4 Credits)**

Introduction to animal behavior; evolution, genetics, physiology and ecology of behavior; sexual/mating/reproductive behavior; habitat selection, feeding behavior, anti-predator defenses, social behavior, human behavior. Four-credit courses that meet for 150 minutes per week require three additional hours of class preparation per week on the part of the student in lieu of an additional hour of formal instruction.

**Attributes:** BIEL, ENSE, ENV5, GEAB, NECM, NEUR.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**BISC 4693. Developmental Biology. (3 Credits)**

An introduction to animal development with emphasis on molecular aspects of gametogenesis, fertilization, and organogenesis. Current models of normal and abnormal cellular differentiation will also be considered.

**Attributes:** BIEL, GEAB, NECM, NEUR.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**BISC 4792. Senior Thesis Research. (4 Credits)**

This is a two-semester practical mentored research course taken during senior year that will result in a thesis. A grade and credits are given only upon completion of the thesis. Preliminary work before senior year is required. Students must have a Fordham faculty member as a mentor. Students are required to work an average of 3-4 hours per week per credit hour. Students should submit a request to their mentor to register the student for the course before the end of the add/drop period. Other details may be obtained in the departmental office.

**Attributes:** BIEL, GEAB.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.

**BISC 4999. Research Tutorial. (0 to 4 Credits)**

This tutorial course provides hands-on participation in a faculty member's research program. Students must have a Fordham faculty member as a mentor. Students are required to work an average of 3-4 hours per week per credit hour. Students should submit a request to their mentor to fill in the Research Tutorial form to register the student for the course before the end of the add/drop period.

**Attribute:** BIEL.

**Prerequisites:** BISC 1404 and BISC 1414 and CHEM 1322 and CHEM 1332.