The courses in the Department of Biology are designed to give students an understanding of modern biology as part of a liberal arts education and to prepare students for both employment and graduate/professional study in the discipline. Courses in biology utilize state-of-the-art equipment in Parker Science Building, as well as a climate-controlled greenhouse and a museum containing plant and animal specimens. The Engelbach Biology Station and the Starhill Arboretum are important supplements to the department for field work by faculty and students. Regular spring break trips to coral reefs in the Florida Keys and the rainforests in Costa Rica are also available to provide students with additional learning opportunities.

Several concentrations are available through the Department of Biology. These include Biology/Ecology, Biology/Exercise Science, 3-2 Biology/Occupational Therapy, and 3-1 Biology/Medical Technology. Details of these programs are described below.

**Biology Major**

The introductory Biology program for majors (BI 110) serves as a solid preparation for more advanced study and is a prerequisite for any advanced courses. The second tier of the Biology program includes required courses of Molecular Genetics (BI 207) and Population Genetics, Ecology and Evolution (BI 338). Students must also complete a minimum of four Biology courses numbered 200 or higher, including at least one from each of the following categories:

I. Organismal Biology
   - BI 201 Botany
   - BI 205 Invertebrate Zoology
   - BI 206 Vertebrate Zoology
   - BI 245 Microbiology
   - BI 328 Animal Behavior
   - BI 342 Parasitology
   - BI 350 Entomology

II. Cellular and Molecular Biology
   - BI 245 Microbiology
   - BI 307 Cell and Molecular Biology
   - BI 310 Immunology
   - BI 311 Virology
   - BI 367 Advanced Molecular Biology

III. Systems Biology
   - BI 208 Developmental Biology
   - BI 315 Anatomy and Physiology I
   - BI 316 Anatomy and Physiology II

*Continued...*
BI 321 Mammalian Histology
BI 325 Tropical Ecology*
BI 326 Marine Biology*
BI 332 Aquatic Biology       * Trip course. Additional fees assessed.

In the senior year, all majors complete the program by enrolling in the capstone sequence: Research and Analysis I (BI 401) and II (BI 402). A major in Biology requires a total of 32 credit hours at or above the 200-level.

Students should complete as many of the following tool courses as possible before enrolling in 200-300 level courses. Math: MA 133 required for the major; MA 123 and MA 213 are highly recommended. Chemistry: CH 111, 112, and 203 required for the major. Physics: PY 181, 182 (or 201, 202) required for the major.

Students who are interested in secondary teaching certification in biology should consult with the Department of Education as soon as possible to fulfill specific requirements for certification.

A major in biochemistry is also available. Refer to the catalog description under Biochemistry for details (page 24).

A minor in Biology can be met by taking BI 110, twelve hours of Biology courses numbered 200 and above, plus CH 111, CH 112.

**Biology with Ecology**

The ecology concentration within the biology major is intended for students interested in conservation biology, ecology, or environmental biology. To complete the biology major with a concentration in ecology, students take the three required Biology core courses (BI 110, BI 207, and BI 338), tool courses in Chemistry, Environmental Studies, and Physics (CH 111, CH 112, CH 203, EV 224, and PY 181), and complete the biology capstone sequence (BI 401 and BI 402) in their final year. MA 123 is strongly recommended; MA133 is a pre-requisite for CH111 but is not required for the major.

Additionally, students in the ecology concentration choose four Biology electives:

Two Organismal Biology Courses from this list:
- BI 201 Botany
- BI 206 Vertebrate Zoology
- BI 245 Microbiology
- BI 318 Algae and Fungi
- BI 350 Entomology

Two Ecology Courses from this list:
- BI 324 General Ecology
- BI 325 Tropical Ecology*
- BI 326: Marine Biology*
- BI 328: Animal Behavior

**Biology with Exercise Science**

A concentration in Exercise Science offers students a basis for intelligent decision making regarding one’s own health as well as prepares students for careers or graduate study in such areas as fitness and wellness, health, athletic training, and exercise physiology. Requirements for a major in biology with exercise science include the following:
A) Basic Science Core (7 courses)
- Math (2 courses), 2 of the following: MA 103, MA 123, MA 133
- Biology (3 courses): BI 110, BI 315, BI 316
- Chemistry (1 course): CH 101 or CH 111
- Physics (1-2 courses): PY 109; or PY 181 and PY 182

B) Exercise Science/Health Core (6 courses)
- BH 210 Personal and Community Health or BH 335 Personal Wellness and Fitness;
- BH 225 Nutrition; BH 340 Exercise Physiology and Kinesiology; EP 308 Athletic Injuries and First Aid; BH 463 or BH 464 Internship in Health

C) Exercise Science Electives (2 courses)
- At least two of the following courses: EP 310 Adaptive Physical Education; EP 383 Tests and Measurement; BH 330 Human Sexuality; BI 245 Microbiology.

**Biology with Medical Technology (3-1)**

Illinois College has been affiliated with St. John's Hospital Laboratory Schools since 1985. Students who wish to pursue a career in medical technology (clinical laboratory science) may complete the prerequisite courses at Illinois College in three years and apply for admission to the St. John's Hospital Laboratory Schools for the professional year. After the successful completion of the fourth year of study, students are awarded the bachelor’s degree in biology from Illinois College.

Students who are interested in the 3-1 program complete most of the biology major requirements, plus extra chemistry. Specific courses required for the 3-1 program include the following; BI 110 (Biological Investigation); BI 245 (Microbiology); BI 310 (Immunology); BI 315, 316 (Anatomy and Physiology I and II); and two courses from the following: BI 205 (Invertebrate Zoology); BI 206 (Vertebrate Zoology); BI 207 (Molecular Genetics); BI 208 (Developmental); BI 307 (Cell and Molecular); or BI 342 (Parasitology). Required chemistry courses include: CH 111, 112 (General Chemistry I and II); CH 203 (Organic I); CH 309 (Biochemistry I). PY 181, 182 (General Physics I and II) is strongly recommended, as is MA 123 (Statistics).

Students who opt to finish their degree at Illinois College before entering a professional program in medical technology may complete their biology major in the fourth year by completing BI 207 (Molecular Genetics); BI 338 Population Genetics, Ecology and Evolution; one other course; and BI 401, 402 (Research and Analysis I, II); and PY 181, 182 (General Physics I and II). They may then apply to any professional program in medical technology in the U.S. For further information, contact Professor Chapman.

**Biology with Occupational Therapy (3-2)**

Illinois College has been affiliated with the Program in Occupational Therapy at Washington University School of Medicine in St. Louis, MO since 1986. Students may complete three years of prescribed study at Illinois College and then apply for admission to either the M.S. program (two years of study) or the new clinical doctorate program (3 years of study) at Washington University. After the first year of professional study, the student will receive the B.S. in Biology from Illinois College and graduate with the rest of the senior class.

Illinois College students who are interested in the 3-2 or 3-3 Biology/Occupational Therapy program must fulfill most of the requirements for the Biology major, including the following: BI 110 Biological Investigation; BI 208 (Developmental); BI 245 (Microbiology); and BI 315,
316 (Anatomy and Physiology I and II). CH 111, 112 (General Chemistry I and II) and MA 133 (Introduction to Functions, or higher) are also required. Other prerequisite courses for entry into the Washington University Program in Occupational Therapy include PS 275 or 276, PS 346, an additional social science course, and MA 123.

Students may also opt to complete the Biology major in a fourth year by enrolling in BI 207 (Molecular Genetics); BI 338 Population Genetics, Ecology and Evolution; CH 203 (Organic Chemistry I); PY 181, 182 (General Physics I and II); and BI 401, 402 (Research and Analysis I, II). Students with a bachelor's degree may apply to any occupational therapy program in the U.S. For further information contact Professor Chapman or Professor Zettler.

**BIOLOGY COURSES**

**BI 107  Human Biology (4)**
Fundamental concepts of normal human anatomy and physiology, including basic cell biology, examination of organ systems, experimental design, and scientific writing. Three class hours and one 2-hour laboratory per week. Does not count towards the biology major. Offered fall semesters.

**BI 109  Plants & Society (4)**
A presentation of the relationships between plants and people with strong emphasis on the economic aspects and implications of plants and fungi. Three class hours and one 2-hour laboratory per week. Does not count towards the biology major. Offered fall semesters.

**BI 110  Biological Investigation (4)**
This course is an introduction to the nature of biological inquiry. Major concepts of biological science and modes of experimentation are introduced through an exploration of a variety of topics selected by the instructor. This course is designed for first- and second-year students interested in pursuing a major or minor in biology or biochemistry, and is required for all subsequent biology courses. Students with junior or senior standing require permission of the instructor to register for this course. Three class hours and one two-hour laboratory period per week. Offered every semester. Corequisite: MA 103 or test into MA 133.

**BI 201  Botany (4)**
A detailed study of the plant kingdom with an emphasis on diversity, identification of the local flora, and collecting/preparing herbarium specimens. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 110 or consent of instructor. Offered alternate fall semesters.

**BI 205  Invertebrate Zoology (4)**
Phylogenetic and comparative aspects of anatomy, physiology, reproduction and embryology of major invertebrate phyla. Three class hours and two laboratory hours-per-week. Prerequisite: BI 110 or consent of instructor. Offered alternate spring semesters.

**BI 206  Vertebrate Zoology (4)**
A detailed study of the vertebrates (especially those in the Midwest) emphasizing the diversity, identification, comparative physiology and anatomy, ecology, and human impact on their populations. Three class hours and one 2-hour laboratory per week. Prerequisite: BI 110 or consent of instructor. Offered alternate spring semesters.

**BI 207  Molecular Genetics (4)**
The molecular principles of heredity and variation in living organisms. Three class hours and one 3-hour laboratory period per week. Required for the biology major. Prerequisite: BI 110. Co-requisite: CH 111. Offered fall semesters.
BI 208  Developmental Biology (4)  
Consideration of the concepts of development in biological systems; developmental processes, events of embryogenesis, and mechanisms of development in animal systems. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 110. Offered alternate spring semesters.

BI 245  Microbiology (4)  
The study of the central role that microorganisms play in the web of life, including the study of physiology, structure, metabolism, cultivation, diversity, and genetics of microorganisms. Correlated laboratory investigations. Prerequisite: CH 111 (or concurrent enrollment) and BI 110 or consent of instructor. Offered spring semesters.

BI 260  Issues in International Health (4)  
This seminar-type course is designed to provide students with an appreciation of the global problems in public health and the approaches of various countries to serious public health problems. Offered alternate spring semesters. Prerequisite: BI 107 or BI 110.

BI 307  Cell and Molecular Biology (4)  
A detailed investigation of the structure, physiology and biochemistry of eukaryotic cells and their organelles. Three class hours and one 3-hour lab period per week. Prerequisites: BI 207 and CH 203. Offered spring semesters.

BI 309  Introduction to Research (4)  
This course emphasizes experimental design reinforced by the methods of scientific inquiry. Research design, data analysis, and scientific writing are emphasized leading to the preparation of a publication-quality article and/or presentation. Variable lab/lecture hours per week. Prerequisite: BI 110 and consent of instructor.

BI 310  Immunology (4)  
Study of the vertebrate immune system, including the principles of cellular and humoral defense mechanisms, and reviews of current research in the field. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 207 or consent of instructor. Offered alternate years.

BI 311  Virology (4)  
An exploration of the viruses that infect all three domains of life, with a focus on the molecular biology and genomic diversity of pathogens that threaten human life and economic activity. Topics to be considered include long-studied pathogens such as poliovirus, variola (smallpox), and tobacco mosaic virus, as well as emerging or re-emerging agents such as hepatitis C and D, prions, and viroids. Discussions of the primary literature will be used to examine recent scientific and clinical developments.  Offered alternate years. Prerequisite: BI 207. Prerequisite or Co-requisite: CH 203.

BI 315  Anatomy and Physiology I (4)  
Emphasis on human anatomy, histology, and physiology with consideration of general organization, skeletal, muscular, and nervous systems. Four class hours and one 2-hour laboratory per week. Prerequisite: BI 110 or BI 107. Offered fall semesters.

BI 316  Anatomy and Physiology II (4)  
Emphasis on human anatomy, histology, and physiology with consideration of endocrine, digestive, respiratory, cardiovascular, urinary, and reproductive systems. Four class hours and one 2-hour laboratory per week. Prerequisite: BI 110 or BI 107; CH 111 recommended. Offered spring semesters.
BI 318 Algae and Fungi (4)
A detailed study of fungi and autotrophic protists (algae) with an emphasis on diversity, identification of microscopic algae, seaweeds and mushrooms. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 110 or consent of instructor. Offered alternate years.

BI 321 Mammalian Histology (4)
The microscopic and ultramicroscopic structure of mammalian cells, tissues, and organs correlated with function. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 315 or 316 or consent of the instructor. Offered alternate years.

BI 324 General Ecology (4)
Principles of ecology, illustrated by lecture and by the investigation of selected types of habitats. Three class hours and one 2-hour laboratory period per week. Field trips. Prerequisite: MA 133 and one 200-level biology course. Recommended: MA 123 or BI 207. (See EV 324).

BI 325 Tropical Ecology (4)
An introduction to the composition, structure, and function of tropical rainforests. Laboratory, held during spring break in Costa Rica, will emphasize biological diversity. Three lecture hours per week. Prerequisite: BI 110 and consent of instructor. Offered spring semester of even years.

BI 326 Marine Biology (4)
An introduction to the study of the plants, animals, and other organisms that live in the ocean. Lecture topics include the principles of marine science, life forms in the marine environment, the structure and function of marine ecosystems, and the role of humans on the sea. Three lecture hours and one two-hour laboratory period per week. Prerequisite: BI 110 and consent of instructor. Offered spring semesters, odd years.

BI 328 Animal Behavior (4)
The behavior of animals as revealed by the ethological approach. Orientation, learning, social behavior, migration, and agonistic behavior. Three class hours and one 2-hour laboratory period per week. Prerequisite: BI 110 or consent of instructor. (See PS 328.)

BI 332 Aquatic Biology (4)
Field course covering biological, physicochemical and geological attributes of both lotic (flowing) and lentic (still) freshwater habitats. Emphasis on aquatic entomology, field data collection techniques, data analysis and critical reading of the primary literature in aquatic biology. Prerequisite: BI 110.

BI 338 Population Genetics, Ecology and Evolution (4)
An introduction to the theoretical and practical concepts of ecology and evolution. Topics include application of the principles of genetics to populations, phylogenetics, history of evolutionary thought from Darwin to the Modern Synthesis, origins of life on Earth, and speciation. Prerequisites: BI 110 and BI 207 or consent of instructor.

BI 342 Parasitology (4)
A detailed study of parasites (arthropod, helminths, and protozoa) that afflict animals and humans with an emphasis on life cycles, treatment and control, and the impact on human and animal lives. Three class hours and one 2-hour laboratory per week. Prerequisite: BI 110 or consent of the instructor. Offered alternate years.
BI 350  Entomology (4)
A study of the terrestrial members of the Phylum Arthropoda, with emphasis on insects and their identification. Three class hours and one 2-hour laboratory period per week. Labs will emphasize field collection and preservation of insects. Prerequisite: BI 110 or consent of instructor. Offered alternate years.

BI 367  Advanced Molecular Biology (4)
A detailed study of current issues in molecular biology. The reading and discussions are based on primary research articles. Discussions include current experimental methods that further the understanding of biological processes on the molecular level, including genetic, biochemical, and biophysical approaches. Prerequisite: BI 307. Offered fall semesters.

BI 401  Research and Analysis I (2)
Discussion of biological topics with emphasis on critical analysis of data and research articles. Required for the major. Prerequisite: BI 110 and junior status. Offered fall semesters.

BI 402  Research and Analysis II (2)
Presentation of a biological topic by a student based on library and/or laboratory research carried out at IC. Required for the major. Prerequisite: BI 401. Offered spring semesters.

BI 411, 412 Problems (1 - 6)
Special problems individually arranged with the faculty. Prerequisite: consent of the instructor.

BI 461, 462 Independent Study in Biology (1 - 4)

BI 463, 464 Internship in Biology (1 - 4)
Students serve as interns for a total of not less than 40-160 hours. Prerequisite: at least Sophomore standing, a B average, and consent of the instructor.

BI 465, 466 Independent Research in Biology (1 - 4)

HEALTH COURSES

BH 210  Personal and Community Health (4)
An introduction to epidemiology; contemporary health problems; communicable disease control; and health issues of the child, the adult and the aging population. Prerequisite: BI 107 or BI 315.

BH 225  Nutrition (4)
The primary focus of this course is to provide the student with a broad foundation of basic and advanced nutritional concepts such that they will acquire an increased understanding of the biological implications which govern the study of nutrition. Topics include the action, interaction, and balance of food constituents as they pertain to human health and disease. Prerequisites: BI 107 or BI 110, and CH 101 or CH 111.

BH 330  Human Sexuality (4)
The concept of sexuality as it incorporates the biological, psychological, physiological and cultural aspects of human sexual behavior. Special emphasis will be given to topics of greatest interest to students and to general society. Prerequisite: BI 107 or BI 110.

BH 335  Personal Wellness and Fitness (4)
An introduction to nutrition, conditioning, aerobic fitness, personal fitness assessment, and stress management. Prerequisite: BI 107 or BI 315.
BH 340  Kinesiology and Physiology of Exercise (4)
An analysis of muscle function/biomechanics, and study of the responses and adaptations of the human body during exercise. Three class hours and one 2-hour lab per week. Prerequisite: CH 101 or CH 111 and BI 315 or BI 316.
BH 461, 462 Independent Study in Health (1 - 4)
BH 463, 464 Internship in Health (1 - 4)
BH 465, 466 Independent Research Health (1 - 4)

MEDICAL TECHNOLOGY CLINICAL COURSES
taught at the professional school site

Clinical Chemistry I
Theory and practice of analytical biochemistry as applied to pathologic states, methodology, and instrumentation. Statistics as applied to reagent preparation, result determination, and quality control.

Clinical Chemistry II
Theory and practice of analytical biochemistry as applied to specialized tests for drugs, endocrine function, urine and body fluid analysis.

Clinical Hematology
Study of the origin, development, morphology, physiology, and pathophysiology of the formed elements of the blood and bone marrow. Manual and automated methods of cell counting, differentiation and other special hematological procedures on blood and body fluids used in disease diagnosis are included.

Clinical Hemostasis
Study of platelet, vascular, coagulation and fibrinolytic systems. Procedures and applications of the principles of hemostasis as related to disease states and therapeutic monitoring are also included.

Clinical Immunohematology
Study of red cell antigen-antibody systems, antibody screening and identification, compatibility testing and immunopathologic conditions. Also included are donor requirements and blood component preparation and therapy.

Clinical Immunology
Study of the principles of the protective and advesive aspects of the cellular and humoral immune responses. Theory and performance of test procedures based on antigen-antibody reactions and clinical significance of test results are included.

Clinical Microbiology I
Theory and practice of the isolation and identification of pathogenic bacteria and mycobacteria in clinical specimens through cultures, morphology, biochemical and/or serological reactions and their drug susceptibility. The relation of clinical testing to disease states is also included.

Clinical Microbiology II
Theory and practice of the isolation and identification of fungi, parasites, rickettsia, and viruses utilizing morphological, cultural, biochemical and serologic methods. The relation of clinical testing to disease states and epidemiology as it applies to microbiology is also included.
Special Topics in Clinical Laboratory Science
An overview of medical ethics, patient approach, the theory and practice of phlebotomy
techniques, laboratory safety, applications of laboratory computer systems and independent
clinical research and development.

Clinical Management and Education
A basic introduction to the principles and theory of management and education as related
to the clinical laboratory. The special job responsibilities of the clinical laboratory scientist in
management and education are addressed.

BUSINESS ADMINISTRATION
(see MANAGEMENT AND ORGANIZATIONAL LEADERSHIP page 108 )
and (ACCOUNTING page 19, ECONOMICS page 46, and FINANCE page 72)