BIOLOGY

The departmental courses in biology are intended to help the student acquire: 1) A knowledge of the basic principles of the biological sciences and some skill in the application of the scientific method to biological problems; 2) The necessary background for work in graduate or professional schools of medicine, dentistry, or biological science; 3) The biological background for certain professional careers such as teaching biology in secondary schools or working in industrial or sales positions requiring a knowledge of biology or chemistry.

Interested and qualified majors in biology are encouraged to supplement their training in zoology or botany by field ecological work, marine or fresh water, in the taxonomic, embryological, and physiological areas, in any approved biological station. Fresh water and terrestrial field stations are operated by many midwestern colleges and universities. With prior consent of the department, credits received will be accepted here.

Students who plan to do graduate work in biology should do Independent study (BIO 255), Research (BIO 220, 355, 455) or Internship in order to gain insight and experience in biological research and applications.

NOTE: Students majoring in Biology, Biology-Chemistry or Medical Technology cannot normally take BIO 121, 122, 123, 202, 203 as part of the major. **BIO 111-112 are prerequisites for all Biology courses numbered higher than 220.** Completion of any major does not guarantee admission to a graduate or professional school.

ASSOCIATE OF SCIENCE DEGREE IN BIOLOGY-CHEMISTRY (60 credits)

REQUIRED: 60 credits
CORE 1, 2, 3, 4
BIO 111&112 Gen Biology CHM 121&122 Gen Chem CHM 233 Organic Chem I
9 credits from biology or chemistry
7 credits from the natural sciences or math-science division

MAJOR IN BIOLOGY (48-60 credits)

All Biology majors are required to take:
BIO 111-112 General Biology I & II (8)
Specially designated Core 5-6 sections for Biology & Bio-Chem majors
Choose and complete one of the following four tracks:

Biologist Track – recommended for pre-med, pre-vet, life science teaching, and a wide variety of careers in the biological sciences. Recommended minors for this track include: Chemistry, Math, Computer Science, Psychology and Secondary Education.

Physical Therapy Track – recommended for pre-physical therapy, occupational therapy, pharmacy and athletic training careers. A minor in Health Therapy or Athletic Training is required for this track. This track is design to provide all of the necessary courses for entrance into graduate programs in physical or occupational therapy.

Forensic Science Track – recommended for forensic science careers. Recommended minors for this track include: Chemistry, Math, Criminal Justice, Psychology, and Sociology. This track meets all of the recommendations for nationally accredited undergraduate programs in forensic science.

Wildlife Ecology Track – recommended for wildlife biology, zoology, ecology, environmental science, environmental consulting, conservation biology, aquatic and marine biology, and natural resource careers. Recommended minors for this track include: Earth Science, Business Administration, Human Resources, Management, Math, Economics, Political Science, Art, and Computer Science. This track follows the guidelines to obtain certification as a professional wildlife biologists from The Wildlife Society.

Biologist Track: (60 credits)
Required: 52 additional credits
- BIO 225 Comparative Vertebrate Anatomy (4)
- BIO 337 Genetics (4)
- CHM 121-122 General Chemistry I & II (8)
- CHM 233-234 Organic Chemistry I & II (8)
- ESS 121-122 General Physics I & II (8)
- 20 credits of biology electives numbered 200 or higher

Physical Therapy Track: (60 credits)
Required: 52 additional credits
- BIO 121-122 Human Anatomy & Physiology (6)
- BIO 225 Comparative Vertebrate Anatomy (4)
- BIO 337 Genetics (4)
- BIO 327 Human Medical Physiology (4)
- CHM 121-122 General Chemistry I & II (8)
- CHM 233-234 Organic Chemistry I & II (8)
- BIO/CHM 379 Biochemistry (4)
- ESS 121-122 General Physics I & II (8)*
- 6 credits of biology electives numbered 200 or higher
- A minor in Health Therapy or Athletic Training is required.

Forensic Science Track: (60 credits)
Required: 52 additional credits
- BIO 218 Intro to Forensic Science (3)
- BIO 225 Comparative Vertebrate Anatomy (4)
- BIO 318 Forensic Entomology (3)
- BIO 337 Genetics (4)
- BIO 341 Advanced Forensic Science (3)
- CHM 121-122 General Chemistry I & II (8)
- CHM 233-234 Organic Chemistry I & II (8)
- ESS 121-122 General Physics I & II (8)*

3-4 credits of Statistics from:
PSY/POL/SOC 225 (4)
MTH 342 Statistics (3)*
7-8 credits of biology or chemistry electives numbered 200 or higher

Wildlife Ecology Track: (48-49 credits)
Required: 40-41 additional credits
BIO 233 Ecology (3)
BIO 339 Conservation Biology (3)
BIO 479 Restoration Ecology (3)
6 credits of vertebrate zoology electives from:
BIO 234 Herpetology (3)
BIO 236 Ornithology & Mammalogy (3)
BIO 220 Amphibian Research (1-3)
13 credits of biology electives from:
BIO 225 Comparative Vertebrate Anatomy (4)
BIO 231 Intro to Entomology (3)
BIO 232 Invertebrate Zoology (3)
BIO 220 Amphibian Research (1-3)
BIO 323 Intro Microbiology (3)
BIO 337 Genetics (4)
BIO 346 Animal Behavior (3)
Independent studies, research or internships in zoology, botany or ecology
3-4 credits of Statistics from:
PSY/POL/SOC 225 (4)
MTH 342 Statistics (3)*
9 credits from:
CHM 101 Intro Chemistry (3)
CHM 121 General Chemistry I (4)
CHM 122 General Chemistry II (4)
ESS 111 Environmental Geology (3)
ESS 128: Environmental Studies (3)
ESS 121 General Physics I (4)
ESS 132 Geography of Economic Resources (3)

*Prerequisites

GROUP MAJOR IN BIOLOGY-CHEMISTRY (62 credits)

The Bio-Chem major is recommended for pre-med, pre-dentistry, pre-vet, life science & physical science teaching, and a wide variety of careers biology or biochemistry. No minor is required with this group major.

REQUIRED:

BIO 111-112 General Biology I & II (8)
BIO 225 Comp.Vertebrate Anatomy (4)
BIO 337 Genetics (4)
BIO/CHM 379 Biochemistry (4)
CHM 121-122 General Chemistry I & II (8)
CHM 233-234 Organic Chemistry I & II (8)
CHM 246 Quantitative Analysis (4)
ESS 121-122 General Physics I & II (8)*
Specially designated Core 5-6 sections for Biology & Biol-Chem majors
14 credits of electives from Biology and/or Chemistry numbered 200 or higher

*Please note that ESS 121-122 has a prerequisite of MTH 125 Calculus I or a year of HS Calculus.

Students majoring in Biology or Biology-Chemistry may elect to concentrate in the following pre-professional programs:

Life Science Teaching: The Biology major or Biology-Chemistry group-major coupled with a minor in education can lead to teach Life Science (biology) at the middle school and high school levels. This program of study coupled with Core 6 covers all six areas required by the state of Indiana (Cells, Heredity, Evolution, Biological Organization, Animal Behavior, Interdependence of Organisms) for a license to teach Life Science at the middle school, junior high and high school levels.

The minimum requirements for a teaching license in Life Science is a major in the Biology or Biology-Chemistry or in Chemistry with a minor in Biology plus an education minor with the following distribution of biology courses:

REQUIRED: 21 credits of Biology (fulfills a biology minor and may be accomplished by a biology or biology-chemistry major) that must include:

BIO 111-112 General Biology I & II

3-4 credits from cellular-subcellular level:

121 Anatomy & Physiology I
323 Intro Microbiology
327 Human Med Physiology
337 Genetics
345 Histology
379 Biochemistry
343 Cellular & Molecular Biology

3-4 credits from organismal level:

122 Anatomy & Physiology II
225 Comp Vertebrate Anat
231 Entomology
232 Invertebrate Zoology
234 Herpetology
236 Ornith-Mammalogy
218 Intro Forensic Science
220 Amphibian Research
346 Animal Behavior

3-4 credits from the population level:

233 Ecology
246 Environmental Research Methods
339 Conservation Biology
479 Restoration Ecology

Please note that a major in Biology-Chemistry or a major in Biology (Biologist Track) also meets the minimum requirements for a teaching license in Physical Science (chemistry & physics).

Pre-Dentistry Program: Interested students are recommended to take the Biologist Track of the Biology major or the Biology-Chemistry Group major. The pre-dentistry program is designed to enable students to meet the entrance requirements of American dental schools. In addition, this program helps students prepare for the Dental Admissions Test (DAT).

Pre-Medical Program: Interested students are recommended to take the Biologist Track of the Biology major or the Biology-Chemistry Group major or a major in Chemistry with a minor in Biology. The pre-medical program is designed to enable students to meet the entrance requirements of medical schools approved by the American Medical Association, the American Osteopathic Association, and the American Pediatric Association. Pre-Med students are advised by SJC's Pre-Med Advisory Committee. This program helps students prepare for the Medical College Admissions Test (MCAT).

Pre-Pharmacy Program: Interested students are recommended to take the Pre-Therapy Track of the Biology major or the Biology-Chemistry Group major. The pre-pharmacy program is designed to enable students to meet the entrance requirements for Doctor of Pharmacy programs after an Associate or Bachelor of Science degree. Recommended courses include Human Anatomy and Physiology, Microbiology, Calculus I & II, Gen Physics I, Economics, Statistics, Biochemistry, Quantitative Analysis and Human Medical Physiology.

Pre-Veterinary Program: Interested students are recommended to take the Biologist or Wildlife Ecology Track of the Biology major with a minor in chemistry or the Biology-Chemistry Group major. This program is designed to enable students to meet the entrance requirements of American veterinary schools. These can often be met by taking TWO years of courses at Saint Joseph's College. Some veterinary schools prefer students to have four years of a major in biology with a biologist or wildlife ecology track.

GROUP MAJOR IN MEDICAL TECHNOLOGY (56 credits)

This program requires completion of three years at SJC and 12 months in an affiliated hospital program. This program meets the requirements of the American Medical Association and the American Society of Clinical Pathologists. SJC is affiliated with the following Indiana hospitals: St. Margaret Mercy, Hammond, and Ball Memorial, Muncie. REQUIRED: 54 credits of Biology and Chemistry plus one course in statistics (hospital program credits count for graduation requirements), which must include:

BIO 111 & 112 General Biology	CHM 121 & 122 Gen Chemistry
BIO 323 Introductory Microbiology	CHM 233 Organic Chem I
BIO 444 Advanced Microbiology	CHM 234 Organic Chem II **or** CHM 379 Biochemistry

REQUIRED: All Core courses except 5 & 6; 12 months in an affiliated hospital program.

MINOR IN BIOLOGY (18 credits)
REQUIRED: BIO 111 & 112 Gen Biology I & II and any 10 credits of Biology electives.

MINOR IN HEALTH THERAPY (18 credits)
REQUIRED: 18 credits from the following: (no more than 6 credits from any area.)

Mathematics	Psychology (except Statistics)
Sociology	Physical Education
Statistics	Art

NOTE: Only students majoring in Biology with the Physical Therapy Track can minor in Health Therapy.

COURSE DESCRIPTIONS

111-112. General Biology **8 credits**
An introductory discussion of the concepts and methods of biology with stress on laboratory investigations to emphasize biology as a science of inquiry. The second semester stresses biodiversity. Laboratory. **These courses are prerequisite to all other course offerings in biology numbered higher than 220.**

121-122. Human Anatomy and Physiology **6 credits**
This course is designed to study the structure and function of various cells, tissues, organs, and systems of the human body. Intended for physical education and nursing majors and Health Therapy minor. The course is recommended for students preparing to teach health in high school. Laboratory.

123. Introductory Microbiology for Nursing **4 credits**
This course gives a basic overview of the major areas of microbiology: microbial structures and physiology; environmental roles; control and growth; and immunology and disease. Laboratory emphasizes culture and handling techniques, means of growth and control, plus macro and microscopic means of identification. This course is meant as an introduction for freshman-level nursing students.

212. Analysis of Pathophysiological Concepts **3 credits**
This course is designed to involve the learner in the conceptual analysis of pathophysiological processes. The learner will build on their previous knowledge of the biological and physical sciences. **Prerequisite: BIO 121, 122, 123 and CHM 101.**

213. Analysis of Pharmacotherapeutics **3 credits**
This course is designed to involve the learner in analyzing various pharmacology concepts. The structure of this course will be based on pharmacological classifications. The learner will build on previous knowledge from the biological and physical sciences. **Prerequisite: BIO 121, 122, 123 and CHM 101.**

218. Introduction to Forensic Science for Science Students **3 credits**
The course will focus on the multi-disciplined aspects of forensic science which will include anthropology, pathology, criminalistics, entomology, chemistry, and odontology. Guest speakers, expert in the above fields, will serve as excellent role models for students

interested in employment in an alternative and very challenging line of work involving general scientific fields of study. Both lecture and laboratory will provide the basis for this hands-on learning experience where, instead of a traditional examination and research paper, the students will match wits with others as "experts in their fields" in a mock court.

220. Amphibian Population Research **1 credit**

Students participate in an ongoing amphibian population monitoring program to determine the distribution and abundance of frogs, toads and salamanders living in Jasper County, IN, and nearby areas. Students will learn in class how to identify all local species' breeding call, indices of relative abundance, and how to use topographic mapping techniques. Students are responsible to keep and submit a data file including habitat, weather, time and date of survey, and data on the relative abundance of amphibians in an assigned area of study. This course may be repeated up to three times.

225. Comparative Vertebrate Anatomy **4 credits**

The study of type forms of different classes of vertebrates, from the viewpoint of the morphological and physiological relationships of the various organs and systems. Laboratory.

231. Introduction to Entomology **3 credits**

The course will focus on insect behavior, biology, morphology, and identification. A laboratory will provide students with insect biology and behavior. This course will provide necessary background for future advanced studies in medical entomology, ecology, and forensic entomology. Laboratory.

232. Invertebrate Zoology **3 credits**

A survey of invertebrate animals with emphasis placed upon structural and functional adaptations of the major phyla and classes, along with their evolutionary relationships. This course includes marine biology component during a spring break field trip to the Gulf Coast. Laboratory.

233. Ecology **3 credits**

The study of organisms in relation to their environments with emphasis upon interrelationships among physical factors (light, temperature, and moisture), biogeo-chemical cycles, and biotic factors (trophic relationships, population dynamics, and interactions between species). Laboratory.

234. Herpetology **3 credits**

This field course will focus on the evolution, classification, ecology and natural history of amphibians and reptiles. Emphasis is placed upon the identification of local species. This course includes a weekend camping trip. Laboratory.

236. Ornithology and Mammology **3 credits**

This field course will focus on the evolution, classification, ecology and natural history of birds and mammals. Emphasis is placed upon the identification of local species. Laboratory.

244. Drugs and the Central Nervous System (PSY 244) 2 credits

This course will cover psychotropic medicines and their effects on the human body. Included are the pharmacology of the major classes of psychotropic drugs and the nature of diseases they are used to treat. Also covered will be the nature of drug dependence and addiction as well as a brief history of human's use of psychotropic substances.
Prerequisite: Bio 111-112 or PSY 110.

246. Environmental Research Methods (ESS 246) 3 credits

Basic environmental field methods will be examined and applied during this course. Field sampling and analysis of various environmental media such as water, soil, air, refuse, sediment, waste, etc., are undertaken in the context of environmental program implementation. Environmental field methods are foundational to virtually all aspects of environmental investigations and problem-solving. This course will also be an introduction to library search techniques, information retrieval systems, and scientific writing. Laboratory. **Prerequisite: BIO 111-112 or ESS 111 & 128.**

255. Independent Study 1-3 credits

318. Forensic Entomology 3 credits

This course will introduce how the biology of insects is used as evidence in criminal cases. Topics include collecting insect evidence from bodies, following a chain of custody, and processing specimen. The class project will be the analysis of an actual forensic entomology case and presentation of findings. Laboratory.

323. Introductory Microbiology 4 credits

This course gives a basic overview of the major areas of microbiology: microbial structures and physiology; environmental roles; control and growth; and immunology and disease. Laboratory emphasizes culture and handling techniques, means of growth and control, plus macro and microscopic means of identification. Though similar to Biology 123, lecture requirements will be in greater detail and depth, and laboratory exercises will place increased emphasis on scientific method and writing.

327. Human Medical Physiology 4 credits

An in-depth study of the physiology of the human body, especially as demonstrated in medical conditions and medical lab tests. Cannot be used to replace Biology 121 or 122. Laboratory.

331. Medical Entomology 3 credits

This course will focus in-depth on the biology of venomous insects, insects that transmit disease, and insects that otherwise cause injury to humans. Laboratory.

337. Genetics 4 credits

A study of the general principles of heredity and the operation of hereditary factors in the origin and development of species and of individual traits. Laboratory.

339. Conservation Biology **3 credits**

This course will focus on population growth, interactions of populations community structure, metapopulation dynamics, and landscape ecology and their implications for conservation biology and wildlife management. Students will research and write a detailed conservation assessment with recommendations of research needs for a state-listed threatened species.

341. Advanced Forensic Science **3 credits**

This course will focus on the basic and applied science aspects of forensic science. The course will stress research, analytical skills, applied methods and the use of the primary science literature to aid crime investigation. **Prerequisite: BIO 111-112 or BIO 218.**

343. Cellular & Molecular Biology **3 credits**

This course will focus on the fundamentals of cellular structure and physiology and molecular genetics and the methods and applications of recombinant DNA biotechnology. Laboratory. **Prerequisite: BIO 111-112 and CHM 234.**

345. Histology **3 credits**

The study of the microscopic structure of animal tissues with emphasis on human tissue structure. Microscopic examination of tissue slides to determine the internal identifying characteristics of cell types and their mode of organization into functional tissues and organs. Laboratory.

346. Animal Behavior (PSY 346) **3 credits**

Types of animal behavior are studied in regard to their causation, development, function, ecology and evolution. Students will design and conduct a series of ethograms and experiments and an independent project. Laboratory. **Prerequisite: BIO 111-112 or PSY 110.**

355. Junior Research in Biology **1-3 credits**

Consent of instructor.

379. Biochemistry (CHM 379) **4 credits**

A study of the chemistry and properties of carbohydrates, amino acids, proteins, lipids and nucleic acids as they relate to cellular metabolism and organelles. Examination of molecular structure and active sites of some model enzymes systems and a study of intermediary metabolism and its control mechanisms are included. Laboratory. **Prerequisites: BIO 111, 112 and CHM 233 (CHM 234 preferred).**

444. Advanced Microbiology **4 credits**

This course looks in greater depth at microbial diseases, genetics, and environmental roles. Half of the course deals with immunology in depth (immune response, agents and cells, modern use of immune technology, hypersensity, cancer and graft immunity). Laboratory.

455. Senior Biology Research **1-3 credits**

Consent of instructor.

459. Topics in Biology **3 credits**

479. Restoration Ecology **3 credits**

This course is intended to provide the student with current information on trends and research in the field of restoration ecology. Further, the causes and cures of environmental damage will be explored through field projects, guest speakers and student presentations. Laboratory.

Doing an experiment in the Chemistry lab