

## BIOLOGY (BIO)

**Degree offered: B.A or B.S.**

The biology major is divided into three Tracks. **Track I** prepares students for entry-level careers and for some levels of clinical laboratory programs. **Track II** prepares students for graduate study, professional schools, and for a variety of careers in the sciences. **Track III** allows students to receive a bachelor's degree in Biology while earning her ADN.

### **Requirements for the Biology Major Track I**

**Biology Major Track I** consists of **47-48 hours**.

A. Thirty-six (36) hours of biology including:

BIO 103	Foundations of Biology <b><u>OR</u></b>	(4 hours)
BIO 104	Principles of Biology	(4 hours)
BIO 108	Introductory Molecular Biology	(2 hours)
BIO 309	Genetics	(4 hours)
BIO 312	Cell Biology	(3 hours)
Two (2) 300-400 level Biology electives (hours vary)		
BIO 400	Seminar	(1 hour)
Additional departmentally approved BIO electives		

B. MAT 111 Precalculus Algebra (3 hours)  
Or any course above MAT 111

C. CHE 100 Introductory Chemistry (4 hours)  
CHE 105 Elem. Org. & Physiological Chemistry (4 hours)  
**OR**  
CHE 101 General Chemistry I (4 hours)  
CHE 103 General Chemistry II (4 hours)

### **Requirements for the Biology Major Track II**

**Biology Major Track II** consists of **66 hours**.

A. Thirty-six (36) hours of biology including:

BIO 103	Foundations of Biology <b><u>OR</u></b>	(4 hours)
BIO 104	Principles of Biology	(4 hours)
BIO 108	Introductory Molecular Biology	(2 hours)

	BIO 309	Genetics	(4 hours)
	BIO 312	Cell Biology	(3 hours)
	Two (2) 300-400 level Biology electives (hours vary)		
	BIO 400	Seminar	(1 hour)
	Additional departmentally approved BIO electives		
B.	MAT 121	Precalculus Trigonometry <b><u>OR</u></b>	(3 hours)
	MAT 151	Calculus I	(3 hours)
C.	CHE 101	General Chemistry I	(4 hours)
	CHE 103	General Chemistry II	(4 hours)
	CHE 201	Organic Chemistry I	(5 hours)
	CHE 202	Organic Chemistry II	(5 hours)
D.	PHY 201	General Physics I	(4 hours)
	PHY 202	General Physics II	(4 hours)

### **Requirements for the Biology Major Track III**

**Biology Major Track III** (Associate Degree in Nursing Option) consists of **36 hours** of Biology.

A. Thirty-six (36) hours of biology including:

	BIO 103	Foundations of Biology <b><u>OR</u></b>	(4 hours)
	BIO 104	Principles of Biology	(4 hours)
	BIO 108	Introductory Molecular Biology	(2 hours)
	<b>BIO 205</b>	<b>Human Anatomy</b>	<b>(4 hours;</b>
	<b>substitutes for BIO 201)</b>		
	<b>BIO 206</b>	<b>Human Physiology</b>	<b>(4 hours;</b>
	<b>substitutes for BIO 202)</b>		
	<b>BIO 304</b>	<b>Microbiology</b>	<b>(4 hours;</b>
	<b>substitutes for BIO 220)</b>		
	BIO 309	Genetics	(4 hours)
	BIO 312	Cell Biology	(3 hours)
	BIO 400	Seminar	(1 hour)
	BIO 300-400 Level Elective		

B. Associate Degree in Nursing (ADN/RN) Program courses, which count as part of the 36 required hours for a Biology major:

NUR 103	Intro to Pharmacology and Drug Dosage	(1 hour)
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NUR104	Advanced Pharmacology	(2 hours)
NUR 205	Maternal Child Nursing	(5 hours)
C. MAT 111	Precalculus Algebra	(3 hours)
D. CHE 101	General Chemistry I	(4 hours)
CHE 103	General Chemistry II	(4 hours)
E. NUR – Nursing Program requirements		(33 hours)
F. General Education Curriculum Requirements		(54 hours)

Additionally, students in the Nursing Program may apply PSY 204 (Human Growth and Development) to Goal II of the GEC. Nursing students are not required to take HPE 121 Health and Fitness.

G. Total credit hours required in Track III: 133

H. No minor is required in Track III.

**Requirements for the Biology Minor**

The **Minor in Biology** consists of **24 hours** including the following:

A.	BIO 103	Foundations of Biology <b><u>OR</u></b>	(4 hours)
	BIO 104	Principles of Biology	(4 hours)
	BIO 108	Introductory Molecular Biology	(2 hours)
B.	BIO 309	Genetics	(4 hours)
C.	Fourteen (14) hours of electives including seven (7) hours of 300-400 level courses.		

**NOTE: BIO 103 is recommended for the B.A. requirement.**

## **Course Descriptions**

### **BIO 100 PISCATOLOGY: One hour**

The art and science of fishing, including behavior and identification of common freshwater fishes. Does not count toward a major or minor in biology or natural science nor as a general graduation requirement in science or education. (Lab. 2 hours)

### **BIO 103 FOUNDATIONS OF BIOLOGY: Four hours**

A study of the major principles of biology. Emphasis is placed on cellular life, biodiversity, plant and animal structure and function, phylogeny, ecology, and behavior. This is the introductory course for a Biology Track I major. Students may not receive credit for both BIO 103 and BIO 104. (Lec. 3, Lab 2)

### **BIO 104 PRINCIPLES OF BIOLOGY: Four hours**

A study of major concepts of Biology with emphasis on molecular and cellular biology, physiology, morphology, and phylogeny. A systematic survey introduces students to the characteristics and features of organisms representing the more important phyla. This is the introductory course for a Biology major. Students may not receive credit for both BIO 103 and BIO 104. (Lec. 3, Lab. 2)

### **BIO 105 GENERAL BOTANY: Four hours**

General botany is a lecture, laboratory and field study course on plants and related groups. Emphasis is placed on molecular and cellular biology, photosynthesis, morphology, and a systematic survey of the plant divisions, especially vascular plants. (Lec. 3, Lab. 2).

### **BIO 108 INTRODUCTORY MOLECULAR BIOLOGY: Two hours**

An introduction to the molecular foundations of biology. Emphasis is placed on mechanisms of gene expression and basic biological chemistry. Elementary principles of genetics will also be introduced. (Lec. 2)  
Prerequisite: BIO 103 OR BIO 104

### **121, 221, 321 MEDICAL TERMINOLOGY: One hour per course**

A blended course consisting of orientation, one-on-one instruction, and web-enhanced study of the language of medicine emphasizing basic word structure, pronunciation, definitions and applications. Designed for students in health related programs.

**BIO 201 HUMAN ANATOMY AND PHYSIOLOGY I:** Four hours  
A study of the structure and function of the human body. Includes all body systems and their physiology. Emphasis is given to basic chemistry, histology, metabolism, nutrition, and special senses. Includes a two (2) hour weekly laboratory. Course available only to students enrolled in the Associate Degree in Nursing Program. (Lec. 3, Lab. 2)

**BIO 202 HUMAN ANATOMY AND PHYSIOLOGY II:** Four hours  
A study of the structure and function of the human body. Includes all body systems and their physiology. Emphasis is given to basic chemistry, histology, metabolism, nutrition, and special senses. Includes a 2 hour weekly laboratory. Course available only to students enrolled in the Associate Degree in Nursing Program. (Lec. 3, Lab. 2)  
Prerequisite: BIO 201

**BIO 204 BIOCHEMICAL NUTRITION:** Three hours  
A study of the chemical basis of nutrients and foods and their use in diet and therapy.  
Prerequisite: CHE 103

**BIO 204L BIOCHEMICAL NUTRITION LAB:** One hour

**BIO 205 HUMAN ANATOMY:** Four hours  
An introduction to the structure of the human body with emphasis on the major organ systems. The students preparing for professional schools and health service careers are encouraged to take this course. (Lec. 3, Lab. 2).  
Prerequisite: BIO 103 or BIO 104

**BIO 206 HUMAN PHYSIOLOGY:** Four hours  
An introduction to the function of the human body. The students preparing for professional schools and health service careers are encouraged to take this course. (Lec. 3, Lab. 2).  
Prerequisites: BIO 103 or BIO 104, BIO 108, BIO 205 and a course in college-level Chemistry

**BIO 215 ADVANCED MICROSCOPY AND INSTRUMENTATION:**  
One to Two hours  
An introduction to laboratory instruments and techniques, including theory, practice, and safety.  
Prerequisite: CHE 101

**BIO 220                    GENERAL MICROBIOLOGY:** Four hours

A study of bacteria, viruses, fungi, and protozoa with an emphasis on those species causing disease. Two 2 hour laboratories each week. Course available only to students enrolled in the Associate Degree in Nursing Program (Lec. 2, Lab. 4)

**BIO 303                    GENERAL ECOLOGY:** Four hours

A study of organisms in their relations to each other and to the environment. Emphasis is placed on basic concepts and principles, natural habitats, and alteration of the environment by man. Students are introduced to major environmental problems, regulating agencies, and conservation organizations. (Lec. 3, Lab 2)

Prerequisite: BIO 103 or BIO 104 or BIO 105

(Cross-listed with MAR 303)

**BIO 304                    MICROBIOLOGY:** Four hours

A study of bacteria, viruses, fungi, and related microorganisms. Physiology, genetics, and the antigenic role in the immune response, identification, and classification of microorganisms are emphasized. (Lec. 2, Lab. 4).

Prerequisite: BIO 103 or BIO 104 and BIO 108

**BIO 306                    BIOETHICS:** Three hours

An investigation of bioethics involving an understanding of concepts of ethics, morality, religion, free will, and social mores. Topics include reproductive technologies, genetic research, euthanasia, death and dying, organ transplants, fetal tissue research, and selected medical case studies. Medical professionals will participate in the course.

Prerequisite: BIO 103 or BIO 104

**BIO 307                    BIOCHEMISTRY I:** Four hours

A study of the chemistry of life. Emphasis is placed on the structure and metabolism of carbohydrates, proteins, lipids, nucleic acids, nucleoproteins, vitamins, and minerals. Principles of enzymology are also emphasized. This course has a clinical biochemistry orientation. (Lec. 3, Lab. 2)

Prerequisite: CHE 202

(Cross-listed with CHE 307)

**BIO 308**                    **BIOCHEMISTRY II:** Four hours

A continuation of topics discussed in Biochemistry I. Emphasis is placed on the structure and metabolism of complex organic molecules, as well as detailed analysis of mechanisms of gene expression and function.

Endocrine regulation of metabolism will also be emphasized. This course is recommended for students planning to apply to Medical School.

(Lec. 2, Lab 4).

(Cross-listed with CHE 308)

**BIO 309**                    **GENETICS (CT):** Four hours

An introduction to the principles of classical and modern genetics in microorganisms, plants, and animals. Special attention is placed on human genetics including research and applications. (Lec. 3, Lab. 2).

Prerequisites: BIO 103 or BIO 104 or 105, BIO 108, CHE 103, completion of at least 40 semester hours of coursework.

**BIO 310**                    **PARASITOLOGY:** Three hours

A study of the classification, morphology, life cycles, biochemical relationships, etiology, distribution, and health consequences of animal parasites. Emphasis is placed on parasites of man. (Lec. 2, Lab. 2).

Prerequisite: BIO 103 or BIO 104

**BIO 312**                    **CELL BIOLOGY (CT):** Three hours

A study of the cell structure and function with attention given to the major classes of organic macromolecules. An organelle approach is taken with emphasis on physiology. Instruction is given on technical writing and a computer generated research paper is required. (Lec. 3).

Prerequisite: BIO 103 or BIO 104 or BIO 105, and BIO 108, and at least one year of Chemistry

**BIO 313**                    **IMMUNOLOGY:** Three hours

The study of immunity to infectious disease, including antigen and antibody reactions, cellular immune response, and other human natural defense mechanisms. (Lec. 2, Lab. 2)

Prerequisite: BIO 103 or BIO 104, and BIO 108, CHE 103

**BIO 315**                    **EPIGENETICS:** Two hours

An exploration of functionally relevant changes to the genome that do not involve a change in nucleotide sequences. Topics include environmental factors, gene regulation, chromosome inactivation and other normal and

disease causing modifications of the gene functions.

Prerequisite: Eight hours of Chemistry and one of the following BIO/CHE 307, BIO 309, or BIO 312

**BIO 331 EQUINE DISEASE MANAGEMENT:** Three hours

The students will experience a more complete in-depth study of the equine. The course covers the internal and outer structure of the equine's anatomy. Students will study soundness, conformation, the digestive, respiratory and lymphatic systems. Students will also study the effects of infectious diseases and parasitic conditions. Students will learn about the reproductive system of the equine and discuss potential problems and conditions of the mare in foal as well as the newborn foal. Fee required. (Cross-listed with EQS 331)

**BIO 333 ANIMAL NUTRITION (CT):** Three hours

Basic and applied farm animal nutritional science; including comparative anatomies of different digestive systems, nutrient requirements, feedstuff types/sources/selection, principles of formulation and practical feeding programs. Judson owned horses may be used for further course expansion and observation. Fee Required. (Cross-listed with EQS 333)

**BIO 400 SEMINAR (CT):** One hour

Readings, discussion, and/or preparation of technical manuscripts of concepts and problems in the field of biology. Prerequisite: BIO major with senior standing (Cross-listed with EQS 400)

**BIO 401 ORNITHOLOGY:** Three hours

A study of birds with emphasis on field identification, classification, behavior, evolution, morphology, and ecology of birds are important aspects of the course. Field work is required. (Lec. 2, Lab. 2) Prerequisite: BIO 103 or BIO 104 or by approval of the department head

**BIO 402 MAMMALIAN PHYSIOLOGY:** Four hours

A study of the cellular and molecular physiology of mammalian cells with an emphasis on endocrinology. Topics to be covered will include: membrane potentials, muscle physiology, neurophysiology, cardiovascular physiology, water regulation and kidney function, respiration, hepatic physiology, endocrinology, digestion and energy metabolism.



(Lec. 3, Lab. 2)

Prerequisites: BIO104 or BIO105 and BIO 108, CHE 101 and CHE 103

**BIO 403                    DEVELOPMENTAL BIOLOGY:** Four hours

A comparative study of animal development, from invertebrates to humans. Descriptive embryology will be combined with analysis of the molecular and genetic foundations of development. Not open to freshmen. (Lec. 2, Lab. 4).

Prerequisite: BIO 103 or BIO 104, and BIO 108, 2 semesters of general chemistry or a minimum of eight (8) hours of chemistry.

**BIO 404                    COMPARATIVE VERTEBRATE ANATOMY:** Four hours

A study of vertebrate anatomy with emphasis on the evolution and morphology of prechordates and vertebrate classes. Labs are devoted to the dissection of representative vertebrates. Not open to freshmen. (Lec. 2, Lab. 4)

Prerequisite: BIO 103 or BIO 104

**BIO 405                    SCIENCE OUTREACH:** One hour

A community service program designed to train upper level science students to host a molecular or environmental science laboratory for high school students. Students will function as a group to organize, prepare, and operate at least one laboratory for a visiting high school group. Students will be graded on their participation and submit a written reflection of their experience. This course mainly serves students preparing for allied health careers and postgraduate work.

Prerequisite: BIO 103 or BIO 104 or BIO 105, CHE103, completion of at least 40 semester hours of coursework (Cross-listed with CHE 405)

**BIO 411                    SPECIAL STUDIES:** One to Three hours

A course for upperclassmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**BIO 412                    SPECIAL STUDIES:** One to Three hours

A course for upperclassmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives

and/or graduate studies.

Prerequisite: Approval by the Department Head

**BIO 413**                **SPECIAL STUDIES:** One to Three hours

A course for upperclassmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**BIO 414**                **SPECIAL STUDIES:** One to Three hours

A course for upperclassmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**BIO 449, 450**        **INDEPENDENT STUDIES:** One to Two hours

Tutorial courses designed to meet particular needs of the student.

Prerequisite: BIO 103 or BIO 104, approval of the Department Head and Academic Dean.

**BIO 471**                **INTERNSHIP:** Three hours

Application and one page proposal describing the nature, location, and duration of the desired internship should be submitted to the Department Head at least three months in advance. Internship guidelines and procedures stated elsewhere in this Catalog will be followed.

Prerequisite: Approval of the Department Head and Academic Dean

**Requirements for the Marine Science Minor**

A **Minor in Marine Science** consists of the following **32 hours**:

A.	BIO 103	Foundations of Biology <b><u>OR</u></b>	(4 hours)
	BIO 104	Principles of Biology	(4 hours)
	BIO 303	Ecology	(4 hours)
	BIO 401	Ornithology	(3 hours)
B.	CHE 101	General Chemistry I	(4 hours)
	CHE 103	General Chemistry II	(4 hours)

- C. Twelve (12) semester hours of upper-level Marine Science coursework.

**NOTE:** Marine Science courses are taught at the Dauphin Island Sea Laboratory; no Marine Science courses are taught at Judson College. MAR information is available from the Head of the Biology Department.

### **Course Descriptions**

**MAR 297, 298 SPECIAL TOPICS:** Two hours

Prerequisite: Determined by Sea Lab Instructor and listed in the DISL Bulletin.

**MAR 303 GENERAL ECOLOGY:** Four hours

A study of organisms in their relations to each other and to the environment. Emphasis is placed on basic concepts and principles, natural habitats, and alteration of the environment by man. Students are introduced to major environmental problems, regulating agencies, and conservation organizations. (Lec. 3, Lab. 2)

Prerequisite: BIO 103 **OR** BIO 104 **OR** BIO 105

(Cross-listed with BIO 303)

**MAR 350 MARINE GEOLOGY:** Four hours

A study of the geology of the ocean basins, with special emphasis on the continental shelves, their sediments, and the sedimentary processes at work there. (Emphasis on the Northeast Gulf of Mexico)

Prerequisite: Introductory Geology

**MAR 355 MARINE BIOLOGY:** Four hours

A general survey of marine plants, invertebrates and vertebrates, the communities they form, and the physical and chemical factors which influence their lives.

Prerequisite: BIO 105

**MAR 360 COASTAL ZONE MANAGEMENT:** Two hours

A review of the ecological features and of management policies for coastal communities with a description of relevant federal and state programs. The course examines the various aspects of coastal zone management in the United States by examining the major substantive and procedural aspects of specific laws and regulations which govern activity in the coastal zone environment and processes; and by examining how coastal

environments and processes affect specific management issues of the zone.

**MAR 365 COASTAL GEOMORPHOLOGY:** Two hours

An introduction to coastal sediment processes and applied coastal geomorphology. Waves and other coastal hydrodynamics, sediment transport, and interaction between natural process and man's activities such as dredging, jetties, and beach fills will be studied.

**MAR 370 INTRODUCTION TO OCEANOGRAPHY:** Two hours

A general introduction to the physics, chemistry, geology, and biology of the ocean. The course introduces the student to the interrelationships between physical, geological, chemical and biological processes in the ocean.

Prerequisite: BIO 105

**MAR 400 SEMINAR:** One hour

Readings, discussion, and/or preparation of technical manuscripts of concepts and problems in the field of marine science. Not open to freshmen.

Prerequisite: Marine Science minor with senior standing

**MAR 411 SPECIAL STUDIES:** Three hours

A course for upper-classmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**MAR 412 SPECIAL STUDIES:** Three hours

A course for upper-classmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**MAR 413 SPECIAL STUDIES:** Three hours

A course for upper-classmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives

and/or graduate studies.

Prerequisite: Approval by the Department Head

**MAR 414 SPECIAL STUDIES:** Three hours

A course for upper-classmen seeking to complete requirements in their major or minor disciplines. Subjects will be taught that do not appear in the College catalog but are of value to a student in her career objectives and/or graduate studies.

Prerequisite: Approval by the Department Head

**MAR 420 MARINE BOTANY:** Four hours

A general survey of marine algae (microscopic and macroscopic), as well as salt marsh vegetation, mangroves, seagrasses and maritime forest communities. Identification, distribution, structure, ecology, and physiology will be emphasized.

Prerequisite: BIO 105

**MAR 422 MARINE VERTEBRATE ZOOLOGY:** Four hours

A survey of marine fishes, reptiles and mammals, and an in-depth, comprehensive treatment of their systematics, zoogeography, and ecology. The vertebrate fauna of the northern Gulf of Mexico will be stressed.

**MAR 424 MARINE INVERTEBRATE ZOOLOGY:** Four hours

This course surveys the morphology, natural history and evolutionary relationships of the marine invertebrates.

**MAR 426 MARINE ECOLOGY:** Four hours

Students will study marine organisms as they interact with each other and their environment, and examine theories and the experimental basis of our current knowledge. Students will study factors influencing population dynamics, community structure, and energy flow in marine ecosystems.

Prerequisite: BIO 105, BIO 103, CHE 103. Physics and Statistics are recommended.

**MAR 428 MARSH ECOLOGY:** Four hours

This is a study of the floral and faunal elements of various coastal and near-coastal marsh communities and the interaction with the environment. The course will focus upon the main indicators of marsh wetlands (vegetation, soil and hydrology), how they interact to form

functional wetlands, and how these wetlands are linked to the estuaries and seas beyond.

Prerequisite: BIO 105, CHE 103. Statistics is recommended.

**MAR 497, 498** **SPECIAL TOPICS:** Three hours

Subjects may be taught that are of value to the student in her career objectives and/or graduate studies.