DEPARTMENT OF BIOLOGY (BY)

242 MARTIN HALL

Department Head: Tim H. Lindblom
Professors: Al-Hamdani, Blair, Carter, Cline, Hamissou, Lindblom, Meade, Rayburn
Associate Professors: Murdock, Sauterer
Assistant Professors: Burns, Tolley-Jordan, Triplett
Instructor: Watkins

The Department of Biology offers a diverse spectrum of undergraduate courses in the biological sciences that enables a student to develop an understanding and appreciation of life, from molecular to ecological, and to develop the strong academic background necessary for pursuing graduate study or a career in biology or the health professions. The Department recognizes the importance of both content and process in science education and thus offers the opportunity to develop communication skills and engage in undergraduate research in the biological sciences.

The **Bachelor of Science** degree with a **Major in Biology** requires an overall minimum of 120 hours with a minimum of 36 hours of 300/400 level courses. At least 12 hours of the 300/400 courses must be taken in residence at JSU. Students must earn a "C" or better in biology coursework and maintain a 2.0 GPA overall and in the courses taken on campus. Once the student has met the requirements for the major, the hours remaining to complete the 120 hours overall will be classified as electives. The Bachelor of Science degree with a major in Biology is for those who intend to pursue careers in health professions (medicine, dentistry, optometry, physical therapy, pharmacy, veterinary medicine, physician assistant, etc.), graduate programs (M.S., Ph.D.), biological education, biomedical sciences, biotechnology, conservation biology, environmental biology, organismal biology, marine biology, industrial professions (lab managers, consulting, etc.), or governmental professions (research scientist, NOAA, NMFS, etc.). After completing a common core of biology courses, the Biology major may choose a concentration from the listing below. Students pursuing a B.S. degree in Biology are not required to have a minor in another academic discipline.

Ecology and Environmental Biology is designed for those majors who plan to enter graduate school or have careers in ecological or environmental research, environmental assessment, or education.

Marine Biology is for majors who plan to enter graduate school or have careers in marine biology research, environmental assessment, or education. The Department is an active member of Alabama's Marine Environmental Sciences Consortium. Summer study at the Dauphin Island Sea Lab is required.

Pre-Health Professional Biology is for those majors who intend to seek admission to such health professions as medicine, dentistry, physical therapy, etc., or graduate study in the biomedical sciences.

Organismal Biology is intended for those majors who plan graduate study in organismal biology (plant or animal biology), or who plan to pursue careers in biological education or conservation biology or as a naturalist.

Cellular and Molecular Biology is for those majors who plan graduate study in biotechnology, cell and molecular biology, or biochemistry or who plan to pursue careers in academic, industrial and/or biotechnology settings.

Advising—Students who plan to earn the B.S. degree in Biology must consult with the Department of Biology for advisement early in their plan of study and every semester thereafter. New students should consult the Department's freshman advisor before or during their first semester. Pre-Health Professional advisees are required to attend scheduled advising sessions that are announced on the departmental webpage. Transfer students should meet with either the Department's transfer advisor or a program advisor before or immediately upon transferring.

To complete the Biology Degree Program, the students majoring in Biology must plan carefully, since science laboratories can cause scheduling conflicts. An advisor can alert students to potential problems and assist in minimizing such conflicts. It is recommended that the Biology major complete the biology core of genetics, cell biology, ecology, and research in biology early in the course of study. Careful planning will facilitate the opportunity for undergraduate research.

Additional departmental, program, advising, and career information is available at www.jsu.edu/biology.

The **Bachelor of Arts Degree** with a **Major in Biology** requires a minimum of 120 hours with a minimum of 36 hours of 300/400 courses. At least 12 hours of the 300/400 level courses must be taken in residence at JSU. Students must earn a "C" or better in biology coursework and maintain a 2.0 GPA overall an in courses taken on

campus. Once the student has met the requirements for the major, the hours remaining to complete the overall 120 hours will be classified as electives. At the beginning of the sophomore year, students considering this degree program (BA vs. BS) should consult with the Biology Department Head or their Biology Faculty Advisor. Students pursuing a B.A. degree in Biology are not required to have a minor in another academic discipline.

The Major in Biology (BS)

The requirements in biology for the major are

a. Freshman Biology Sequence: BY 101, 102, 103 and 104 ..... 8 hrs
b. Biology Core Courses: BY 322 (Genetics), BY 332 (Ecology) and BY 373 (Cell Biology) ..... 12 hrs
c. Introduction to Research: BY 370 ..... 2 hrs
d. Biology courses to be selected from each of the following groups:
Group I — Approved courses in cellular, physiological or developmental biology ..... 4 hrs
Group II —Approved courses in organismal biology ..... 4 hrs
e. Senior Seminar: BY 496 ..... 1 hr
f. BY 300/400 electives: ..... 8 hrs

TOTAL hours in Biology ..... 39 hrs
g. Freshman Chemistry Sequence: CY 105, 106, 107 and 108 ..... 8 hrs

h. Organic Chemistry Sequence: CY 231 and 232 ..... 8 hrs

i. Mathematics: MS 113 or 125 or higher ..... 3-4 hrs

j. Computer Science: CS 201 ..... 3 hrs

k. Physics Sequence: PHS 201, 202, 203 and 204 ..... 8 hrs

TOTAL hours in support courses 30-31

The approved Group I and II courses required for the Biology major vary according to the specific concentration chosen and are outlined in the "Plan of Study" which follows "Course Descriptions." **No more than 1 hour each of BY 327, BY 397, BY 427, and BY 489 can be applied to the Biology major.**

The Major in Biology (BA)

The requirements in biology for the major are

a. Freshman Biology Sequence: BY 101, 102, 103 and 104 ..... 8 hrs
b. Biology Core Courses: BY 322 (Genetics), BY 332 (Ecology) and BY 373 (Cell Biology) ..... 12 hrs
c. Introduction to Research: BY 370 ..... 2 hrs
d. Biology courses to be selected from each of the following groups:
Group I — Approved courses in cellular, physiological or developmental biology ..... 4 hrs
Group II —Approved courses in organismal biology ..... 4 hrs
e. Senior Seminar: BY 496 ..... 1 hr
f. BY 300/400 electives: ..... 8 hrs

TOTAL hours in Biology ..... 39 hrs
g. Freshman Chemistry Sequence: CY 105, 106, 107 and 108 ..... 8 hrs

h. Foreign Language Sequence: FL 101/102 or SH 101/102 ..... 6 hrs

i. Mathematics: MS 113, 125 or 204 ..... 3-4 hrs

j. Computer Science: CS 201 ..... 3 hrs

k. Wellness: MSC 113, 115, FCS 215 or HPE 109 ..... 3 hrs

TOTAL hours in support courses.....23-24 hrs

The approved Group I and II courses required for the Biology major are outlined in the "Plan of Study" which follows "Course Descriptions." **No more than 1 hour each of BY 327, BY 397, BY 427, and BY 489 can be applied to the Biology major.**

DEPARTMENTAL MINORS
MINOR IN BIOLOGY

A **Minor in Biology** comprises a minimum of 24 hours that shall include BY 101, 102, 103, 104, 322, 332, 373 and 4 additional hours of approved biology courses at or above the 300 level. A minor in Biology may not be taken in conjunction with a major in Biology.

BIOLOGY (BY)
DESCRIPTION OF COURSES

101. Introductory Biology I (3). *Corequisite: BY 103.* An introduction to the concepts of biology, including cellular structure and function, bioenergetics, patterns and mechanisms of inheritance, the processes of evolution, and ecology. For majors and non-majors.

102. Introductory Biology II (3). *Prerequisite: BY 101. Corequisite: BY 104.* An introduction to biodiversity, from bacteria through plants and animals, with an emphasis on their structure, function, and ecological interactions. For majors and non-majors.

103. Introductory Biology Lab I (1). *Corequisite: BY 101.* One two-hour laboratory per week. This course reinforces lecture materials and must be taken concurrently with BY 101.

104. Introductory Biology Lab II (1). *Prerequisite: BY 103. Corequisite: BY 102.* One two-hour laboratory per week. This course reinforces lecture material and must be taken concurrently with BY 102.

105. Honors Introductory Biology I (3). *Prerequisite: Admission to the Honors Program or permission of instructor. Substitutes for BY 101. Corequisite: BY 107.* An advanced introduction to the concepts of biology, including chemistry as related to biology, cell structure and function, energy pathways, cellular reproduction, genetics, genetic techniques, evolution and ecology. For majors and non-majors.

106. Honors Introductory Biology II (3). *Prerequisite: Successful completion of BY 105 or permission of instructor. Substitutes for BY 102. Corequisite: BY 108.* An advanced introduction to diversity in the living world. Emphasis is on structure, function, and ecological interactions of living organisms beginning with bacteria and viruses and progressing through plants and animals. For majors and non-majors.

107. Honors Introductory Biology Lab I (1). *Prerequisite: Admission to the Honors Program or permission of instructor. Substitutes for BY 103. Corequisite: BY 105.* One two-hour laboratory per week. This course reinforces lecture materials with hands-on creative laboratory exercises and must be taken concurrently with BY 105.

108. Honors Introductory Biology Lab II (1). *Prerequisite: Admission to the Honors Program or permission of instructor. Substitutes for BY 104. Corequisite: BY 106.* One two-hour laboratory per week. This course reinforces lecture materials with hands-on creative laboratory exercises and must be taken concurrently with BY 106.

114. Introductory Biology Research Lab I (2). *Corequisite: BY 101 and permission from the instructor.* Substitutes for BY 103. Two-hour laboratory (two times per week). Students will isolate mycobacteriophages from soil samples, purify them, perform electron microscopy, and isolate viral DNA for sequencing.

115. Introductory Biology Research Lab II (2). *Corequisite: BY 102 and permission from the instructor.* Substitutes for BY 104. Two-hour laboratory (two times per week). Students will obtain sequence data for their selected mycobacteriophage, annotate the genome and compare the genome to other mycobacteriophage genomes available in the GenBank database.

263. Human Anatomy and Physiology (4). *Prerequisite: BY 101, 103.* Lecture and laboratory. The first of a two-course sequence of human anatomy and physiology, with an emphasis on the skeletal, muscular, respiratory and circulatory systems. For students in health-related majors; no credit allowed toward Biology major or minor.

264. Human Anatomy and Physiology (4). *Prerequisite: BY 263.* Lecture and laboratory. The second of a two-course sequence of human anatomy and physiology, with an emphasis on the digestive, urinary, reproductive and endocrine systems. For students in health-related majors; no credit allowed towards Biology major or minor.

283. Health Microbiology (4). *Prerequisite: BY 101, 103.* Lecture and laboratory. The study of viruses, bacteria, protozoa and fungi that cause diseases in humans. For students in health-related majors; no credit for Biology major or minor.

301. Field Zoology (3). *Prerequisites: BY 101, 102, 103, 104.* Lecture, laboratory, and field study. Collecting and identifying animals and noting ecological conditions.

302. Field Botany (3). *Prerequisites: BY 101, 102, 103, 104.* Lecture, laboratory, and field study. The laboratory work will involve the collection and identification of native plants of Alabama.

303. Biological Conservation (3). *Prerequisites: BY 101, 102, 103, 104.* A contemporary and historical study of biological conservation in America. Topics include national and global biodiversity, threats to biodiversity, conservation ethics and economics, habitat loss and degradation, habitat fragmentation, overexploitation, invasive species, conservation genetics, and conservation policy. Also addressed are the management of species and population dynamics, ecosystem conservation, restoration of degraded ecosystems, and sustainable development.

320. Comparative Vertebrate Anatomy (4). *Prerequisites: BY 101, 102, 103, 104.* Lecture and laboratory. The comparative study of vertebrate organ systems supplemented in laboratory with the dissection of selected vertebrates.

322. Genetics (4). *Prerequisites: BY 101, 102, 103, 104.* Lecture and laboratory. Important facts, laws, theories, and methods used in the study of genetics.

323. Microbiology (4). *Prerequisites: BY 101, 102, 103, 104.* Lecture and laboratory. General microbiology, including methods of culture and identification of some of the most common types of microorganisms.

327. Directed Studies in Biology (1). *Prerequisite: BY 322 or 332 or 373. Recommended: BY 370.* May be duplicated for credit for a total of three (3) semester hours, but only 1 hour may be applied to the major. A laboratory, field or library research investigation dealing with an aspect of the biological sciences. Biology sponsor required for topic approval and supervision. (Grade of Pass/Fail only)

331. Principles of Animal Nutrition (3). *Prerequisites: BY 101, 102, 103, 104.* The classification and function of nutrients, deficiency symptoms, digestive processes, characterization of feedstuffs, and formulation of diets for domestic animals.

332. Ecology (4). *Prerequisites: BY 101, 102, 103, 104. Prerequisite or corequisite: MS 112 or higher.* Lecture, laboratory, and field study. The association and distribution of organisms in relation to the major environmental factors.

340. Discovering Genomics and Bioinformatics (3). *Prerequisite: BY 101.* The course provides fundamental background in bioinformatics, both theoretical (bioinformatics algorithms) and practical (databases and web-based tools used to study problems in biology), to students in computer science or in biological sciences. Introduction to the biological problems addressed in this course will be provided, as well as a formal definition of the computational problems and deep exploration of the algorithms for solving these problems. Practical use of topics introduced in class is demonstrated by laboratory exercises and homework problems. Students are grouped for class projects such that each group contains at least one life scientist and one computer scientist. (BY 340 is cross-listed with CS 340, but only one course can be counted for credit.)

370. Introduction to Research in Biology (2). *Corequisite: BY 322 or 332 or 373.* Lecture and discussion. An introduction to research in biology, including discussion of the scientific method; reading, analyzing, and interpreting biological literature; experimental design and use of statistics; building and interpreting figures and tables; ethics; and developing a basic proposal for undergraduate research in biology.

373. Cell Biology (4). *Prerequisites: BY 101, 102, 103, 104.* Lecture and laboratory. The study of prokaryotic and eukaryotic cells, with an emphasis on their chemical and structural organization, bioenergetics and reproduction.

397. Biology Internship (1). *Prerequisites: BY 101, 102, 103, 104; either BY 322, 332 or 373; and permission of instructor required.* May be duplicated for credit for a total of three (3) semester hours, but only 1 hour may be applied to the major. The student will spend a minimum of 25 hours gaining practical experience at a public or private institution or business. (Grade of Pass/Fail only)

399. Study Tour (3). Topics, excursions, and requirements determined by department. May be duplicated for credit; however, only three (3) credits may be applied toward any major or minor. Infrequently scheduled and subject to minimum and maximum numbers. Advance deposit required.

402. Medical Microbiology (4). *Prerequisite: BY 283 with permission of instructor or BY 323.* Lecture and laboratory. The study of pathogenic bacteria, viruses, fungi, and parasites of humans and some domestic animals. Emphasis on identification of pathogens, disease processes, and public health.

403. Immunology (3). *Prerequisite: BY 373. Recommended: BY 323.* The study of immunity and how the immune system responds to specific infectious and non-infectious agents. Includes comparative immunology of invertebrate and vertebrate animals, immunological disorders, and application of immunological techniques.

405. Animal Behavior (3). *Prerequisite: BY 332.* Lecture, discussion, demonstration, and library study. The genetic and anatomical basis of behavior, with an emphasis on the impact of behavior on the ecology of animals.

406. Ornithology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. The history, classification, anatomy, physiology, ecology, and distribution of birds, with an emphasis on field identification and ecology.

407. Mammalogy (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. Aspects of the biology, ecology, taxonomy, and distribution of Southeastern mammals.

408. Public Policy and Ecosystems (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. The course will address the history, evolution, and recent developments in natural resource policy and how it influences ecosystem structure and function. Topics will include fish and wildlife conservation, forest planning and management, agricultural policies, public lands (Bureau of Land Management lands, national forests, national wildlife refuges, national parks, and wilderness areas), endangered species, and policies that influence private lands. The relationship between policies and ecosystem structure and function will be addressed in class and in labs by debates and field exercises.

412. Plant Reproduction and Development (4). *Prerequisites: BY 322, 373. Recommended: CY 105, 106, 107, 108.* Lecture and laboratory. A study of structural and functional aspects of reproductive and developmental phenomena in vascular plants.

413. Animal Reproduction and Development (4). *Prerequisites: BY 322, 373. Recommended: CY 105, 106, 107, 108.* Lecture and laboratory. A study of the structural and functional aspects of reproductive and developmental phenomena in animals, with an emphasis on the cellular and molecular mechanisms involved.

415. Biometrics (3). *Prerequisites: BY 322, 332, or 373 and MS 204.* An introduction to statistics for biology majors. This course will introduce students to appropriate statistics for analyzing biological data. This course will include how to select random samples, use basic statistical package(s), post-hoc statistical testing and the use of linear regression. The students will be introduced to real-world examples of statistics in ecological, toxicological, and physiological research.

422. Biology of Cryptogams (4). *Prerequisites: BY 332, 373.* Lecture, laboratory, field, and library study. The study of blue-green algae, algae, slime molds, bryophytes, and lichens. Extensive field and laboratory identifications.

427. Independent Studies in Biology (1). *Prerequisite: BY 370.* May be duplicated for credit for a total of three (3) semester hours, but only 1 hour may be applied to the major. A laboratory or field research project dealing with an aspect of the biological sciences. Biology sponsor required for topic approval and supervision. (Grade of Pass/Fail only)

434. Animal Systems Physiology (4). *Prerequisites: BY 373, CY 105, 106, 107, 108. Recommended: CY 109 or 231, 232; one semester of physics.* Lecture and laboratory. A systematic survey of organ system physiology in vertebrates, with an emphasis on systems analysis, biophysics, and bioengineering.

435. Landscape Ecology and Management (4). *Prerequisites: BY 332 and MS 204.* Lecture, laboratory, and field study. The role of spatial and temporal heterogeneity in the management of wildlife and natural resources is emphasized. Topics addressed include detection and description of heterogeneity, landscape dynamics and models, ecosystem management, adaptive management, genetics in conservation and management, population dynamics, community management, landscape-level conservation, managing biodiversity, and human interactions with ecosystems.

438. Freshwater Biology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. An analysis of the unique ecology and biology of the freshwater ecosystems, with extensive field work and a research project involved.

440. Evolutionary Biology (4). *Prerequisite: BY 322.* Lecture, laboratory, and field study. A study of the processes and mechanisms which lead to evolutionary change in the biota.

442. General Entomology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study of insects and other arthropods, with an emphasis on the taxonomy, morphology, physiology, and ecology of the insects.

445. Ecotoxicology (4). *Prerequisites: BY 332, BY 373. Recommended: BY 322.* Lecture, laboratory and field study. This course is a survey of ecotoxicology: study of the integration of the major processes involved with transport, exposure and response of biological systems to xenobiotics; study of how toxicants mediate interactions between organisms and their biotic and abiotic environments; study of the impact and toxic effects of pollutants on diversity, growth and metabolism of living organisms, populations, communities, and the ecosystem.

450. Molecular Biology (4). *Prerequisites: BY 322, 373, or permission of the instructor.* Lecture and laboratory. A study of the processes involved in the expression of biological information at the molecular level. The laboratory includes methods in recombinant DNA technology.

451. Plant Anatomy (4). *Prerequisite: BY 373.* Lecture and laboratory. The comparative structural organization of the vegetative and reproductive parts of seed plants, from cells to tissues to systems.

452. Plant Taxonomy (4). *Prerequisite: BY 322 or 332.* Lecture, library, laboratory, and field study. Survey of plant nomenclature, identification systems, description, evolution, and classification, with an emphasis on vascular plants.

453. Dendrology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. The identification, taxonomy, ecological characteristics, distribution, and economic importance of trees native to North America and ornamentals.

454. Tropical Biology (3). *Prerequisites: BY 101, 102, 103, 104 and permission of instructor.* An extensive field trip to study the flora and fauna of tropical regions. Advance deposit required.

455. Plant Ecology (4). *Prerequisite: BY 322 or 332.* Lecture, laboratory, library, and field study. The study of the major plant communities of the southeastern U.S. and their relationships with major abiotic features, including autecological field studies of plant species and populations.

458. Herpetology (4). *Prerequisite: BY 332. Recommended: BY 320.* Lecture, laboratory, and field study. The study of the taxonomy, ecology, physiology, and external anatomy of amphibians and reptiles, with an emphasis on conservation and field methodology.

460. Ichthyology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. An overview of the evolution, ecology, behavior, physiology, and conservation of fishes.

473. Advanced Cell Biology (4). *Prerequisites: BY 373. Recommended: BY 322, CY 231, 232, 362, 363.* Lecture and laboratory. A study of molecular aspects of cell structures and their functions using both descriptive and biochemical approaches.

475. Economic Botany (4). *Prerequisites: BY 101, 102, 103, 104.* Lecture, laboratory, and field study. The collection, identification, culture, and preservation of plants for illustration and utilization in the classroom and laboratory.

476. Invertebrate Zoology (4). *Prerequisite: BY 332.* Lecture, laboratory, and field study. The study of the systematics, ecology, physiology, and phylogenetic relationships of invertebrate animals.

477. Cell and Tissue Culture (4). *Prerequisites: BY 373 and CY 105-108. Recommended: BY 322, 412, 431 and CY 231.* Lecture and laboratory. The study of *in vitro* manipulation of cells, tissues, and organs, both solid and suspension culture, and their application to biotechnology.

478. Endocrinology (3). *Prerequisites: BY 373 and CY 231.* General introduction to vertebrate endocrine systems and the variety of chemical messengers involved in the regulation of physiological processes. Topics will include discussions of the history and methodologies of endocrinology, hormone synthesis, physiological effects of hormones, and the mechanisms of actions for various hormones.

479. Plant Physiology (4). *Prerequisite: BY 373. Recommended: BY 451.* Lecture and laboratory. The study of mineral nutrition, water relations, photosynthesis, metabolism, and transport in vascular plants.

480. Advanced Topics in Biology I (1). *Prerequisites: BY 322, 332, 373.* Lecture and discussion. Topics to be posted in the Biology Department.

481. Advanced Topics in Biology II (1). *Prerequisites: BY 322, 332, 373.* Lecture and discussion. Topics to be posted in the Biology Department.

488. Laboratory Practicum I (2). *Prerequisites: BY 322, 332, 373 and permission of instructor.* Lecture and laboratories. The design, organization, and implementation of laboratory exercises, the use of appropriate equipment and instructional materials, and laboratory safety and supervision. **Offered fall term only.**

489. Laboratory Practicum II (1). *Prerequisites: BY 322 or 332 or 373, and the permission of the instructor.* The organization and implementation of laboratories, including the use of appropriate equipment and instructional materials. (Grade of Pass/Fail only)

496. Senior Seminar (1). *Prerequisites: BY 370 and Senior standing*. The capstone course in biology includes a written report, an oral presentation in a symposium format, satisfactory completion of a comprehensive exam for the major, and participation in departmental assessment. Required for Biology major; should be taken in the last semester.

MARINE BIOLOGY (MBY)

In addition to the requirements for the B.S. in Biology, the Marine Biology concentration requires 16 credit hours of MBY courses which are offered during the **summer only** at the Dauphin Island Sea Lab (DISL). The following courses are required:

MBY 415 Marine Ecology or MBY 461 Marine Behavioral Ecology

MBY 486 Marine Vertebrate Zoology, MBY 487 Marine Invertebrate Zoology, orMBY 481 Marine Mammals

MBY 411 Marine Botany, MBY 423 Marsh Ecology, or MBY 439 Coastal Wetland Ecology

4 hours of MBY at the 300 or 400 level.

MBY electives must be approved by the JSU Marine Biology Advisor. Students interested in Marine Biology must consult with the Biology Department's Marine Biology Advisor for information about the concentrations, actual summer offerings at DISL, JSU Sea Lab Scholarships, application, and registration. Special fees and course availability are determined by DISL. Registration for DISL courses occurs during February each year.

MARINE BIOLOGY (MBY)
DESCRIPTION OF COURSES

309. Marine Biology (4). *Prerequisites: BY 101, 102, 103, 104.* A general survey of the invertebrates, vertebrates, and marine plants as communities with emphasis on local examples of these principal groups. Students will have an opportunity to examine marshland, estuarine, beach, dune, inlet and neritic habitats, and niches. Lecture, laboratory, and field work will be included.

411. Marine Ecology (4). *Prerequisites: BY 101, 102, 103, 104, one year of general chemistry, one semester of general physics.* Bioenergetics, community structure, population dynamics, predation, competition, and speciation in marine ecosystems will be studied. Lecture and laboratory work will be included, although considerable time will be spent in field work. Students who have not previously had marine courses may enroll; however, Marine Invertebrate Zoology (MBY 487) or Marine Biology (MBY 309) would be very helpful. Individual species will be studied as they relate to ecological principles which they exemplify, thus providing both a taxonomic and ecologic background.

415. Marine Botany (4). *Prerequisites: BY 101, 102, 103, 104.* A general survey of coastal and marine flora with emphasis on taxonomy, morphology, physiology, ecology, and distribution. Community structure in various ecosystems will be studied. Students will have an opportunity to examine pelagic, marshland, estuarine, beach, sand dune, and inlet niches. Lecture and laboratory work will be included, and a collection will be required.

416. Introduction to Oceanography (4). *Prerequisites: One year of general biology or one year of general zoology and one year of general botany; one year of general chemistry; one semester of physics; and one semester of college algebra.* An introduction to biological, chemical, geological, and physical aspects of the sea.

423. Marsh Ecology (4). *Prerequisite: Advanced undergraduate standing in biology.* A study of the floral and faunal elements of various marine marsh communities with an emphasis on the interaction of physical and biological factors. Lecture, lab, and field trips.

427. Marine Technical Methods I (2). *Prerequisite: Advanced undergraduate standing.* An introduction to instruments and procedures normally utilized aboard a marine research vessel. These include physical, biological, chemical, and geological parameter measurements and sample collections. Basic positioning and communication procedures are included.

428. Marine Technical Methods II (2). *Prerequisite: Advanced undergraduate standing.* An introduction to the laboratory methodology associated with the usual chemical parameters of nutrient analysis. The laboratory approach will be pursued, ship-board and specific practical skills developed.

435. Coastal Zone Management (2). *Prerequisite: Advanced undergraduate standing.* A review of ecological features and of management policies for coastal communities with a description of relevant federal and state programs.

439. Coastal Wetlands Ecology (4). *Prerequisites: BY 101, 102, 103, 104.* This course will focus on coastal and near shore wetlands, with an emphasis on biogeochemical processes, ecological function, and conservation. Lecture and laboratory.

459. Shark and Ray Biology (2). *Prerequisites: BY 101, 102, 103, 104.* This course provides an introduction to the biology of sharks and rays, with special emphasis on regional shark fauna and field techniques. Topics covered include, but are not restricted to, evolution and systematics of chondrichthyan fishes, physiology, reproduction and life history, diet, ecology, and conservation biology. Lecture and lab experiences.

460. Dolphins and Whales (2). *Prerequisites: BY 320 and MBY 486.* This course enables students to make rapid, accurate, and thoughtful use of a customized reference file and laboratory and field notes to respond to questions about the classification, anatomy, and ecology of marine mammals of the order Cetacea. Lecture and laboratory. (Not open to students with credit in MBY 481.)

461. Marine Behavioral Ecology (4). *Prerequisite: BY 332. Recommended: MS 204.* This course examines how animal behavior is influenced by and interacts with its environment, and the ecological and evolutionary significance of these behaviors in a marine setting. Lecture, laboratory, and field exercises (some overnight).

462. Marine Protozoology (4). *Prerequisites: BY 101, 102, 103, 104 or MBY 309.* A study of the major groups of protists from a variety of marine habitats, including their taxonomy, structure, and ecology of methods of identification. Lectures, laboratory, and field trips.

464. Introduction to Neurobiology (4). *Prerequisite: Advanced undergraduate standing.* An introduction to the neuroanatomy and neurophysiology of marine invertebrates and vertebrates. A neurosim computer package is used to help illustrate the basic principles and to allow a detailed exploration of neurophysiology and neural networks. Lecture and lab.

465. Biology and Conservation of Marine Turtles (2). *Prerequisites: BY 101, 102, 103, 104.* This course will cover the identification, distribution, nesting behavior, migratory behavior, population biology and genetics, evolution, and conservation of marine turtles. Lecture and laboratory. Overnight field trip and special fees apply.

481. Marine Mammals (4). *Prerequisites: BY 101, 102, 103, 104.* This course will cover the evolutionary history, taxonomy/classification, anatomy, physiology, behavior, conservation/management issues, and research techniques related to marine mammals. Lecture and laboratory. (Not open to students with credit in MBY 460.)

486. Marine Vertebrate Zoology (4). *Prerequisites: BY 101, 102, 103, 104.* A study of marine fishes, reptiles and mammals, with an in-depth, comprehensive treatment of their systematics, zoogeography, and ecology. Lectures will encompass subject matter on a nonregional basis. Field and laboratory work will stress the vertebrate fauna of the northern Gulf of Mexico. Most of the courses will be devoted to fishes. Students will have an opportunity to assemble a collection of vertebrate species.

487. Marine Invertebrate Zoology (4). *Prerequisites: BY 101, 102, 103, 104.* An examination of the systematics, ecology, physiology, and phylogenetic relationships of locally occurring marine invertebrate taxa. Lecture, laboratory, and field work required. Opportunity to acquire collections of local fauna.

491. Directed Research (2). *Prerequisite: Consent of instructor.* Students may enroll by special arrangement to do research in any of the subject areas of marine science currently being offered at the Sea Laboratory.

NOTE: Other Marine Science courses taught at the Sea Lab located on Dauphin Island, Alabama, include GY 329, Coastal Climatology, and GL 390, Marine Geology. Descriptions of these courses are listed under the Department of Physical and Earth Sciences.

PLANS OF STUDY

BACHELOR OF SCIENCE
MAJOR: BIOLOGY

I. Plan of Study: CONCENTRATION IN ECOLOGY AND ENVIRONMENTAL BIOLOGY

FRESHMAN YEAR

Fall	Spring

EH 101	3
BY 101	3
BY 103	1
CY 105	3
CY 107	1
MS 112	3
	STU 101
	0
	14

EH 102	3
BY 102	3
BY 104	1
CY 106	3
CY 108	1
MS 113 or higher	3
	14

SOPHOMORE YEAR

Fall	
EH literature[1]	3
HY sequence[2]	3
BY Core[3]	4
BY 370	2
	CY 231
	CY 232
	4
	4
	16

Spring	
EH literature[1]	3
HY sequence[2]	3
BY Core[3]	4
CS 201 or higher	3
	17

JUNIOR YEAR

Fall	
EH 141	3
BY Core[3]	4
BY Group I[4]	4
	Social/Behavioral Science[7]
	3
PHS 201[5]	3
PHS 203	1
	15

Spring	
BY Group II[6]	4
BY 300+ electives	4
PHS 202[5]	3
PHS 204	1
	15

SENIOR YEAR

Fall	
BY 300+ electives	4
Behavioral/Social Science	3
Fine Arts	3
Electives	5
	15

Spring	
Electives	13
BY 496	
	14

TOTAL HOURS: 120

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[1]Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232 [2]Select from HY 101 & 102 or 201 & 202

[3]Select from BY 322, 332, or 373

[4] BY Group I: Select from BY 412, 413, 434, 445, 473, or 479

[5] Students may elect to take calculus-based PHS 211/212 in place of PHS 201/202.

[6] BY Group II: Select from BY 320, 323, 406, 407, 422, 442, 451, 452, 453, 458, 460 or 476

[7]Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221[8]Select from ART 202, MU 233, DR 242, or FL 101

II. Plan of Study: CONCENTRATION IN MARINE BIOLOGY

FRESHMAN YEAR

Fall		Spring	
BY 101	3	BY 102	3
BY 103	1	BY 104	1
CY 105	3	CY 106	3
CY 107.	1	CY 108.	1
EH 101	3	EH 102	3
MS 112 or higher	3	MS 113 or higher	3
STU 101	0		
	14		14

SOPHOMORE YEAR

Fall		Spring	
EH literature[1]	3	EH literature[1]	3
HY sequence[2]	3	HY	
sequence[2]	3		
BY Core[3]	4	BY Core[3]	4
BY 370	2	CY	231
	4	CY 232	4
	16		14

JUNIOR YEAR

Fall		Spring	
EH 141	3	CS 201 or higher	3
BY Core[3]	4	Electives	4
PHS 201 & 203.	4	PHS 202 & 204.	4
Social/Behavioral Science[5]	3	Social/Behavioral Science[5]	3
	14		14

SUMMER BETWEEN JUNIOR AND SENIOR YEAR
IN RESIDENCE AT DAUPHIN ISLAND SEA LAB

BY Group II:	MBY 486, 487, or 481	4
	MBY 415 or 461	4
		8

SENIOR YEAR

Fall		Spring	
Electives	9	Electives	7
Fine Arts[6]	3	BY 496	1

12 8

SUMMER FOLLOWING SENIOR YEAR
IN RESIDENCE AT DAUPHIN ISLAND SEA LAB

MBY 411, 423, or 439 4
MBY Elective[7] 4
_____
8

TOTAL HOURS: 120

[1] Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232

[2] Select from HY 101 & 102 or 201 & 202
[3] Select from BY 322, 332, or 373
[4] Students may elect to take calculus-based PHS 211/212 in place of PHS 201/202.
[5] Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221
[6] Select from ART 202, MU 233, DR 242, or FL 101
[7]
[8] MBY elective (see Marine Biology Program Advisor for current list of approved courses)

III. Plan of Study: CONCENTRATION IN PRE-HEALTH PROFESSIONAL BIOLOGY *

FRESHMAN YEAR

Fall		Spring	
EH 101	3	EH 102	3
BY 101	3	BY 102	3
BY 103	1	BY 104	1
CY 105	3	CY 106	3
CY 107	1	CY 108.	1
MS 112 or higher	3	MS 113 or higher[2]	3
STU 101	0		
	14		14

SOPHOMORE YEAR

Fall		Spring	
.....			
HY sequence[1]	3	HY sequence[1]	3
Social/Behavioral Science[2]	3	Social/Behavioral Science[2]	3
CY 231	4	CY 232	4
BY Core: BY 322 or BY 373	4	BY Core: BY 322 or BY 373	4
BY 3702	CS 201 or higher	3	
	16		17

JUNIOR YEAR

Fall		Spring	
EH 141	3	EH Literature[4]	3
BY Group I: BY 320	4	BY Group II: BY 434	4
BY 300+ elective	4	BY 300+ elective	4
PHS 201[3]	3	. PHS 202[3]	3
PHS 203	1	PHS 204	1

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15	15

SENIOR YEAR

Fall		Spring	
EH literature[4]	3	Fine Arts[5]	3
BY Core: BY 332	4	Electives	11
Electives	7	BY 496	1
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	14		15

TOTAL HOURS: 120

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[1] Select from HY 101 & 102 or 201 & 202
[2] Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221
[3] Student may elect to take calculus-based PHS 211/212 in place of PHS 201/202

[4] Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232
[5] Select from ART 202, MU 233, DR 242, or FL 101
[6]
[7] Also recommended: BY 323, 402, 403, 450; CY 362; minor in chemistry

IV. Plan of Study: CONCENTRATION IN ORGANISMAL BIOLOGY

FRESHMAN YEAR

Fall		Spring	
EH 101	3	EH 102	3
BY 101	3	BY 102	3
BY 103	1	BY 104	1
CY 105	3	CY 106	3
CY 107.	1	CY 108.	1
MS 112 or higher	3	MS 113 or higher	3
STU 101	0		
	-----		-----
	14		14

SOPHOMORE YEAR

Fall		Spring	
HY sequence[2]	3	HY sequence[2]	3
EH literature[1]	3	EH literature[1]	3
BY Core[3]	4	BY Core[3]	4
BY 370	2		
CY 231	4	CY 232	4
CS 201 or higher	3	-----	

	16		17

JUNIOR YEAR

Fall		Spring	
EH 141	3	BY Group II[6]	4
BY Core[3]	4	BY 300+ elective	4

BY Group I[4]	4
PHS 201[5] .	3
PHS 203	1
	15

Social/Behavioral Science[7]	3
PHS 202[5]	3
PHS 204.	1
	15

SENIOR YEAR

Fall	
BY 300+ elective .	4
Social/Behavioral Science	3
Fine Arts[8]	3
Electives	9
	16

Spring	
Electives	12
BY 496	1
	13

TOTAL HOURS: 120

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[1]Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232

[2]Select from HY 101 & 102 or 201 & 202

[3]Select from BY 322, 332, or 373

[4] BY Group I: Select from BY 403, 412, 413, 434, 445, 473, 478, 479

[5]Students may elect to take calculus-based PHS 211/212 in place of PHS 201/202.[6]BY Group II: Select from BY 320, 323, 406, 407, 422, 442, 451, 452, 453, 458, 460, 476[7]Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221

[8] Select from ART 202, MU 233, DR 242, or FL 101

V. Plan of Study: CONCENTRATION IN CELLULAR AND MOLECULAR BIOLOGY *

FRESHMAN YEAR

Fall	
BY 101	3
BY 103	1
CY 105	3
CY 107.	1
EH 101	3
MS 112 or higher	3
.....	
STU 101	0
	14

Spring	
BY 102	3
BY 104	1
CY 106	3
CY 108.	1
EH 102	3
MS 113 or higher	3
	14

SOPHOMORE YEAR

Fall		Spring	
EH Literature[1]	3	EH Literature[1]	3
HY sequence[2]	3	HY sequence[2]	3
BY core 322 or 373	4	BY core 322 or 373	4
BY 370	2	CS 201 higher	3
CY 231	4	CY 232	4
	16		17

JUNIOR YEAR

Fall		Spring	
EH 141	3	BY Group II	4
BY core (332)	4	BY 300+ electives	7
BY Group I[3]	4	Social/Behavioral Science[6]	3
PHS 201[4]	3	PHS 202[4]	3
PHS 203	1	PHS 204	1
	15		15

SENIOR YEAR

Fall		Spring	
Fine Arts[7]	3	BY 496	1
BY 300+ elective	4	Social/Behavioral Science[6]	3
Electives[9]	8	Electives[9]	10
	15		14

TOTAL HOURS: 120

[1]Select 2: EH 201, 202, 203, 204, 219, 220, 231, or 232

[2]BY Core Select from HY 101 & 102 or 201 & 202

[3]MS 113 or higher math BY Group I: Select from BY 412, 413, 434, 473

[4]Student may elect to take calculus-based PHS 211/212 in place of PHS 201/202

[5]BY Group II: Select from BY 323 or 450[6] Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221

[7] Select from ART 202, MU 233, DR 242, or FL 101

* A chemistry minor, including Biochemistry (CY 362 and/or 363) is highly recommended for students intending to pursue a graduate degree in Cellular and Molecular Biology.

PLANS OF STUDY

BACHELOR OF ARTS
MAJOR : BIOLOGY

I. Plan of study: CONCENTRATION IN NATURALIST BIOLOGY with law enforcement minor.

In addition to courses noted below, candidates for graduation must successfully complete all JSU Academic Regulations.

FRESHMAN YEAR

Fall		Spring	
EH 101	3	EH 102	3
BY 101	3	BY 102	3
BY 103	1	BY 104	1
CY 105	3	CY 106	3
CY 107.	1	CY 108.	1
CJ 101	3	CJ 202	3
Elective	3	Wellness[2]	3
STU 101	0		
	17		17

SOPHOMORE YEAR

Fall		Spring	
BY Core[3]	4	BY Core[3]	4
BY 370	2	EH 141	3
MS 112 or higher	3	MS 108, 110, 113 or higher Math	3
EH literature[4]	3	EH literature[4]	3
SH Elective[5]	3	SH Elective[5]	3
	15		16

JUNIOR YEAR

Fall		Spring	
BY Core[3]	4	BY Group II[7]	3
BY Group I[6]	3	BY elective	3
CJ 363	3	CJ 370	3
CS 201 or higher	3	Social / Behavioral Sciences[8]	3
HY sequence[1]	3	HY Sequence[1]	3
	16		15

SENIOR YEAR

Fall		Spring	
BY elective 300+	7	BY 496	1
CJ 402	3	CJ 460	3
Social / Behavioral Sciences[8]	3	CJ elective 300+	3
Elective	3	300+ elective	6
		Elective	3
	16		16

TOTAL HOURS: 128

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[1]Select from HY 101 & 102 or HY 201 & 202

[2]Select from MSC 113, 115, 116, FCS 215 or HPE 109

[3]Select from BY 322, 332, 373

[4]Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232

[5]See Academic Advisor when selecting Spanish electives (this will count as Fine Art requirement)

[6]For Group I courses, select from BY 403, 412, 413, 434, 445, 473, 478, or 479

[7]For Group II courses, select from BY 301, 302, 320, 323, 406, 407, 422, 442, 451, 452, 453, 458, 460, 475, or 476

[8]Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221

II. Plan of study: CONCENTRATION IN GENERAL BIOLOGY

In addition to courses noted below, candidates for graduation must successfully complete all JSU Academic Regulations.

FRESHMAN YEAR

Fall		Spring	
EH 101	3	EH 102	3
BY 101	3	BY 102	3
BY 103	1	BY 104	1
CY 105	3	CY 106	3
CY 107	1	CY 108	1
HY sequence[1]	3	HY Sequence[1]	3
Elective	3	Wellness[2]	3
STU 101	0		
	17		17

SOPHOMORE YEAR

Fall		Spring	
BY Core[3]	4	BY Core[3]	4
BY 370	2	EH 141	3
MS 112 or higher	3	MS 108, 110, 113 or higher Math	3
EH literature[4]	3	EH Literature[4]	3
FL Elective[5]	3	FL Elective[5]	3
	15		16

JUNIOR YEAR

Fall		Spring	
BY Core[3]	4	BY Group II[8]	4
BY Group I[6]	4	BY or Minor electives[7]	9
BY or Minor electives[7]	4	Social /Behavioral Sciences[9]	3
CS 201 or higher	3		
	15		16

SENIOR YEAR

Fall		Spring	
BY or Minor elective[7]	13	BY or Minor elective[7]	15
Social / Behavioral Sciences[9]	3	BY 496	1

16	16

TOTAL HOURS: 128

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[1]Select from HY 101 & 102 or HY 201 & 202

[2]Select from MSC 113, 115, 116, FCS 215, or HPE 109

[3]Select from BY 322, 332, 373

[4]Select 2 from EH 201, 202, 203, 204, 219, 220, 231, or 232

[5]See Academic Advisor when selecting Foreign Language electives (this will count as Fine Arts requirement)

[6]For Group I courses, select from BY 403, 412, 413, 434, 445, 473, 478 or 487

[7]Most minor electives must be at the 300/400 level

[8]For Group II courses, select from BY 301, 302, 320, 323, 406, 407, 422, 442, 451, 452, 453, 458, 460, 475, or 476

[9]Select from AN 224, EC 221, EC 222, GY 120, GY 220, PSC 100, PSY 201, PSY 222, or SY 221