



**KENTUCKY STATE
UNIVERSITY**

BIOLOGY

Biology is the scientific study of living systems. The Bachelor of Science in biology curriculum includes the study of organismal diversity, cell biology, physiology, genetics, evolution, and ecology. Students are encouraged to master basic principles of scientific inquiry while familiarizing themselves with the traditional aspects of a sound liberal education.

The Bachelor of Science degree in Biology has four options: General Biology, Pre-Professional, Biotechnology, and a track in Biology Education. Details on the former may be found elsewhere in this Catalog in the sub-section on the School of Education, Human Development, and Consumer Sciences. A minor in Biology is also offered.

Our Mission

The mission of the Bachelor of Science in Biology degree program at Kentucky State University is to prepare our undergraduate students, especially from underrepresented groups and minorities, for graduate and professional degree programs, teaching positions in biology and related fields and careers in industry. We seek to facilitate student learning by providing excellent undergraduate learning experiences, including conducting mentored research, and opportunities for participation in other practical experiences. We are committed to producing graduates who have the conceptual knowledge, laboratory-based and analytical skills, as well as the ethical mindset to be engaged citizens.

Our Vision

The Bachelor of Science in Biology degree program at Kentucky State University will embody the university's HBCU heritage by providing excellent education in Biology utilizing student-centered approaches, innovative instruction, peer-led and collaborative learning, mentored undergraduate research, and other evidence-based practices.

We will maintain our close-knit, student-centered community while we enhance our instructional excellence by facilitating faculty professional development, scholarly activity, mentorship of students, and service.

Our Core Values

1. Our students and their success
2. Student-centered learning
3. Academic rigor
4. Evidence-based practices
5. Continuous program improvements based on input from all stakeholders
6. Collegiality, professionalism, and mutual respect

Biology Program Learning Competencies

FOUNDATIONS OF KNOWLEDGE:

Students who graduate with a B.S. in Biology will be able to:

- Demonstrate understanding of the five core concepts of Biology: evolution; transformations of energy and matter; information flow; structure and function; and biological systems.
- Integrate and apply principles of chemistry, physics, and mathematics to biology.

INQUIRY AND ANALYTICAL SKILLS:

Students who graduate with a B.S. in Biology will be able to:

- Apply the process of science to make observations, formulate testable hypotheses, and perform experiments.
- Collect, analyze, and interpret data to draw appropriate conclusions.
- Demonstrate the use of good laboratory practices.

COMMUNICATION AND PROFESSIONAL SKILLS:

Students who graduate with a B.S. in Biology will be able to:

- Effectively communicate scientific data and concepts orally and in writing.
- Read, comprehend, and analyze scientific literature.
- Collaborate and communicate within biology and across disciplines.
- Apply biology to issues facing our society.

Major in Biology

The Bachelor of Science in Biology at Kentucky State University offers a curriculum that prepares students for post-baccalaureate programs and many possible career fields including medicine, pharmacy, physical therapy, dental, education, veterinary medicine, environmental science, and other related areas. Incoming students who desire to pursue a biology degree should work with their advisor and the biology faculty members to ensure that they are selecting electives that will meet their desired career goals.

Students who major in Biology must complete a minimum of 120 semester credit hours, including the University's Liberal Studies Requirements. See the Plan of Study for each track to see specific recommended curriculum plans.

Biology majors must earn a C or better in all core, elective, and support courses.

Biology core course requirements:

Code	Title	Hours
BIO 111	Principles of Biology	4
BIO 115/116	Freshman Seminar	1
BIO 210	General Zoology	3
BIO 212	General Botany	3
BIO 302	General Microbiology	4
BIO 303	Human Physiology	4
BIO 307	Genetics	4
BIO 316	Ecology	4
BIO 401	Biology Seminar	1
BIO 408	Cell Biology	4
BIO 410	Special Problems Biology	2

Biology electives include: any biology course at the 300- or 400-level that is not required for the major and BIO 410 Special Problems Biology after it has been taken once to fulfill the major requirement. Biology electives also include CHE 315 Biochemistry/CHE 350 Biochemistry Laboratory, AQU 300/400 level courses (except AQU 425 Aquaculture Econ/

Marketing). Additional elective courses may be approved by the Biology Committee.

Bachelor of Science in Biology: General Biology Track

Students should work with an advisor to develop an individualized degree plan based on their prerequisite scores/courses.

Course	Title	Hours
Year 1		
Term 1 (Fall)		
MAT 131	Calculus/Analy Geom I (fulfills Quantitative Reasoning requirement; see prerequisite)	5
CHE 101	General Chemistry I	3
CHE 110	General Chem I Laboratory	1
ENG 101	English Comp I	3
KSU 118	Intro. to University Learning	3
Hours		15
Term 2 (Spring)		
BIO 111	Principles of Biology	4
BIO 115	Freshman Seminar	1
CHE 102	General Chemistry II	3
CHE 120	General Chemistry II Lab	1
ENG 102	English Comp II	3
COM 103	Interpersonal Communication	3
Hours		15
Year 2		
Term 3 (Fall)		
BIO 212	General Botany	3
CHE 200	Intro to Organic & Biochem	4
PHY 207	Physics In Biological Sci I	4
Select one General Education Arts Course		3
ART 130	Introduction to Art	
MUS 130	Introduction to Music	
THE 130	Introduction to Theatre	
ENG 211	Intro to Literature	
Free Elective/Minor		3
Hours		17
Term 4 (Spring)		
BIO 210	General Zoology	3
BIO 302	General Microbiology	4
PHY 208	Physics In Biological Sci II	4
Select one General Education Humanities Course		3
BUA 120	Business and Society	
HIS 103	Western Civilization	
HIS 108	Intro to African American Hist	
EDU 204	Cultural Responsiveness	
Hours		14
Year 3		
Term 5 (Fall)		
BIO 307	Genetics	4
BIO 316	Ecology	4
BIO 300/400 Guided Elective		3-4
Select one of the following:		3
FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	
Hours		14-15

Term 6 (Spring)		
BIO 303	Human Physiology	4
BIO 408	Cell Biology	4
BIO 300/400 Guided Elective		3-4
Select one of the following:		3
FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	
Hours		14-15
Year 4		
Term 7 (Fall)		
BIO 410	Special Problems Biology	2
BIO 300/400 Guided Elective		4
Select one General Educational Global/Civic Course		3
AFE 117	Global Perspect Ag/Food/Env	
ASP 303	American Civil Rights Movement	
POS 101	American Government	
POS 361	World Politics	
Free Elective/Minor		3
Free Elective/Minor		3
Hours		15
Term 8 (Spring)		
BIO 401	Biology Seminar	1
BIO 300/400 Guided Elective		3-4
Free Elective/Minor		3
Free Elective/Minor		3
Free Elective/Minor		3
Free Elective/Minor		3
Hours		16-17
Total Hours		120-123

Bachelor of Science in Biology: Pre-Professional Track

Students should work with an advisor to develop an individualized degree plan based on their prerequisite scores/courses.

Course	Title	Hours
Year 1		
Term 1 (Fall)		
MAT 131	Calculus/Analy Geom I (fulfills Quantitative Reasoning requirement; prerequisite required)	5
CHE 101	General Chemistry I	3
CHE 110	General Chem I Laboratory	1
ENG 101	English Comp I	3
KSU 118	Intro. to University Learning	3
Hours		15
Term 2 (Spring)		
BIO 111	Principles of Biology (fulfills Natural Science requirement)	4
BIO 115	Freshman Seminar	1
CHE 102	General Chemistry II	3
CHE 120	General Chemistry II Lab	1
ENG 102	English Comp II	3
COM 103	Interpersonal Communication	3
Hours		15
Year 2		
Term 3 (Fall)		
BIO 212	General Botany	3
CHE 301	Organic Chemistry I	3

CHE 310	Organic Chemistry I Lab.	1
PHY 207	Physics In Biological Sci I	4
Select one General Education Humanities Course		3
BUA 120	Business and Society	
HIS 103	Western Civilization	
HIS 108	Intro to African American Hist	
EDU 204	Cultural Responsiveness	

Hours 14

Term 4 (Spring)

BIO 210	General Zoology	3
CHE 302	Organic Chemistry II	3
CHE 320	Organic Chemistry II Lab	1
BIO 302	General Microbiology	4
PHY 208	Physics In Biological Sci II	4

Hours 15

Year 3

Term 5 (Fall)

BIO 307	Genetics	4
BIO 316	Ecology	4
CHE 315	Biochemistry	3
CHE 350	Biochemistry Laboratory	1

Select one of the following: 3

FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	

Hours 15

Term 6 (Spring)

BIO 303	Human Physiology	4
BIO 408	Cell Biology	4
BIO 300/400 Guided Elective		3-4

Select one of the following: 3

FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	

Free Elective/Minor 3

Hours 17-18

Year 4

Term 7 (Fall)

BIO 410	Special Problems Biology	2
BIO 300/400 Guided Elective		4
Free Elective/Minor		3
Select one General Education Arts Course		3

ART 130	Introduction to Art	
MUS 130	Introduction to Music	
THE 130	Introduction to Theatre	
ENG 211	Intro to Literature	

Select one General Educational Global/Civic Course 3

AFE 117	Global Perspect Ag/Food/Env	
ASP 303	American Civil Rights Movement	
POS 101	American Government	
POS 361	World Politics	

Hours 15

Term 8 (Spring)

BIO 401	Biology Seminar	1
BIO 300/400 Guided Elective		4
Free Elective/Minor		3
Free Elective/Minor		3

Free Elective/Minor 3

Hours 14

Total Hours 120-121

Bachelor of Science in Biology: Biotechnology Track

Students should work with an advisor to develop an individualized degree plan based on their prerequisite scores/courses.

Course **Title** **Hours**

Year 1

Term 1 (Fall)

MAT 131	Calculus/Analy Geom I (fulfills Quantitative Reasoning requirement; see prerequisite)	5
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CHE 101	General Chemistry I	3
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CHE 110	General Chem I Laboratory	1
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ENG 101	English Comp I	3
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KSU 118	Intro. to University Learning	3
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Hours 15

Term 2 (Spring)

BIO 111	Principles of Biology	4
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BIO 116	Intro to Biotechnology	1
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CHE 102	General Chemistry II	3
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CHE 120	General Chemistry II Lab	1
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ENG 102	English Comp II	3
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COM 103	Interpersonal Communication	3
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Hours 15

Year 2

Term 3 (Fall)

BIO 212	General Botany	3
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CHE 301	Organic Chemistry I	3
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CHE 310	Organic Chemistry I Lab.	1
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PHY 207	Physics In Biological Sci I	4
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300/400 Statistics		3
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Select one General Education Arts Course 3

ART 130	Introduction to Art	
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MUS 130	Introduction to Music	
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THE 130	Introduction to Theatre	
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ENG 211	Intro to Literature	
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Hours 17

Term 4 (Spring)

BIO 210	General Zoology	3
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BIO 302	General Microbiology	4
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CHE 302	Organic Chemistry II	3
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CHE 320	Organic Chemistry II Lab	1
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PHY 208	Physics In Biological Sci II	4
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Hours 15

Year 3

Term 5 (Fall)

BIO 307	Genetics	4
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BIO 316	Ecology	4
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BIO 431	Biotechnology I	4
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Select one General Education Humanities Course 3

BUA 120	Business and Society	
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HIS 103	Western Civilization	
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HIS 108	Intro to African American Hist	
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EDU 204	Cultural Responsiveness	
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Hours 15

Term 6 (Spring)

BIO 303	Human Physiology	4
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BIO 408	Cell Biology	4
BIO 432	Biotechnology II	4
Select one of the following:		3
FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	
Hours		15
Year 4		
Term 7 (Fall)		
BIO 410	Special Problems Biology	2
BIO 438	Forensics	3
BIO 300/400 Guided Elective		4
Select one of the following:		3
FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
PSY 200	General Psychology	
SOC 203	Principles of Sociology	
Free Elective/Minor		3
Hours		15
Term 8 (Spring)		
BIO 401	Biology Seminar	1
BIO 300/400 Guided Elective		3-4
Select one General Educational Global/Civic Course		3
AFE 117	Global Perspect Ag/Food/Env	
ASP 303	American Civil Rights Movement	
POS 101	American Government	
POS 361	World Politics	
Free Elective/Minor		3
Free Elective/Minor		3
Hours		13-14
Total Hours		120-121

A minor in biology requires the completion of a minimum of 21 semester credit hours in Biology. A student pursuing a minor in Biology will be required to successfully complete:

Code	Title	Hours
BIO 111	Principles of Biology	4
BIO 210	General Zoology	3
BIO 212	General Botany	3
Select three courses from the remaining core requirements:		11-12
BIO 302	General Microbiology	
BIO 303	Human Physiology	
BIO 307	Genetics	
BIO 316	Ecology	
NOTE: One course may be selected from the biology electives		
Total Hours		21-22

BIO 401 (<https://kysu-public.courseleaf.com/search/?P=BIO%20401>) Biology Seminar and BIO 410 (<https://kysu-public.courseleaf.com/search/?P=BIO%20410>) Special Problems Biology can be taken, but they cannot be used as part of the required 21 semester credit hours for a minor in Biology.

BIO 101: Life Science

A general study of biological concepts of living organisms. Emphasis is placed on cellular physiology, genetics, ecology, and evolution. (Two hours of lecture, two hours of laboratory per week)

Credit Hours: 3

Contact Hours: 4

BIO 103: Environmental Biology

This course investigates the impact of humans on our environment and the impacts on resource sustainability, biodiversity, and human health.

Credit Hours: 3

Contact Hours: 3

BIO 107: Anatomy & Physiology I

Study of basic chemistry, biochemistry, cell structure and function, tissues, the integument, and the skeletal, muscle, and nervous systems. Required for Nursing majors. (Three hours of lecture, two hours of laboratory per week)

Credit Hours: 4

Contact Hours: 5

BIO 108: Anatomy & Physiology II

A continuation of BIO 107 with emphasis on the endocrine, digestive, respiratory, circulatory, urinary, and reproductive systems. Required for Nursing majors. (Three hours of lecture, two hours of laboratory per week)

Prerequisite: C or better in BIO 107 or consent of instructor

Credit Hours: 4

Contact Hours: 5

BIO 111: Principles of Biology

Analysis of fundamental concepts underlying and unifying living systems. Emphasis on major principles of cellular anatomy and physiology, reproduction and development, genetics, ecology, and evolution. (Three hours of lecture per week)

Prerequisite: Either completion of or testing out of remedial courses

Credit Hours: 4

Contact Hours: 5

BIO 112: Modern Topics in Biology

Formal presentations and colloquia on biological topics of current interest. Concise overviews will be presented on the diversity of living systems, evolution, and life processes. (Three hours of lecture per week)

Prerequisite: BIO 101 or BIO 111

Credit Hours: 3

Contact Hours: 3

BIO 115: Freshman Seminar

Prerequisites/Corequisites: BIO 111, BIO 101, or consent of instructor. A seminar exploring the variety of careers in the biological sciences and closely-related disciplines; led by faculty, visiting scientists and practitioners.

Credit Hours: 1

Contact Hours: 1

BIO 116: Intro to Biotechnology

This course familiarizes students with career options, necessary academic preparation, and how to search for job in biotechnology. In addition to lectures, students will visit several biotechnology companies in central Kentucky. (One hour of lecture per week plus field trips)

Credit Hours: 1

Contact Hours: 1

BIO 204: Fund of Microbiology

Emphasis on infection by microbes, the body's immune system, pathogens, and parasites. Required for Nursing majors. (Two hours of lecture, two hours of laboratory per week)

Prerequisite: C or better in BIO 107 or recommendation of the Nursing Department

Credit Hours: 3

Contact Hours: 4

BIO 210: General Zoology

Introduction to the animal world, including taxonomy and diversity of kind, morphological and physiological organization of representatives of various phyla; and evolutionary relationships among phyla. (Two hours of lecture, two hours of laboratory per week)

Prerequisite: BIO 111

Credit Hours: 3

Contact Hours: 4

BIO 212: General Botany

Introduction to the plant world, including taxonomy and diversity of kind, morphological and physiological organization in various divisions, and evolutionary relationships among divisions. (Two hours of lecture, two hours of laboratory per week)

Prerequisite: BIO 111

Credit Hours: 3

Contact Hours: 4

BIO 220: Medical Terminology

Designed to review common terms used in the medical professions.

Prerequisite: C or better in BIO 101, BIO 107, or BIO 111; or consent of instructor

Credit Hours: 2

Contact Hours: 2

BIO 301: Human Anatomy

A study of the anatomical configuration of cells and tissues forming neural, muscular, renal, circulatory, respiratory, digestive, skeletal, and reproductive systems. (Three hours of lecture, two hours of laboratory per week)

Prerequisite: BIO 101 or BIO 111

Credit Hours: 4

Contact Hours: 5

BIO 302: General Microbiology

Prerequisite(s): BIO 111 and CHE 102 (concurrent), or consent of instructor. Morphology, classification, distribution, and physiology of bacteria, viruses, and other microorganisms in industry and the environment. Aseptic technique, staining, cultivation, identification, and control of bacteria. (Three hours of lecture, three hours of laboratory per week)

Credit Hours: 4

Contact Hours: 6

BIO 303: Human Physiology

Cells, tissues, organs, and systems in relation to each other and in coordination with contractility, conductivity, respiration, translocation of materials, and other problems in physiology. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 210 and CHE 102; PHY 207 and PHY 208 are recommended

Credit Hours: 4

Contact Hours: 6

BIO 304: Vertebrate Embryology

Study of morphological and developmental aspects of embryology, including genetic and molecular mechanisms. The comparative developmental anatomy of the starfish, frog, chick, and mammals are studied. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 111 or consent of instructor

Credit Hours: 4

Contact Hours: 6

BIO 305: Comp Vertebrate Anatomy

Relationships of vertebrate groups and structure and significance of various organs and systems of typical vertebrates. Discussions of the history and habitats of various groups. (Two hours of lecture, four hours of laboratory per week)

Prerequisite: BIO 210

Credit Hours: 4

Contact Hours: 6

BIO 307: Genetics

Explores the laws and principles of heredity and genetic variation in organisms. Topics include aspects of Mendelian genetics, quantitative genetics, and molecular genetics, as well as principles of developmental, behavioral, population, and evolutionary genetics. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 111 with C or better and CHE 102 with C or better

Credit Hours: 4

Contact Hours: 6

BIO 308: Microtech & Histology

A lecture/laboratory course dealing with microscopic anatomy of various tissues in the human body. Theories of microscopic techniques and tissue development are also discussed. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 111

Credit Hours: 4

Contact Hours: 6

BIO 309: Parasitology

A study of epidemiology, pathology, diagnosis, and control of parasites of man and other animals. (Two hours of lecture and four hours of laboratory per week)

Prerequisite: BIO 210 or consent of instructor

Credit Hours: 4

Contact Hours: 6

BIO 315: Immunology

Immune system, immunoglobulin structure, antigenicity, antigen/antibody reactions, phylogeny of immune responses, and antibody formation. Immunity to bacterial and viral infections, allergies, and graft/host reactions. (Three hours of lecture/discussion/ demonstration/ laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 316: Ecology

A study of the interrelationships of living organisms and their environment. This course draws from several disciplines and stresses concepts of modern ecology. (Three hours of lecture per week)

Prerequisite: BIO 111 or BIO 101, BIO 210, BIO 212, CHE 101, CHE 102

Credit Hours: 4

Contact Hours: 4

BIO 317: Medical Microbiology

Lecture and laboratory work in pathogenic bacteriology, virology, mycology, and parasitology. Emphasis on etiology, epidemiology, identification, and clinical diagnosis of pathogens. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 302

Credit Hours: 4

Contact Hours: 6

BIO 318: Hematology

A comprehensive study of the blood system, including the hematopoietic systems and disorders of the blood in humans. (Five hours of lecture/laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 4

Contact Hours: 5

BIO 319: Study Abroad Topics

This course is designed for biology major students to receive credit for an upper level biology course taught abroad through an accredited study abroad program (e.g., CCSA, KIIS)

Credit Hours: 3-4

Contact Hours: 3-4

BIO 321: Virology

An upper level elective for biology major and health-related disciplines. Emphasis on animal viruses. Credits: 3 semester hours.

Prerequisite: BIO 111 or BIO 101

Credit Hours: 3

Contact Hours: 3

BIO 399: Undergrad Teaching Exper.

A comprehensive study of the blood system, including the hematopoietic systems and disorders of the blood in humans. (Five hours of lecture/laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 1

Contact Hours: 1

BIO 401: Biology Seminar

Expose students to presentations of biological research by faculty and visiting scientists and allows students to formally present a research topic. Students are required to make a formal, oral presentation of a research topic with computer-generated audio-visual materials.

Prerequisite: Upper/division standing; senior classification recommended

Credit Hours: 1

Contact Hours: 1

BIO 407: Fish Genetics

An overview of fish genetics including basic principles and methods of selective breeding in aquaculture.

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 408: Cell Biology

Cell structure and chemistry as it relates to cell function. Biochemical and molecular aspects of cell functions are emphasized. (Three hours of lecture, three hours of laboratory per week)

Prerequisite: BIO 111 and either CHE 200 or CHE 302 with a grade of C or better

Credit Hours: 4

Contact Hours: 6

BIO 409: Biostatistics

Basic principles of experimental design and data analysis with emphasis on their applications in aquaculture research.

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 410: Special Problems Biology

A course in which advanced Biology students pursue an independent experimental or library research project. May be repeated once for credit.

Prerequisite: Consent of instructor

Credit Hours: 2

Contact Hours: 2

BIO 411: Fish Diseases

Clinical diagnosis of fish diseases; necropsy of diseased fish; and formulation of corrective measures for disease control. (Three hours of lecture, two hours of laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 412: Fish Morphology and Physiology

An overview of fish morphology and physiology with emphasis on comparative and adaptive aspects among Osteichthyes (true bony fish). (Three hours of lecture, two hours of laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 4

Contact Hours: 5

BIO 413: Aquatic Ecology

This course investigates the interaction of aquatic organisms with their biotic and abiotic environment. Sampling and laboratory methods of limnological; analysis will be covered. (Three hours of lecture, three hours of laboratory per week)

Credit Hours: 4

Contact Hours: 6

BIO 414: Basics of Fish Diseases

An online course with no lab. Students are introduced to bacteria, parasites, viruses and environmental factors that cause disease in aquatic animals. Prevention, identification and treatment of these diseases are included (course intended for non-aquaculture majors). Credit: 3 semester hours.

Prerequisite: Consent of Instructor

Credit Hours: 3

Contact Hours: 3

BIO 415: Animal Behavior

This course examines the behavior of non-human animals from a physiological, ecological and evolutionary perspective. (Three hours of lecture per week)

Prerequisite: BIO 111 and BIO 210; BIO 316 recommended

Credit Hours: 3

Contact Hours: 3

BIO 417: Ecological Field Meth

) Lecture, field and laboratory course emphasizing modern ecological field techniques. Compares quantitative and qualitative methods of sampling and interpreting data. (Two hours of lecture, four hours of laboratory per week)

Prerequisite: BIO 111, BIO 210, BIO 212, CHE 101, CHE 102; BIO 316 recommended

Credit Hours: 4

Contact Hours: 6

BIO 421: Fish Nutrition

Fundamental and applied aspects of fish nutrition including nutrient requirements, nutrient chemistry, ration formulation, and practical feeding will be taught. (Three hours of lecture per week)

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 422: Principles of Aquaculture

Introduction to principles underlying aquatic productivity and management with a survey of domestic and foreign cultures of fish and aquatic vertebrates.

Credit Hours: 3

Contact Hours: 3

BIO 423: Aqua Economics/Marketing

Aquaculture economics, marketing channels and consumer preferences for fish products will be presented. (Three hours of lecture, two hours of laboratory per week)

Prerequisite: MAT 120 or MAT 125 or consent of instructor

Credit Hours: 4

Contact Hours: 5

BIO 427: Fish Reproduct & Spawning Tech

An overview of basic biology of fish reproduction and techniques of artificial spawning for common aquaculture species.

Credit Hours: 3

Contact Hours: 3

BIO 431: Biotechnology I

This course will familiarize students with aspects of plant and animal tissue culture including: historical development, basic techniques, safety issues, media formulation and preparation, and culturing tissues. (Two hours of lecture/ Four hours of laboratory per week) Preg: BIO 111, CHE 301 and CHE 310.

Credit Hours: 4

Contact Hours: 4

BIO 432: Biotechnology II

This course offers an introduction to the molecular tools used in DNA biotechnology including purification of nucleic acids, cutting and joining DNA, vectors, sequencing DNA, genomic and cDNA libraries, RFLPs, Southern Blots, and PCR. (Two hours of lecture/ Four hours of laboratory per week) Prereq: BIO 431

Credit Hours: 4

Contact Hours: 4

BIO 433: Biotech III: Proteins

This course covers aspects of protein chemistry and immunology pertinent to biotechnology including: amino acid structure and analysis, polypeptide structure; protein sequencing, immunoglobulins, diagnostic application of monoclonal antibodies, SDS-PAGE, spectrophotometric analysis of proteins, and immuno-chemical methods of diagnostics. (Four hours of lecture/laboratory per week)

Credit Hours: 3

Contact Hours: 4

BIO 434: Biotech IV: Adv Biotechnology

This course allows students to utilize and extend previously learned biotechnological principles and techniques used in industrial research and development, with special emphasis on pharmaceutical and value-added products. (Three hours of lecture and three hours of laboratory per week)

Credit Hours: 3

Contact Hours: 6

BIO 435: Global Persp in Biotechnology

This course critically surveys potential impacts of biotechnology from a global perspective, providing an understanding of issues and values information different viewpoints on biotechnology. (Three hours of lecture per week)

Credit Hours: 3

Contact Hours: 3

BIO 436: Biotech Writing/Presentations

This course will focus on effective communication of ideas and research results in biotechnology, specifically publishing a scientific paper and making presentations at scientific meetings. Students will write a paper and present a talk on data they have been assigned at the beginning of the semester. (Three hours of lecture per week)

Credit Hours: 3

Contact Hours: 3

BIO 437: Environmental Sci/Bioremed

The fate and transport of pollutants in the environment and their final destination, dilution, dispersion, adsorption, persistence, degradation, their adverse effects, and the route these pollutants take in the environment will be discussed and possible solutions and remediation techniques will be presented. (Four hours of lecture/laboratory per week)

Credit Hours: 3

Contact Hours: 4

BIO 438: Forensics

Lectures focus on the fundamental principles and concepts in disciplines of biology such as serology, entomology, and molecular biology relevant in forensic investigations. Students learn serological, microscopic, and DNA related techniques used in forensic sciences in laboratory. (Four hours lecture/laboratory per week)

Credit Hours: 3

Contact Hours: 4

BIO 451: Survey of Production Methods

An overview of alternative production methods including ponds, cages, net-pens, raceways, and recirculating systems with application to suitable species. (Three hours of lecture per week)

Prerequisite: AQU 422 or consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 460: Water Quality Management

A survey of theory and practice into the understanding and manipulation of the biological, chemical, and physical aspects of water quality in aquaculture production. (Three hours of lecture, two hours of laboratory per week)

Prerequisite: Consent of instructor

Credit Hours: 3

Contact Hours: 3

BIO 461: Water Quality Management Lab

Credit Hours: 1

Contact Hours: 1

BIO 490: Biological Practicum

An on-the-job clinical practice (Clinical Laboratory Sciences).

Prerequisite: Consent of advisor

Credit Hours: 12

Contact Hours: 12

BIO 493: Internship

An intensive experience in a biological/medical field involving practical on-site participation.

Prerequisite: Consent of advisor

Credit Hours: 1-4

Contact Hours: 1-4

BIO 495: Topics in Biology

This course requires intensive examination of a biological topic chosen by a faculty member in biology. Will involve intensive reading and discussion, as well as writing.

Prerequisite: Senior status

Credit Hours: 3

Contact Hours: 3