BIOLOGY

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MAJORS IN THE BIOLOGICAL SCIENCES

The Biology Department offers majors in Biology in four degree programs: Bachelor of Arts; Bachelor of Science; Bachelor of Science in Secondary Education; and Bachelor of Science in Biotechnology

For students considering graduate and/or pre-professional study:

In addition to the Bachelor of Science in Biology program requirements, the following courses are strongly recommended. All courses are 4 credits:

CHE 260 – Organic Chemistry II
MAT 150 – Calculus I
MAT 151 – Calculus II
PHY 230 and PHY 231 – Physics for Scientists and Engineers I and II

Bachelor of Science in Secondary Education Cognates

Requirements needed to fulfill teaching certification in Connecticut are listed under the heading major programs in the secondary education section of the School of Education.

The following additional courses are strongly recommended:
CHE 260 - Organic Chemistry
MAT 221 - Intermediate Applied Statistics
The department offers the following:
Biology, B.A.
Biology, B.S.
Biology 7-12, B.S.
Minor in Biology
BIOLOGY, B.A.

120 Overall Credits Required

LIBERAL EDUCATION PROGRAM AND WRITING REQUIREMENTS

Liberal Education Program

48 Credits Required

Students must complete a comprehensive three-tiered Liberal Education Program (LEP). View all requirements of the tiers on the Liberal Education Program.

While the choice of courses that fulfill the requirements is generally left up to students, some departments require that students select specific courses to complement their major. This major has specific Tier requirements/restrictions for the following:

Tier 1 - Quantitative Reasoning (select one):
- MAT 122 – Precalculus
- MAT 150 – Calculus I

Tier 2 – Natural World I: Physical Realm:
- CHE 120 – General Chemistry I

Tier 2 – Natural World II: Life and Environment:
- BIO 103 – Botany (‘C’ or better)

Writing Requirements (“W-Courses”)

Three W-courses are required. These may not be taken until after a student has passed ENG 112 — Writing Arguments. W-courses may count toward LEP, major, or cognate requirements, as well as free electives. Course sections that meet this requirement are designated by section numbers ending in “W”.

Transfer students who enter with 60 to 89 credits are required to pass two W-courses, while transfer students who enter with 90 credits or more must pass one W-course.

MAJOR REQUIREMENTS

32 Credits Required

Requirements:
- BIO 102 – Biology I (‘C’ or better)
- BIO 220 – Genetics (‘C’ or better)

CONTENT AREAS
GPA of 2.3 in the following areas

ANATOMY/PHYSIOLOGY

Select one Entry Level (4 credits):
- BIO 230 – Plant Anatomy and Morphology
- BIO 231 – Comparative Vertebrate Anatomy
- BIO 235 – Histology

Select one Upper Level (4 credits):
- BIO 301 – Physiology
- BIO 401 – Animal Physiology
- BIO 420 – Plant Physiology
- BIO 454 – Brain: Anatomy and Transmission

BIODIVERSITY/ECOLOGY/ORGANISMAL BIOLOGY

Select one Entry Level (3-4 credits):
- BIO 202 – Ecology
- BIO 210 – Environmental Biology and Conservation
- BIO 215 - Animal Behavior
- BIO 228 – Vertebrate Zoology
- BIO 229 – Invertebrate Zoology
- BIO 250 – Plant Taxonomy and Systematics

Select one Upper Level (3-4 credits):
- BIO 327 - Field Natural History (Belize)
- BIO 334 – Microbial Ecology
- BIO 337 – Medically Important Arthropods
- BIO 399 - Mammology
- BIO 427 – Entomology
- BIO 429 – Limnology
- BIO 430 – Marine Ecology
- BIO 432 – Mycology
- BIO 438 – Aquatic Entomology
- BIO 440 – Parasitic Infections
- BIO 460 – Paleontology

CELL/MOLECULAR

Select one Entry Level (3-4 credits):
- BIO 205 – Forensic Biology
- BIO 233 – General Microbiology
- BIO 236 - Cell Biology
- BIO 240 – Human Heredity
- BIO 296 - Genomics I

Select one Upper Level (4 credits):
• BIO 325 - Immunology and Infection
• BIO 335 – Pathogenic Microbiology
• BIO 360 – Plant Growth and Development
• BIO 386 - Genomics II
• BIO 393 - Bioinformatics
• BIO 435 – Developmental Biology
• BIO 436 – Molecular Biology
• BIO 451 – Tissue Culture
• BIO 466 – Advanced Molecular and Cell Biology
• BIO 467 – Laboratory Course in Biotechnology

Select one additional upper level course from any of the courses listed in the three upper level content areas above (3-4) credits.

You may also select one course from those listed below, all three of which require departmental permission.

• BIO 497 – In-service Training in Biology (3 cr)
• HON 495 – Departmental Honors (3 cr)
• BIO 499 – Independent Study and Research (3 cr)

COGNATE REQUIREMENTS

4 Credits Required

Requirement:
CHE 121 – General Chemistry II

FREE ELECTIVES

Remaining credits to reach Overall Credits Required (listed above).
BIOTECHNOLOGY, B.S.

120 Credits Required

LIBERAL EDUCATION PROGRAM AND WRITING REQUIREMENTS

48 Credits Required

Students must complete a comprehensive three-tiered Liberal Education Program (LEP). View all requirements of the tiers on the Liberal Education Program.

While the choice of courses that fulfill the requirements is generally left up to students, some departments require that students select specific courses to complement their major. This major has specific Tier requirements/restrictions for the following:

Tier 1 - Critical Thinking
PHY 123 - Critical Thinking and Science for Future Leaders

Tier 1 - Quantitative Reasoning
MAT 150 - Calculus I

Tier 2 - Natural World I: Physical Real
CHE 120 - General Chemistry I

Tier 2 - Natural World II: Life and Environment
BIO 103 - Biology II

Tier 3 - Capstone
BIO 396 - Synthetic Biology: Engineering Life

Writing Requirements (“W-Courses”)

Three W-courses are required. These may not be taken until after a student has passed ENG 112 — Writing Arguments. W-courses may count toward LEP, major, or cognate requirements, as well as free electives. Course sections that meet this requirement are designated by section numbers ending in “W”.

Transfer students who enter with 60 to 89 credits are required to pass two W-courses, while transfer students who enter with 90 credits or more must pass one W-course.

MAJOR REQUIREMENTS

32 Credits Required

Requirements:
BIO 102 - Zoology
BIO 220 - Genetics
BIO 233 - Microbiology
BIO 296 - Genomics I
BIO 393 - Introduction to Bioinformatics
BIO 491 - Seminar in Biotechnology
BIO 497 - In-Service Training in Biotechnology

Choose 1 From:
BIO 386 - Genomics II
BIO 436 - Molecular Biology
BIO 467 - Lab Course in Biotechnology

Choose 1 From:
BIO 466 - Advanced Cell Molecular Biology
BIO 451 - Tissue Culture Workshop

COGNATE REQUIREMENTS

24 Credits Required

Requirements:

CHE 121 - General Chemistry I
CHE 260 - Organic Chemistry I
CHE 261 - Organic Chemistry II
MAT 221 - Intermediate Applied Statistics
PHY 230 - Physics for Scientists and Engineers I

Choose 1 From:
CHE 450 - Biochemistry I
CHE 465 - Medicinal Chemistry
CHE 458 - Drug Discovery

FREE ELECTIVES

Remaining credits to reach Overall Credits Required (listed above).
BIOLOGY 7-12, B.S.

This program has a separate admission process. Please consult the admission requirements for this program on the School of Education page for more information.

Overall GPA of 2.7 Required
120 Overall Credits Required

LIBERAL EDUCATION PROGRAM AND WRITING REQUIREMENTS

Liberal Education Program

48 Credits Required

Students must complete a comprehensive three-tiered Liberal Education Program (LEP). View all requirements of the tiers on the Liberal Education Program.

While the choice of courses that fulfill the requirements is generally left up to students, some departments require that students select specific courses to complement their major. This major has specific Tier requirements/restrictions for the following:

Tier 1 - Quantitative Reasoning (select one):
MAT 122 – Precalculus
MAT 150 – Calculus I

Tier 2 – American Experience (select one):
HIS 110 – United States History I
HIS 111 – United States History II

Tier 2 – Mind and Body:
SHE 203 – School Health

Tier 2 – Natural World I: Physical Realm:
CHE 120 – General Chemistry I

Tier 2 – Natural World II: Life and Environment:
BIO 103 – Biology II (‘C’ or better)

Tier 2 - Social Structure, Conflict, and Consensus
EDU 200 - Teachers, Schools, and Society

Writing Requirements (“W-Courses”)

Three W-courses are required. These may not be taken until after a student has passed ENG 112 — Writing Arguments. W-courses may count toward LEP, major, or cognate requirements, as well as free electives. Course sections that meet this requirement are designated by section numbers ending in “W”.

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Transfer students who enter with 60 to 89 credits are required to pass two W-courses, while transfer students who enter with 90 credits or more must pass one W-course.

**MAJOR REQUIREMENTS**

59 Credits Required

Biology Requirements
32 Credits Required

Requirements:
BIO 102 – Biology I (‘C’ or better)
BIO 220 – Genetics (‘C’ or better)
BIO 470 - Methods of Biology (‘C’ or better)

GPA of 2.3 in the following Content Areas

**ANATOMY/PHYSIOLOGY**

One Entry Level (4 credits):
- BIO 230 – Plant Anatomy and Morphology
- BIO 231 – Comparative Vertebrate Anatomy
- BIO 235 – Histology

One Upper Level (4 credits):
- BIO 301 – Physiology
- BIO 401 – Animal Physiology
- BIO 420 – Plant Physiology
- BIO 454 – Brain: Anatomy and Transmission

**BIODIVERSITY/ECOLOGY/ORGANISMAL BIOLOGY**

One Entry Level (3-4 credits):
- BIO 202 – Ecology
- BIO 210 – Environmental Biology and Conservation
- BIO 215 - Animal Behavior
- BIO 228 – Vertebrate Zoology
- BIO 229 – Invertebrate Zoology
- BIO 250 – Plant Taxonomy and Systematics

One Upper Level (3-4 credits):
- BIO 327 - Field Natural History
- BIO 334 – Microbial Ecology
- BIO 337 – Medically Important Arthropods
- BIO 399 - Mammalian Biology
- BIO 427 – Entomology
- BIO 429 – Limnology
• BIO 430 – Marine Ecology
• BIO 432 – Mycology
• BIO 438 – Aquatic Entomology
• BIO 440 – Parasitic Infections
• BIO 460 – Paleontology

CELL/MOLECULAR

One Entry Level (3-4 credits):
• BIO 205 – Forensic Biology
• BIO 233 – General Microbiology
• BIO 236 – Cell Biology
• BIO 240 – Human Heredity
• BIO 296 - Genomics I

One Upper Level (4 credits):
• BIO 325 - Immunology and Infection
• BIO 335 – Pathogenic Microbiology
• BIO 360 – Plant Growth and Development
• BIO 386 - Genomics II
• BIO 393 - Bioinformatics
• BIO 435 – Developmental Biology
• BIO 436 – Molecular Biology
• BIO 451 – Tissue Culture
• BIO 466 – Advanced Molecular and Cell Biology
• BIO 467 – Laboratory Course in Biotechnology

Education Requirements
27 Credits Required

Requirements:
EDU 316 - Child Development and Psychology for Educators
EDU 413 – Secondary Education
EDU 471 – Supporting English Learners for School Success (formerly IDS 471)
RDG 470 – Literacy in the Content Areas (formerly IDS 470)
SCE 490 – Science (Secondary School)
SCE 494 – Student Teaching (Science)
SCE 496 – Student Teaching Seminar (Science)
SED 482 – Teaching Exceptional Students in the Secondary Education Classroom

Non-Course Requirements:
Module 1: Behavioral Difficulties (Social and Emotional Development)
Module 2: Dyslexia

COGNATE REQUIREMENTS

12 Credits Required

Requirements:
CHE 121 – General Chemistry II

Select one from:

• PHY 200 – General Physics I
  • and PHY 201 – General Physics II
• PHY 230 – Physics for Scientists and Engineers I
  • and PHY 231 – Physics for Scientists and Engineers II

FREE ELECTIVES

Students must take remaining credits to reach Overall Credits Required (listed above).
BIOLOGY, B.S.

120 Overall Credits Required

LIBERAL EDUCATION PROGRAM AND WRITING REQUIREMENTS

Liberal Education Program

48 Credits Required

Students must complete a comprehensive three-tiered Liberal Education Program (LEP). View all requirements of the tiers on the Liberal Education Program.

While the choice of courses that fulfill the requirements is generally left up to students, some departments require that students select specific courses to complement their major. This major has specific Tier requirements/restrictions for the following:

Tier 1 - Quantitative Reasoning (select one):
MAT 122 – Precalculus
MAT 150 – Calculus I

Tier 2 – Natural World I: Physical Realm:
CHE 120 – General Chemistry I

Tier 2 – Natural World II: Life and Environment:
BIO 103 – Biology II (‘C’ or better)

Writing Requirements (“W-Courses”)

Three W-courses are required. These may not be taken until after a student has passed ENG 112 — Writing Arguments. W-courses may count toward LEP, major, or cognate requirements, as well as free electives. Course sections that meet this requirement are designated by section numbers ending in “W”.

Transfer students who enter with 60 to 89 credits are required to pass two W-courses, while transfer students who enter with 90 credits or more must pass one W-course.

MAJOR REQUIREMENTS

32 Credits Required

Requirements
BIO 102 – Biology I (‘C’ or better)
BIO 220 – Genetics (‘C’ or better)

Content Areas
GPA of 2.3 in the following Content Areas

ANATOMY/PHYSIOLOGY
One Entry Level:

• BIO 230 – Plant Anatomy and Morphology
• BIO 231 – Comparative Vertebrate Anatomy
• BIO 235 – Histology

One Upper Level:

• BIO 301 – Physiology
• BIO 401 – Animal Physiology
• BIO 420 – Plant Physiology
• BIO 454 – Brain: Anatomy and Transmission

BIODIVERSITY/ECOLOGY/ORGANISMAL BIOLOGY

One Entry Level:

• BIO 202 – Ecology
• BIO 210 – Environmental Biology and Conservation
• BIO 215 - Animal Behavior
• BIO 228 – Vertebrate Zoology
• BIO 229 – Invertebrate Zoology
• BIO 250 – Plant Taxonomy and Systematics

One Upper Level:

• BIO 327 - Field Natural History (Belize)
• BIO 334 – Microbial Ecology
• BIO 337 – Medically Important Arthropods
• BIO 399 - Mammology
• BIO 427 – Entomology
• BIO 429 – Limnology
• BIO 430 – Marine Biology
• BIO 432 – Mycology
• BIO 438 – Aquatic Entomology
• BIO 440 – Parasitic Infections
• BIO 460 – Paleontology

CELL/MOLECULAR

One Entry Level:

• BIO 205 – Forensic Biology
• BIO 233 – General Microbiology
• BIO 236 - Cell Biology
• BIO 240 – Human Heredity
• BIO 296 - Genomics I

One Upper Level:
• BIO 325 - Immunology and Infection
• BIO 335 – Pathogenic Microbiology
• BIO 360 – Plant Growth and Development
• BIO 386 - Genomics II
• BIO 393 - Bioinformatics
• BIO 435 – Developmental Biology
• BIO 436 – Molecular Biology
• BIO 451 – Tissue Culture
• BIO 466 – Advanced Molecular and Cell Biology
• BIO 467 – Laboratory Course in Biotechnology

One Additional Upper Level Course

Select one additional upper level course from any courses listed in the three upper level content areas above (3-4 credits).
You may also select one course from those listed below, all three of which require special departmental permission.

BIO 497 – In-service Training in Biology (3 cr)
BIO 495 – Senior Thesis (3 cr)
BIO 499 – Independent Study and Research (3 cr)

COGNATE REQUIREMENTS

20 Credits Required

Requirements:
CHE 121 – General Chemistry II
CHE 260 – Organic Chemistry I
MAT 221 – Intermediate Applied Statistics

Select one from:

• PHY 200 – General Physics I
  • and PHY 201 – General Physics II
• PHY 230 – Physics for Scientists and Engineers I
  • and PHY 231 – Physics for Scientists and Engineers II

FREE ELECTIVES

Remaining credits to reach Overall Credits Required (listed above).
COURSES

BIO 100 - General Zoology
Fundamental principles of zoology are examined. Lecture and laboratory sessions introduce organization, responsiveness, reproduction, and classification on invertebrate and vertebrate animals while also analyzing the role of mankind on biodiversity. Lecture, 2 hours; laboratory, 2 hours. Not for biology majors.
Last Offered: Spring 2020
3 credits

BIO 101 - General Botany
Fundamental principles of botany. Organization, metabolism, responsiveness, reproduction and classification of selected plant forms illustrate the principles in the laboratory. Lecture, 2 hours; laboratory, 2 hours. Not for biology majors.
Last Offered: Spring 2020
3 credits

BIO 102 - Biology I
A more comprehensive treatment of general zoology. For science majors and minors. Lecture, 2 hours; laboratory, 4 hours.
Prerequisite(s): Science majors and minors.
Last Offered: Spring 2020
4 credits

BIO 103 - Biology II
A more comprehensive treatment of general botany than BIO 101. For science majors and minors. Lecture, 2 hours; laboratory, 4 hours.
Prerequisite(s): Science majors and minors.
Last Offered: Spring 2020
4 credits

BIO 110 - Human Biology I
A survey of man’s functional anatomy starting at the molecular level then progressing through various cell and tissue types, organs and organ systems. Labs are anatomically oriented and include the dissection of a representative mammal. Credits not applicable toward biology major. Lecture, 3 hours; laboratory, 2 hours.
Last Offered: Summer 2017
4 credits

BIO 111 - Human Biology II
Man’s functional anatomy is further explored focusing on physiological responses at the molecular and cellular level then progressing through various cell and tissue types, organs and organ systems. Labs are physiologically oriented and designed to examine human physiological responses. Credits not applicable toward biology major. Lecture, 3 hours; laboratory, 2 hours.
Prerequisite(s): BIO 110 Human Biology I
Last Offered: Summer 2017
4 credits

BIO 120 - Microbiology
Biology of microorganisms with emphasis on their roles in health and disease. Host defense mechanisms, immunology, and antimicrobial agents will be discussed in the context of infectious diseases. Credits not applicable toward biology major. Lecture, 3 hours; laboratory, 2 hours.
Last Offered: Spring 2020
4 credits

BIO 200 - Human Anatomy and Physiology I
A survey of human’s functional anatomy starting at the molecular level then progressing through various cell and tissue types, organs and organ systems. Labs are anatomically oriented and designed to examine gross anatomy of the human body.
Last Offered: Spring 2020
4 credits
BIO 201 - Human Anatomy and Physiology II

Functional anatomy of the human body is further explored focusing on physiological responses at the molecular and cellular level then progressing through various cell and tissue types, organs and organ systems. Labs are physiologically oriented and designed to examine human physiological responses.

Prerequisite(s): BIO 200

Last Offered: Spring 2020

4 credits

BIO 202 - Ecology

Relationships of plants and animals to each other and to their environment. Investigated by experimental and field studies involving quantitative and qualitative techniques. Lecture, 3 hours; laboratory, 3 hours.

Prerequisite(s): 6-8 credits in biology.

Last Offered: Spring 2020

4 credits

BIO 210 - Environmental Biology and Conservation

Causes, effects and remedies relating to the environmental crisis as analyzed from an ecological viewpoint. Emphasizing biological resources or biological consequences from resource use.

Lecture, 3 hours.

Prerequisite(s): Sophomore status.

Last Offered: Winter 2019-20

3 credits

BIO 215 - Animal Behavior

Catalogs behaviors across multiple taxa of animals. Examines the empirical and conceptual foundations that explain causation of animal behavior and how it can be further shaped by intrinsic and ambient parameters.

Prerequisite(s): 'C' or better in BIO 102 and sophomore status.

Last Offered: Summer 2019

3 credits

BIO 220 - Genetics

Biological inheritance in organisms from virus to man. Emphasis is on design and analysis of experiments. Topics include the chemistry of the genes and gene action, cytogenetics, genes in development, and the genetic basis of evolution.

Lecture, 3 hours; laboratory, 2 hours.

Prerequisite(s): 'C' or better in both BIO 102 and BIO 103.

Last Offered: Spring 2020

4 credits

BIO 228 - Vertebrate Zoology

The natural history, evolution and phylogenetic relationships of vertebrate animals are discussed in lecture; laboratories are devoted to the anatomy and taxonomy of the major vertebrate classes.

Lecture, 2 hours; laboratory, 4 hours.

Prerequisite(s): 'C' or better in BIO 102.

Last Offered: Spring 2020

4 credits

BIO 229 - Invertebrate Zoology

General introduction to the invertebrates. The classification, morphology, ecology, and phylogeny of major invertebrate phyla is emphasized. Lecture, 2 hours; laboratory, 4 hours; plus one all day Saturday or Sunday trip late in the course (students must provide transportation).

Prerequisite(s): 'C' or better in BIO 102.

Last Offered: Spring 2020

4 credits

BIO 230 - Plant Anatomy and Morphology

Study of the external morphology of plants and their internal structures, including cells, tissues, and organs. Each feature is studied within an evolutionary context focusing on developmental and functional aspects, relating how the features arose and their possible functions. The lab consists of experience with the use of microscopes, the sectioning and staining of plant materials, and the observation of plant structures.

Lecture, 3 hours; laboratory, 3 hours.

Prerequisite(s): 'C' or better in BIO 103.

Last Offered: Fall 2018

4 credits
BIO 231 - Comparative Vertebrate Anatomy
Study of vertebrate organs and systems from the standpoint of divergent and convergent evolution. Dissection of the dogfish and cat illustrate the principles. Lecture, 2 hours; laboratory, 4 hours. Prerequisite(s): 'C' or better in BIO 102.
Last Offered: Fall 2019
4 credits

BIO 232 - Morphology of Non-Vascular Plants
Basic structures, relationships, and life histories of representative algae and fungi are analyzed. Two three-hour lecture-laboratory periods each week. Prerequisite(s): 'C' or better in BIO 103.
Last Offered: Spring 2016
4 credits

BIO 233 - General Microbiology
Scientific research. will be used to examine the worldwide health threat related to the supply of effective antibiotics. Basic biology concepts will be addressed through intensive research investigations of microbial diversity. Antibiotic discovery from soil bacteria during the lab portion of the course will support understandings of principles of microbiology. Prerequisite(s): 'C' or better in BIO 102 or BIO 103.
Last Offered: Spring 2020
4 credits

BIO 235 - Histology
Microscopic anatomy of cells and tissues within the organ systems of vertebrates with an emphasis upon structure-function relationships. Lecture, 2 hours; laboratory, 4 hours. Prerequisite(s): CHE 120 and CHE 121; and 'C' or better in both BIO 102 and BIO 103.
Last Offered: Spring 2020
4 credits

BIO 236 - Cell Biology
Study of cell biology including organelles, biological membranes, signal transduction, and changes in gene expression. Each feature is studied within a molecular and cell biology context focusing on structural and functional aspects, relating form and function, with emphasis on communication between the extracellular environment and changes in the cell. Prerequisite(s): 'C' or better in BIO 102
Last Offered: Fall 2019
4 credits

BIO 250 - Plant Taxonomy and Systematics
Study of the origin and diversification of land plants, emphasizing both classical taxonomy and modern systematics. Students learn to identify and classify plant groups based on evolutionary relationships. Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): BIO 220 and 'C' or better in BIO 103.
Last Offered: Fall 2019
4 credits

BIO 296 - Genomics I
An introduction to genomics through the study of prokaryotic and eukaryotic (including human) genomes, comparative genomics, and phylogenetic analysis. The lab is a course-based authentic research experience in which novel soil viruses are discovered, purified, characterized, visualized by electron microscopy, and sequenced by 'next-gen' sequency technology. Prerequisite(s): 'C' or better in BIO 102 , BIO 103, and freshman or sophmore status.
Last Offered: Fall 2019
4 credits

BIO 298 - Special Topics
Topics vary.
Last Offered: Fall 2018
3 to 4 credits
BIO 301 - Physiology
Discussion of the basic principles of physiology, including biological molecules and cells, tissue biology, and system physiology. Not appropriate for premeds. Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): CHE 121 and 'C' or better in BIO 102 and BIO 103.
Last Offered: Fall 2019
4 credits

BIO 325 - Immunology and Infection
Role of the human immune response with specific regard to combating infectious agents. Immune development including innate and adaptive immunity are explored. A focus on the interplay of the immune system with intracellular and extracellular pathogens including bacteria, fungi, viruses, and prions. Prerequisite(s): C+ or better in BIO 220.
Last Offered: Fall 2019
3 credits

BIO 327 - Field Natural History
Travel abroad to examine natural history and biodiversity of different ecosystems. Appreciate the diversity of other cultures and their relationship with biological features of their environment. Create and practice various applications of field biology as it relates to ecology, physiology, behavior, evolution, and conservation of a variety of organisms. Prerequisite(s): 'C' or better in both BIO 102 and BIO 103.
Last Offered: Summer 2019
3 credits

BIO 334 - Microbial Ecology
Comprehensive study of the interrelationships between microorganisms and their environment with emphasis on physiology as a determinant of habitat and activity. Lecture, 2 hours; laboratory, 4 hours. Prerequisite(s): BIO 233.
Last Offered: Fall 2019
4 credits

BIO 335 - Pathogenic Microbiology
Role of microorganisms in human disease including pathogenic mechanism, epidemiology, host resistance, laboratory diagnosis, treatment, and prevention. Lecture, 2 hours; laboratory, 4 hours. Prerequisite(s): BIO 233.
Last Offered: Spring 2020
4 credits

BIO 337 - Medically Important Arthropods
Students study biology, systematics, distribution, and ecology of arthropods (insects, arachnids, and myriapods) directly or indirectly injurious to humans or domestic animals. Students gain experience necessary to take more advanced courses on applied aspects of this topic. Prerequisite(s): 'C' or better in BIO 102.
Last Offered: Spring 2019
3 credits

BIO 360 - Plant Growth and Development
Study of plant growth and development from embryogenesis through senescence, including pattern formation, cell fate determination, meristem and axis formation, and hormonal responses. Students conduct experiments testing environmental effects on plant growth and development. Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): BIO 220 and 'C' or better in BIO 103.
Last Offered: Spring 2019
4 credits

BIO 386 - Practical Bioinformatics: Genomics II
Mapping, annotating, and comparing genomes with an introduction to DNA and protein sequence analysis using web-based genomic databases and tools. The lab is a course-based authentic research experience in which genes and associated sequences are identified and analyzed from a novel viral genomes sequenced in BIO 296, and submitted for publication. Prerequisite(s): BIO 220 or 296
Last Offered: Spring 2020
4 credits
BIO 393 - Introduction to Bioinformatics
An analysis of DNA and protein sequences, evolutionary processes, genome characteristics, protein structure analysis, and global gene expression. Lab involves using bioinformatics software and programming.
Prerequisite(s): BIO 220 or BIO 386
Last Offered: Fall 2018
4 credits

BIO 396 - Synthetic Biology: Engineering Life
This emerging interdisciplinary field intersects biology, mathematics, physics, computer science, and engineering. Real-world problems are identified, and student-driven projects are performed using network modeling in order to make predictions and test assumptions, and then molecular biology and genetic engineering laboratory techniques are used to redesign genetic circuits in single-celled organisms.
Prerequisite(s): MAT 122 or MAT 150, completion of LEP: Natural World I and II, 6 of 8 Tier 2 complete (Honors Coll: 15 cr. HON or 45 cr. total), and prior or concurrent completion of all Tier 1 (Honors Coll.: T1MC and T1QR only).
Last Offered: Fall 2019
4 credits

BIO 398 - Special Topics
Topics vary.
Last Offered: Spring 2020
3 or 4 credits

BIO 399 - Mammalian Biology
Evolution, classification, ecology, behavior, and conservation of mammals. Identification and familiarity with a diverse range of both North American and exotic mammalian species. This course includes field trips, during which students must provide their own transportation. Lecture, 2 hours; laboratory, 2 hours.
Prerequisite(s): BIO 102 and either BIO 228 or BIO 231.
Last Offered: Spring 2020
4 credits

BIO 401 - Animal Physiology
Basic principles of physiology with emphasis on the biochemical and cellular mechanisms. Designed for students who wish to pursue a career in biomedical profession. Lecture, 3 hours; laboratory, 3 hours.
Prerequisite(s): CHE 121; and (PHY 201 or PHY 210 or PHY 230) and 'C' or better in BIO 102.
Last Offered: Spring 2020
4 credits

BIO 420 - Plant Physiology
Study of the principles of plant physiology including photosynthesis, respiration, gas exchange, transpiration, and metabolism. The interaction of plants and the environment is emphasized focusing on both biotic and abiotic factors. Lecture, 3 hours; laboratory, 3 hours.
Prerequisite(s): CHE 120 and 'C' or better in BIO 103.
Last Offered: Spring 2020
4 credits

BIO 429 - Limnology
Study of freshwater lake and stream ecosystems. Practical field and laboratory experiences supplement theory. Identification and interpretation of freshwater organisms and their habitats. Lecture, 2 hours; laboratory or field work, 4 hours. Students must provide transportation.
Prerequisite(s): CHE 120 and 'C' or better in BIO 102 and BIO 103.
Last Offered: Fall 2019
4 credits

BIO 430 - Marine Ecology
Ecological approach to the study of estuarine-marine environments and organisms. Topics emphasized are productivity, food from the sea, food webs, pollution and environmental limiting factors. Field trips are required. Students must provide transportation. Lecture, 2 hours; laboratory, 4 hours.
Prerequisite(s): CHE 120 and 'C' or better in BIO 102 and BIO 103.
Last Offered: Summer 2019
4 credits
BIO 432 - Mycology
General characteristics of the fungi. Emphasis on the importance of fungi to the environment, industrial application, and their evolutionary history. Lecture, 2 hours; laboratory, 4 hours. Prerequisite(s): 'C' or better in either BIO 102 or BIO 103.
Last Offered: Fall 2018
4 credits

BIO 435 - Developmental Biology
Study of the mechanisms and patterns of development in animals. Microscopic examination of prepared slides and selected experiments are used to illustrate principles involved. Two three-hour lecture-laboratory periods each week. Prerequisite(s): BIO 220; BIO 436 recommended.
Last Offered: Fall 2019
4 credits

BIO 436 - Molecular Biology
The study of the macromolecules and pathways of life that allow cells to store information, replicate, and maintain homeostasis. The structures and functions of the genome, transcriptome, and proteome will be emphasized. Introductory techniques of molecular biology are emphasized in the laboratory. Lecture, 2 hours; laboratory, 3 hours. Prerequisite(s): BIO 220 or BIO 296; and CHE 121.
Last Offered: Spring 2020
4 credits

BIO 438 - Aquatic Entomology
The study of aquatic insects in field and laboratory. Identification; environmental requirements; roles of insects in fisheries management, water pollution studies and recreation. Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): 'C' or better in BIO 102. BIO 427 is recommended.
Last Offered: Spring 2016
4 credits

BIO 440 - Parasitic Infections
Study of parasites that infect humans and the diseases that they cause. The focus will be on transmission, hosts, symptoms, and prevention. The social costs of current and emerging infections will be discussed. Prerequisite(s): BIO 233.
Last Offered: Spring 2020
3 credits

BIO 451 - Tissue Culture
Methods of growing isolated cells in vitro. Media preparation, inoculation, growth factors and analysis of results are considered. A variety of tissues is cultured subject to facilities, time, and student interest. Two three-hour periods per week of lecture-laboratory. Prerequisite(s): BIO 233 or BIO 301.
Last Offered: Fall 2019
4 credits

BIO 454 - Brain – Anatomy and Transmission
Discussion of the structure of human brain and the pharmacology and biochemistry of neural transmission. Offered primarily to pre-med, pre-vet and pre-dental students. Prerequisite(s): (BIO 228 or 231 or 301 or 401) and CHE 121
Last Offered: Spring 2020
4 credits

BIO 460 - Paleontology
Systematic study of the fossil remains of organisms, with emphasis on their evolution, structure, distribution and phylogenetic relationships. Three two-hour lecture-laboratory periods. Prerequisite(s): Junior status and Biology or Earth Science major.
Last Offered: Spring 2020
4 credits
**BIO 467 - Laboratory Course in Biotechnology**
Principles and practice of biotechnology in a research context. Laboratory methods, experimental design and research applications. Inquiry-based format designed to explore and analyze specific research problems. 
Prerequisite(s): BIO 220 and BIO 436. 
Last Offered: Spring 2020
4 credits

**BIO 470 - Methods of Biology Teaching**
Research-based teaching and learning methods taught in an active instructional environment. Curriculum development, inquiry and questioning methods, and assessment design in the context of core life sciences content are emphasized. 
Prerequisite(s): 'C' or bett in BIO 102, BIO 103, and BIO 220; Biology education major. 
Last Offered: Spring 2018
3 credits

**BIO 491 - Seminar in Biotechnology**
Development of communication skills needed by professionals in the field of biotechnology through student oral presentations and facilitated discussion. Topics include current scientific advances in biotechnology and the social impact of biotechnology. May be repeated. 
Last Offered: Spring 2020
1 credits

**BIO 497 - In-Service Training in Biology**
Provides the opportunity for upperclass Biology majors to participate in a biological research project being conducted by an industry or governmental agency. Acceptance dependent on student’s qualifications. 3 credits
Prerequisite(s): Departmental approval required. 
Last Offered: Spring 2019
3 credits

**BIO 498 - Advanced Special Topics**
Topics vary. 
Last Offered: Spring 2017
4 credits

**BIO 499 - Independent Study and Research**
No Description Available
Prerequisite(s): Departmental permission and overall GPA of 3.0 or higher. 
Last Offered: Fall 2019
1 to 6 credits