BIOLOGY (BIOL)

BIOL 100 Biology in the Modern World Credits: 3
A study of the major themes in biology including the nature of life, genetics, evolution, ecology and biological diversity.
Goal: Goal: 03- Natural Science
Fall: All Years **Spring:** All Years **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000184/)

BIOL 100L Biology in Modern World Lab Credits: 1
A study of the major themes in biology including the nature of life, genetics, evolution, ecology and biological diversity.
Goal: Goal: 03- Natural Science
Fall: All Years **Spring:** All Years **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001396/)

BIOL 104 Medical Terminology Credits: 1
A presentation of the basic principles inherent in the formation of medical terms. Students will develop a medical vocabulary of common and contemporary terms.
Fall: All Years **Spring:** All Years **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000185/)

BIOL 120 Conservation Biology Credits: 3
This course will provide an interdisciplinary introduction to the biologic processes that generate and maintain biological diversity, the value of biodiversity to human societies and natural ecosystems, the causes and environmental and human consequences of biodiversity loss, and biodiversity conservation. Core concepts include evolution, ecological-evolutionary interactions, ecosystem services, and conservation strategies.
Goal: Goal: 03- Natural Science 10- People/Environment
Spring: Even Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00214039/)

BIOL 120L Conservation Biology Lab Credits: 1
This course will provide an interdisciplinary introduction to the biologic processes that generate and maintain biological diversity, the value of biodiversity to human societies and natural ecosystems, the causes and environmental and human consequences of biodiversity loss, and biodiversity conservation. Core concepts include evolution, ecological-evolutionary interactions, ecosystem services, and conservation strategies.
Goal: Goal: 03- Natural Science 10- People/Environment
Spring: Even Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00214029/)

BIOL 150 Physiological Anatomy for Non-science Majors Credits: 3
A lecture-laboratory course designed for the non-major to study human anatomy and physiology with emphasis on the structure and function of the systems of the body. Special emphasis will be placed on skeletal and muscular systems, as well as the cardiovascular, respiratory, nervous, endocrine, renal, digestive, urinary, and reproductive systems.
Pre-Requisite : BIOL 100
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001967/)

BIOL 150L Physiological Anatomy for Non-science Majors Lab Credits: 1
A lecture-laboratory course designed for the non-major to study human anatomy and physiology with emphasis on the structure and function of the systems of the body. Special emphasis will be placed on skeletal and muscular systems, as well as the cardiovascular, respiratory, nervous, endocrine, renal, digestive, urinary, and reproductive systems.
Pre-Requisite : BIOL 100
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001968/)

BIOL 186 Special Topics in Biology Credits: 1-4
A study of topics in biology not normally provided as part of the curriculum.
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00002075/)

BIOL 200 Introduction to Cellular Biology Credits: 3
This is an introductory level course emphasizing the basic cellular/molecular aspects of biology including scientific inquiry, biological molecules, cell structure and function, metabolism, cell division, and genetics.
Goal: Goal: 03- Natural Science
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00156832/)

BIOL 200L Introduction to Cellular Biology Lab Credits: 1
This is an introductory level course emphasizing the basic cellular/molecular aspects of biology including scientific inquiry, biological molecules, cell structure and function, metabolism, cell division, and genetics.
Goal: Goal: 03- Natural Science
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00156833/)

BIOL 201 Introduction to Biodiversity & Evolution Credits: 3
This course is an introduction to plant and animal diversity with an emphasis on evolutionary relationships of organisms and the ways in which these organisms interact and function in ecological communities. Core concepts include evolution, plant and animal phylogeny and classification, and energy flow through ecosystems. This course is one part of a two course introductory biology sequence intended for biology majors.
Goal: Goal: 03- Natural Science
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00155274/)

BIOL 201L Introduction to Biodiversity & Evolution Lab Credits: 1
This course is an introduction to plant and animal diversity with an emphasis on evolutionary relationships of organisms and the ways in which these organisms interact and function in ecological communities. Core concepts include evolution, plant and animal phylogeny and classification, and energy flow through ecosystems. This course is one part of a two course introductory biology sequence intended for biology majors.
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00155275/)

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BIOL 286 Topics in Biology Credits: 1-4
A study of topics in biology not normally provided as part of the curriculum
Fall: Department Discretion **Spring:** Department Discretion **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000194/)

BIOL 287 Sophomore Biology Seminar Credits: 1
In this course, students will learn to find, read, analyze, and evaluate published research in biology. The skills developed in this course will be used to prepare the student for advanced biology courses and the requisite seminar presentation in BIOL 487.
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001664/)

BIOL 292 Honors Credit in Biology Credits: 1
An independent study course designed primarily for Honors Program students. This course allows more in-depth or comprehensive study or research by certain students concurrently enrolled in at least one other Biology course.
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000195/)

BIOL 302 Botany Credits: 3
Introduction to plant anatomy, physiology, growth, and development. Topics also include plant ecology, biotechnology, and human uses of plants.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000197/)

BIOL 302L Botany Lab Credits: 1
Introduction to plant anatomy, physiology, growth, and development. Topics also include plant ecology, biotechnology, and human uses of plants.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001406/)

BIOL 303 Microbiology Credits: 3
Functional and structural diversity of bacteria, protozoans, fungi and viruses; environmental, economic, and pathogenic significance of representative forms.
Pre-Requisite : BIOL 200
Fall: All Years **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000198/)

BIOL 303L Microbiology Lab Credits: 2
Functional and structural diversity of bacteria, protozoans, fungi and viruses; environmental, economic, and pathogenic significance of representative forms.
Pre-Requisite : BIOL 200
Fall: All Years **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001407/)

BIOL 305 Human Anatomy & Physiology I Credits: 3
Lecture and lab exercises covering basic anatomical and directional terminology; selected principles of cell biology; histology; and the integumentary, skeletal, muscular, nervous and endocrine systems. Course designed for science and allied health majors.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 231
Fall: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00002033/)

BIOL 305L Human Anatomy & Physiology I Lab Credits: 1
Lecture and lab exercises covering basic anatomical and directional terminology; selected principles of cell biology; histology; and the integumentary, skeletal, muscular, nervous and endocrine systems. Course designed for science and allied health majors.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 231
Fall: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00002034/)

BIOL 306 Human Anatomy & Physiology II Credits: 3
Lecture and lab exercises covering the cardiovascular, lymphatic, respiratory, immune, digestive, urinary, and reproductive systems; metabolism; fluid/electrolyte and acid/base balance.
Pre-Requisite : BIOL 305
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00002035/)

BIOL 306L Human Anatomy & Physiology II Lab Credits: 1
Lecture and lab exercises covering the cardiovascular, lymphatic, respiratory, immune, digestive, urinary, and reproductive systems; metabolism; fluid/electrolyte and acid/base balance.
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00002036/)

BIOL 309 Invertebrate Zoology Credits: 3
A survey of major invertebrate phyla, including structure, function, evolutionary relationships, life histories, adaptations, and health and/or economic importance.
Pre-Requisite : BIOL 201
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00198240/)

BIOL 309L Invertebrate Zoology Laboratory Credits: 1
A survey of major invertebrate phyla, including structure, function, evolutionary relationships, life histories, adaptations, and health and/or economic importance.
Pre-Requisite : BIOL 201L
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00198241/)

BIOL 310 Vertebrate Zoology Credits: 3
A survey of vertebrates including discussion of characteristics of each class, representative species, and adaptations for survival and reproduction. Lab emphasizes vertebrates in the Midwest.
Pre-Requisite : BIOL 201
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00220417/)

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BIOL 310L Vertebrate Zoology Lab Credits: 1
A survey of vertebrates including discussion of characteristics of each class, representative species, and adaptations for survival and reproduction. Lab emphasizes vertebrates in the Midwest.
Pre-Requisite : BIOL 201
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00220418/)

BIOL 311 Ecology Credits: 3
Discussion of ecosystem structure and function, population ecology, evolution, and applied ecology. Lab emphasizes field experiments.
Pre-Requisite : BIOL 200 AND BIOL 201 AND BIOL 287 AND BIOL 302
Fall: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000200/)

BIOL 311L Ecology Lab Credits: 1
Discussion of ecosystem structure and function, population ecology, evolution, and applied ecology. Lab emphasizes field experiments.
Pre-Requisite : BIOL 200 AND BIOL 201 AND BIOL 287 AND BIOL 302
Fall: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001408/)

BIOL 321 Genetics Credits: 3
An analysis of hereditary principles covering classical Mendelian inheritance and recent advances in molecular genetics. Expression and inheritance of characteristics in eukaryotes.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000201/)

BIOL 321L Genetics Lab Credits: 1
An analysis of hereditary principles covering classical Mendelian inheritance and recent advances in molecular genetics. Expression and inheritance of characteristics in eukaryotes.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001409/)

BIOL 326 Animal Behavior Credits: 3
This course examines mechanisms and evolutionary processes that drive animal behavior. Topics include communication, social organization, imprinting, courtship and mating, & agonistic behavior, among others.
Pre-Requisite : BIOL 200 OR BIOL 201 OR PSYC 101
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00193202/)

BIOL 326L Animal Behavior Lab Credits: 1
This course examines mechanisms and evolutionary processes that drive animal behavior, including but not limited to communication, social organization, imprinting, courtship and mating, & agonistic behavior. Laboratory sessions allow students to gain hands-on experiences in many of these areas.
Pre-Requisite : BIOL 200 OR BIOL 201 OR PSYC 101
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00193179/)

BIOL 333 Histology Credits: 3
Histology techniques and microscopic anatomy of selected animal tissues.
Pre-Requisite : BIOL 305
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000203/)

BIOL 337 Natural Medicines & Clinical Trials Credits: 3
An investigation into the medicinal use of drugs and supplements derived from plants and other natural sources, and how to evaluate evidence about the safety and efficacy of these medicines. Topics include characteristics of good clinical trials, how plant-derived drugs are developed, how drug mechanisms are studied, psychoactive drugs from plants, and history of some natural medicines.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 231
Fall: Even Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00164901/)

BIOL 338 Plant Diversity Credits: 3
A survey of the diversity of plants, their life cycles, evolutionary relationships among major groups as well as plant distribution and factors affecting distribution.
Pre-Requisite : BIOL 200 AND BIOL 201
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000204/)

BIOL 338L Plant Diversity Lab Credits: 1
A survey of the diversity of plants, their life cycles, evolutionary relationships among major groups as well as plant distribution and factors affecting distribution.
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001410/)

BIOL 371 Food Microbiology Credits: 2
This course is a study of the nature, physiology, and interactions of microorganisms in food. Emphasis is placed on food-borne illness, food spoilage, food preservation, food fermentations, microbial standards, identification and detection of microbes in food, and sanitation and quality control of foods.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 122 OR BIOL 200 AND CHEM 231
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000208/)

BIOL 371L Food Microbiology Lab Credits: 2
This course is a study of the nature, physiology, and interactions of microorganisms in food. Emphasis is placed on food-borne illness, food spoilage, food preservation, food fermentations, microbial standards, identification and detection of microbes in food, and sanitation and quality control of foods.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 122 OR BIOL 200 AND CHEM 231
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00001413/)

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BIOL 377 Principles of Nutrition Credits: 3
A course focused on the biology of the digestive system, cellular functions of the macro- and micro-nutrients, diseases of malnutrition, and critical evaluation of nutrition research.
Pre-Requisite : BIOL 200 AND CHEM 121 OR BIOL 200 AND CHEM 231
Spring: All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000209/)

BIOL 401 Evolution Credits: 3
Introduction to the concept of evolution, origin and types of genetic variation, modes of selection, and evidence for the evolutionary process.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000210/)

BIOL 401L Evolution Lab Credits: 1
Introduction to the concept of evolution, origin and types of genetic variation, modes of selection, and evidence for the evolutionary process. Laboratory experiences complement the lectures and discussions.
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00189909/)

BIOL 403 Ornithology Credits: 3
An introduction to ornithology, including the anatomy, physiology, ecology, behavior, life history, classification, and identification of birds.
Pre-Requisite : BIOL 201 AND BIOL 201L
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00206297/)

BIOL 403L Ornithology Laboratory Credits: 1
An introduction to ornithology, including the anatomy, physiology, ecology, behavior, life history, classification, and identification of birds. Lab emphasizes identification of birds by sight and sound; The lab class to accompany BIOL 403 lecture.
Pre-Requisite : BIOL 201 AND BIOL 201L
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00206298/)

BIOL 405 Insect Ecology & Diversity Credits: 3
An introduction to entomology, including the biology, ecology, diversity, and classification of insects. Emphasis is placed on the ecological, agricultural, health, and economic importance of insects.
Pre-Requisite : BIOL 201
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00202182/)

BIOL 405L Insect Ecology & Diversity Lab Credits: 1
An introduction to entomology, including the biology, ecology, diversity, and classification of insects. Emphasis is placed on the ecological, agricultural, health, and economic importance of insects; The lab class to accompany BIOL 405 lecture.
Pre-Requisite : BIOL 201L
Fall: Department Discretion **Spring:** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00202184/)

BIOL 407 Restoration Science and Management, Credits: 4
An introduction to the ecological principles and management practices used in restoring and rehabilitating wildland and semi-natural ecosystems after alteration or disturbance. Examines the scientific and ethical foundations of restoration as well as the social, economic, and political forces that impinge on any restoration project. Includes practical hands-on experience in restoration activities.
Pre-Requisite : BIOL 311
Fall: Even Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00215810/)

BIOL 425 Advanced Cell Biology Credits: 3
A critical evaluation of recent research on cellular structures and phenomena, with a special emphasis on the technological and methodological advances that have facilitated this research.
Pre-Requisite : BIOL 200 AND BIOL 287
Spring: Even Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00209726/)

BIOL 461 Immunology Credits: 3
Course will address the basics and applications of immunologic functions and will enable the student to understand one of the basic protective systems in humans.
Pre-Requisite : BIOL 200 and junior status.
Spring: Odd Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000216/)

BIOL 471 Virology Credits: 3
Course is designed to address the structure, classification, and diagnosis of major viral pathogens; and the viral diseases affecting humans and animals.
Pre-Requisite : BIOL 200 AND BIOL 201
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00206299/)

BIOL 486 Advanced Topics in Biology Credits: 1-4
A study of more advanced topics in biology not normally provided as part of the curriculum.
Spring: Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000218/)

BIOL 487 Senior Biology Seminar Credits: 1
An applied learning experience which involves critical evaluation of biological research articles, scientific writing, and oral seminar presentation.
Pre-Requisite : BIOL 200 AND BIOL 201 AND BIOL 287 and Requires minimum credits: 75
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00156379/)

BIOL 494 Directed Studies in Biology Credits: 1-3
Independent research, directed by a faculty member, which may be laboratory research, library research, or other experiences approved by the Biology Program.
Fall: All Years **Spring:** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000220/)

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BIOL 499 Internship in Biology Credits: 1-15
Supervised experiences in learning situations that cannot be obtained on campus.
Fall: All Years **Spring:** All Years **Summer** All Years
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00000221/)

BIOL 589 Special Topics in Biology Credits: 1-4
Advanced interdisciplinary study of the biological sciences. Intensive lectures, literature reviews, and discussions on fundamental and contemporary topics that have shaped and continue to shape our understanding of natural systems. Topics vary based on the interests of the students and the instructor.
Fall: Department Discretion **Spring:** Department Discretion **Summer** Department Discretion
Course Outline (https://eservices.minnstate.edu/registration/rest/rcId/0075/curricId/00194821/)

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