

# DEPARTMENT OF BIOLOGY

## College of Arts and Sciences

Janet Steele, Ph.D., Chair - (308) 865-8325, steelej@unk.edu

Melissa Wuellner, Ph.D., Co-Chair - (308) 865-8006, wuellnerm@unk.edu

Bryan Drew, Ph.D., Graduate Program Committee Chair - (308) 865-8883, drewbt@unk.edu

Austin Nuxoll, Ph.D., Director of Biology Distance (Non-thesis) Program - (308) 865-8602, nuxollas@unk.edu

Brian Peterson, M.S., Coordinator Biology Distance (Non-thesis) Program - (308) 865-1589, msbiology@unk.edu

Janet Steele, PhD., Director of Health Sciences Program - (308) 865-8325, steelej@unk.edu

Biology is part of the Master of Science in Education Degree in STEM Education (<http://catalog.unk.edu/graduate/departments/science-math-education-program/science-math-education-mse/>).

## Master of Science

- Biology (<http://catalog.unk.edu/graduate/departments/biology/biology-ms/>) - Master of Science Degree (thesis and non-thesis)
- Health Sciences (<http://catalog.unk.edu/graduate/departments/biology/health-sciences-ms/>) - Master of Science Degree (non-thesis, online)

## Biology (BIOL)

### BIOL 801 – Principles of Immunology 3 credit hours

An in-depth discussion of basic and advanced principles of immunology. Topics to be covered include: 1. structural and functional aspects of the immune system, 2. structure and function of antigen receptors (TCR and BCR) and antibody molecules, 3. antigen-antibody interaction, 4. antigen recognition and response, 5. development of T and B cells, 6. disorders of the immune system including allergies and hypersensitivities, immunodeficiencies, tolerance, and autoimmunity, 7. immunobiology of tissue transplants, and 8. basic aspects of cancer and cancer therapy that relate to immunology. A competent background in cell biology and/or biochemistry and microbiology is strongly recommended.

### BIOL 801P – Principles of Immunology 4 credit hours

In this course, we will cover basic and advanced principles of immunology. Topics to be covered include: 1. structural and functional aspects of the immune system, 2. structure and function of antigen receptors (TCR and BCR) and antibody molecules, 3. antigen-antibody interaction, 4. antigen recognition and response, 5. development of T and B cells, 6. disorders of the immune system including allergies and hypersensitivities, immunodeficiencies, tolerance, and autoimmunity, 7. immunobiology of tissue transplants, and 8. basic aspects of cancer and cancer therapy that relate to immunology. Lab required. Offered on-campus Fall only.

Prerequisite: BIOL 309 or CHEM 351 or instructor's permission.

Additional Course Fee Required

### BIOL 802 – Organic Evolution 3 credit hours

This course is an overview of the basic concepts in evolutionary biology with a focus on pattern and process through the use of examples. Molecular and organismal data will be examined. Offered online, every Fall and Spring.

### BIOL 803P – Plant Physiology 3 credit hours

Life processes of plants with an emphasis on water relations and hormonal and stress physiology. Three hours of laboratory each week. Offered online, Fall of odd-numbered years and on-campus on demand. Additional Course Fee Required

### BIOL 804 – Evolution of Epidemics 3 credit hours

Through videotaped lectures, reading and writing assignments, and online discussions, students will develop an understanding of the origin and the evolution of plagues. We will illustrate the techniques humans have to defend against epidemics and will speculate about their role in shaping humanity and our futures. Offered online, Spring of odd-numbered years.

### BIOL 804P – Developmental Biology 3 credit hours

Principles of developmental processes with emphasis on the physiological and genetic events occurring during the growth and maturation of living organisms. Three hours of laboratory each week. Offered on-campus, Spring of odd-numbered years. Additional Course Fee Required

### BIOL 805P – Range and Wildlife Management 3 credit hours

Basic principles of range and pasture management for use by domestic livestock and wildlife. Course includes three hours of field or laboratory work each week. Offered on-campus, Spring of even-numbered years. Additional Course Fee Required

### BIOL 806P – Plant Ecology 3 credit hours

A study of plants in relation to their environment. Three hours of laboratory or field work each week. Offered on-campus, Fall of even-numbered years. Additional Course Fee Required

### BIOL 809P – Biological Studies using GIS 3 credit hours

This course is an introduction to many aspects of using Geographic Information Systems as a natural resources tool. The class introduces cartographic concepts, tools such as Global Positioning System tools, and natural resource databases at the state and federal levels. In addition to lectures and labs where the software and tools are used, students also have the opportunity to complete projects using GIS and data of their own choosing. The main objective of the class is to give students enough familiarity with GIS software, data resources, and project design to be able to effectively produce their own projects. Offered on-campus, Fall of odd-numbered years.

Prerequisite: BIOL 307 and General Biology I II

### BIOL 810P – Fire Ecology and Management in Grasslands 1 credit hour

Familiarizes students with the role of fire as a major ecosystem process in grasslands and its use as a management tool.

### BIOL 811 – Scientific Illustration 3 credit hours

An introduction to the discipline of scientific illustration. Students will learn the fundamental principles of creating effective illustrations for the purpose of communicating science. A limited set of media types, both traditional and digital, will be explored. The main focus will be on creating the best images for use in research, teaching, journal publications, presentations, and other applications. Copyright and other legal issues will also be discussed. A basic knowledge of biological concepts is useful; artistic ability not required.

**BIOL 812 – Microbial Diversity 3 credit hours**

Microbes are the most abundant and diverse organisms on Earth. Collectively, they play critical roles in biogeochemical cycling, human health, and food production. This course will explore the evolutionary and ecological processes that generate and maintain microbial diversity. Students will also be exposed to molecular and bioinformatic approaches that are used to study microorganisms in a variety of habitats, including freshwater, marine and terrestrial. Offered online.

**BIOL 813 – Issues in Bioethics 3 credit hours**

Bioethics is the study of ethical controversies in both biology and medicine. Science has progressed significantly in the last century and with this progress has come ethical questions. The intent of this course is to focus on a variety of issues that have arisen, including, but not limited to, assisted reproductive technologies, sex selection, cloning, and stem cell research to name a few. Offered online, Spring only.

**BIOL 816P – Plant Diversity and Evolution 4 credit hours**

Morphology of each group of the plant kingdom. Three hours of laboratory each week. Offered on-campus, Spring of odd-numbered years. Additional Course Fee Required

**BIOL 818P – Plant Taxonomy 3 credit hours**

Collection and identification of vascular plants with emphasis on the prairies and plains. A family approach is utilized. Three hours of laboratory or fieldwork each week. Offered on-campus, Fall only. Additional Course Fee Required

**BIOL 819 – Bioethics of HeLa Cells 3 credit hours**

HeLa cells are one of the oldest and most commonly used human cell line. Even though the utility of this cell line is vast and important, the history behind how the cells were isolated and used is a bioethical conundrum. Science, medicine, and technology have progressed significantly because of the use of HeLa cells and with this progress have come ethical questions. The intent of this course is to focus on the biological, medical, technological, and ethical issues surrounding HeLa cells.

**BIOL 820 – Introduction to Graduate Study 3 credit hours**

An introduction to graduate study and requirements at UNK with emphasis on research methods and biological techniques for the professional teacher and biologist. Students will gain an appreciation for the scientific method by formulating good scientific questions including sound null and alternative hypotheses, design experimental methods addressing the hypotheses and propose appropriate statistical tests for evaluation of results. Students will practice the art of locating and understanding scientific literature. In addition, students will engage in scientific writing which will include the submission of a research proposal. Offered online, every semester and on-campus, Fall only. Prerequisite: Biology majors or permission

**BIOL 821 – Directed Readings 1-3 credit hours**

Enables the student to supplement knowledge in selected areas of biology. Primarily independent readings as assigned by the instructor. Readings in Genetic & Societal Problems Readings in Biological Techniques Readings in Vertebrate Biology Readings in Invertebrate Biology Readings in Aquatic Biology Readings in Cell Biology Readings in Recent Developments in Biology Readings in Systematics and Ecology Readings in Evolution Readings in Botany Readings in Microbiology Readings in Developmental Biology  
Department Consent Required  
Total Credits Allowed: 6.00

**BIOL 822 – Advances in Biology 1-3 credit hours**

Recent advances in biological topics will be covered. A maximum of 6 hours credit may be counted toward a degree.  
Total Credits Allowed: 6.00

**BIOL 823 – Environmental Biology 3 credit hours**

Environmental biology focuses on the interface of human activity and the natural biological world. The impacts of humans on biogeochemical cycles, ecosystems, and individual species are examined. The role of governmental policies and politics is a part of this discipline and is reviewed. Recent scientific research and reports are used to predict what the future challenges are to humans and organisms in the face of the rapid changes brought about by human activity.

**BIOL 824 – Principles of Ecology 3 credit hours**

Ecology is the study of how species interact with each other and with their abiotic environment. There are many disciplines within ecology that we will touch on, including marine ecology, ecological physiology, population biology, and community ecology. This class will summarize current ecological knowledge, and students will read a number of classic papers in the field. Offered online, Spring of odd-numbered years.

**BIOL 826P – Human Dimensions 3 credit hours**

Various approaches to understand human attitudes and behaviors toward wildlife, fisheries, and nature. The course is organized around three major sections: psychology, sociology, and economics.

**BIOL 827 – Biological Statistics 3 credit hours**

This class is divided into two main areas. The first is biological statistics: the collection and analysis of scientific data. The second area is experimental design: how an experimental hypothesis is built and what are the pieces and procedures needed to conduct a successful experiment. The class is not mathematically intensive and relies on the power of computers beyond a few examples done by hand. The class includes both parametric and non-parametric statistics with continuous and categorical variables. Offered online, every semester.

**BIOL 830P – Special Topics in Biology 1-3 credit hours**

Topics are studied which are not assigned or covered in other courses in the department. The format of this course will vary depending on the topic of instruction and the needs of students. Topics in Botany Topics in Fresh Water Biology Topics in Vertebrate Biology Topics in Invertebrate Biology Topics in Nebraska Flora Topics in Physiology  
Total Credits Allowed: 18.00

**BIOL 831 – Biological Research 1-3 credit hours**

Independent investigation of biological problems. A maximum of three hours credit may count toward the 36 hours required for the thesis option. Offered on-campus, every semester.  
Total Credits Allowed: 6.00

**BIOL 831A – Biological Research: Hypotheses and Justification 1 credit hour**

Students will identify a research project and, with the help of a faculty mentor, develop testable hypotheses and write a referenced justification for the research. Credit 1 of the 6 credits of BIOL 831; all 6 credits must be completed to count toward the degree program. It is recommended that students have taken six graduate Biology credit hours in addition to BIOL 820 before enrolling in this class. Offered online, every semester. Department Consent Required  
Prerequisite: BIOL 820 and permission.

**BIOL 831B – Biological Research: Methodology 1 credit hour**

Students will develop detailed methodology, statistical analysis, and budget to investigate the hypotheses identified in BIOL 831A. If possible, preliminary trials will be conducted. Credit 2 of the 6 credits of BIOL 831; all 6 credits must be completed to count towards the degree program. Offered online, every semester.

Prerequisite: BIOL 820 and permission and completion of or concurrent enrollment in BIOL 831A.

**BIOL 831C – Biological Research: Annotated Bibliography 1 credit hour**

Students will conduct a complete literature review (annotated bibliography) of their topic and obtain a minimum of 50 peer-reviewed references related to their research identified in BIOL 831A. Credit 3 of the 6 credits of BIOL 831; all 6 credits must be completed to count towards the degree program. Offered online, every semester.

Prerequisite: BIOL 820 and permission and completion of or concurrent enrollment in BIOL 831B.

**BIOL 831D – Biological Research: Data Collection 1 credit hour**

Students will gather data according to the methodology developed in BIOL 831B. IRB and/or IACUC approval, if required, must be obtained prior to enrollment. Credit 4 of the 6 credits of BIOL 831; all 6 credits must be completed to count towards the degree program. Offered online, every semester.

Prerequisite: BIOL 820 and permission and completion of or concurrent enrollment in BIOL 831C.

**BIOL 831E – Biological Research: Statistical Analysis 1 credit hour**

Students will use appropriate statistics to analyze their results, construct appropriate tables and figures to visually present the results, and use text to verbally describe the results. Students will evaluate their results in the framework of the hypotheses developed in BIOL 831A. Credit 5 of the 6 credits of BIOL 831; all 6 credits must be completed to count towards the degree program. Offered online, every semester.

Prerequisite: BIOL 820 and permission and completion of or concurrent enrollment in BIOL 831D.

**BIOL 831F – Biological Research: Manuscript 1 credit hour**

Students will submit a final manuscript summarizing their work done in BIOL 831A-E. The manuscript will be prepared in a manner consistent with submission to a professional journal in their field of study. Credit 6 of the 6 credits of BIOL 831; all 6 credits must be completed to count towards the degree program. Offered online, every semester.

Prerequisite: BIOL 820 and permission and completion of or concurrent enrollment in BIOL 831E.

**BIOL 832 – Crane Ecology 1 credit hour**

This course is an in-depth study of the behavior and ecology of cranes. Assigned readings from the scientific literature, one writing assignment and online discussions will be used to explore a variety of topics including: reproductive biology, wintering ecology, migratory behavior, conservation and management of cranes. Plan to spend at least several hours each week on reading, writing, and responding to topic discussions.

**BIOL 833P – Invertebrate Zoology 3 credit hours**

This course provides an introduction to the biology of specific phyla, classes, and orders of invertebrates with emphasis on classification, morphology, structure and function of their internal anatomy, ecology and evolution, and fundamental concepts characteristic of this diverse animal group. Laboratory stresses anatomy, natural history and ecology of invertebrates. Three hours of laboratory every week.

Prerequisite: BIOL 105 and BIOL 106 or permission of instructor  
Additional Course Fee Required

**BIOL 834 – Conservation Biology 3 credit hours**

An overview of conservation biology and its importance. Special emphasis is placed on ecological, economic, and social issues relevant to biological rarity. Offered online, Spring of odd-numbered years.

**BIOL 835P – Herpetology 3 credit hours**

Herpetology provides an introduction to reptiles and amphibians with an emphasis placed on morphology, taxonomy, life history, and ecology of the major groups. Together, reptiles and amphibians are more diverse, numerous, and important to many terrestrial ecosystems than any other organism. You will learn life histories, their role in the ecosystem, reasons for the decline of many species and increase in other species and their importance to humans. Offered on-campus, Fall of odd-numbered years. Additional Course Fee Required

**BIOL 837 – Reproductive Physiology 3 credit hours**

This course discusses the role of hormones in regulating reproduction in mammals, with an emphasis in humans. Topics to be covered include: 1) sexual differentiation of the brain, 2) spermatogenesis and oogenesis, 3) pregnancy, parturition, and lactation, and 4) fertility and sexually transmitted diseases. Background in anatomy and physiology is recommended. Offered online, Summer only.

**BIOL 838 – Essential Human Anatomy 3 credit hours**

Human anatomy including essential aspects of functional morphology will be covered. Topics covered may include the integumentary, skeletal, muscular, nervous, endocrine, circulatory, lymphatic, respiratory, urinary, digestive and reproductive systems. Detailed discussion of specific anatomical regions will be required. Offered online, every Fall and Spring.

**BIOL 839 – Human Physiological Systems 3 credit hours**

General human physiology will be studied with an emphasis on systems. The integumentary, skeletal, muscular, nervous, endocrine, circulatory, lymphatic, respiratory, urinary, digestive, immune and reproductive systems will be discussed. Salient mechanical, physical and biochemical processes of organs, tissues and cells will be covered. Anatomy will be included at a level necessary to make sense of the system's function. Offered online, every Fall and Spring.

**BIOL 840 – Infectious Diseases 3 credit hours**

This course is an introduction to medical microbiology with coverage of viral, bacterial, fungal, and protozoan disease causing microorganisms. It will cover the basic mechanisms of infection, disease progression, and immune response. It is strongly suggested that students have taken an introductory microbiology course before taking this class. Offered online, Fall only.

**BIOL 840P – Infectious Diseases 3 credit hours**

This course focuses on the medical aspects of microbiology. The course will cover viruses, bacteria, fungi, and parasitic protists. We will study the mechanisms of infection, disease progression, and immune response. Offered on-campus, Fall of odd-numbered years.

Additional Course Fee Required

**BIOL 841 – Virology 3 credit hours**

An in-depth discussion of the principles of modern virology. Major topics of discussion will include: virus replication strategies, virus structure, virus infection and disease, and host resistance to disease. A course in genetics and a course in cell biology or biochemistry is strongly recommended. Offered online, Spring only.

**BIOL 842P – Wildlife and Fisheries Laws and Policies 3 credit hours**

Evolution of laws relating to fish and wildlife with a particular focus on major federal legislation, federal versus state jurisdiction, fishing and hunting rights, and other topics.

**BIOL 843 – Cell Structure and Function 3 credit hours**

This course will cover current topics in eukaryotic cell Biology including functions of the membrane, cell organelle functions, cell signaling, cell cycle, and cell movement. This course will also cover the involvement of specific cell organelles and cell functions in human diseases. Offered online, Spring of even-numbered years.

**BIOL 844 – Molecular Biotechnology 3 credit hours**

The course will consist of a short review of pertinent principles in protein structure and function, enzyme mechanisms and kinetics, and the basics of the genetic dogma and recombinant DNA technology. The bulk of the course will be made up of a topical consideration of subjects in biotechnology such as: the production of protein pharmaceuticals, genetic engineering of animals and plants, and cloning of organisms. Special consideration will be given to the molecular mechanisms behind the processes discussed. Offered online, Spring of odd-numbered years.

**BIOL 845 – Forensic Biology 3 credit hours**

This course studies biology and earth science by engaging in investigations of how scientific evidence is used to solve crimes. Students take on the roles of public safety professionals to identify, collect, preserve, test, and analyze physical evidence ranging from general considerations to the latest in molecular techniques. Students will review current literature, discuss case studies, and look at some mass market publications on crime scene investigation.

**BIOL 846 – Cancer Biology 3 credit hours**

This course is designed as a survey of the current state of knowledge in the cellular and molecular biology of cancer processes. The students will also review current literature in cancer biology by analyzing and critiquing current articles.

**BIOL 850P – Advanced Molecular Biology 4 credit hours**

The course is an in-depth discussion of the principles and techniques of modern molecular biology. Specifically, this course covers the central dogma processes (replication, transcription and translation) as they occur in both prokaryotic and eukaryotic organisms. Students will be exposed to a number of techniques including isolating DNA, RNA, and proteins, polymerase chain reaction, gel electrophoresis, genetic cloning, flow cytometry, ELISA, and immunoblotting. This course will emphasize design and interpretation of scientific experiments specific to molecular biology in coursework completed in lecture and lab. Students should have completed an advanced cell biology or genetics course prior to enrolling in this course.

Additional Course Fee Required

**BIOL 853 – Genome Evolution 3 credit hours**

This course is a survey of current research in genome evolution with an emphasis on understanding the unifying evolutionary principles. Topics include gene duplication, polyploidy, mobile elements and comparative genomics. Offered online on demand.

**BIOL 854 – Biological Application of GIS 3 credit hours**

This class introduces students to Geographical Information Systems (GIS) and associated concepts and technologies. The class curriculum includes an introduction to (and temporary license for) the ArcGIS GIS software package, cartographic principles, online GIS data sources, and the functioning of Global Positioning System (GPS). Particular attention will be paid to organizing GIS data into appropriate data structures and the completion of independent research projects. The independent projects have been found to be a crucial component for becoming familiar with much of the material covered in the class. No prior experience with GIS or GPS software or GPS receivers is expected. Offered online, Fall of odd-numbered years.

**BIOL 856P – Regional Field Study 1-4 credit hours**

This course is designed to introduce students to detailed biological studies of specific regions. Regions studied may vary depending upon instructor availability and student needs. Topics may include but are not limited to: Tropical and Marine Island Biology Natural History of Nebraska Natural History of the Southwest  
Total Credits Allowed: 6.00

**BIOL 857 – Human Histology 3 credit hours**

Histology is also called micro-anatomy. This course examines animal bodies on the tissue and cellular level. Most examples will be from the human anatomy. Basic tissue types will be studied as well as organ structure and function. As a distance class, microphotographs will be used (not glass slides) from the web, as well as from an assigned textbook. No prior experience with histology is expected. Offered online on demand.

**BIOL 858 – Physiology of Stress 3 credit hours**

An examination of how living organisms cope with short- and long-term exposure to extreme environmental conditions related to nutrient and water availability, temperature, and pressure. A basic understanding of organismal physiology is required.

**BIOL 859 – Biology of the Brain 3 credit hours**

This course will focus on the central nervous system (brain and spinal cord) and will include gross anatomical features and landmarks of the cerebral hemispheres, diencephalons, brainstem, cerebellum and spinal cord. Physiological aspects will include the generation and modification of action potentials as well as normal functions of the specific regions of the central nervous system. Selected abnormal functions will also be studied. The interdependency of the central nervous system to itself (various pathways between the spinal cord and within the brain) as well as to the peripheral nervous system and select organ systems will complete the focus of the course. It is recommended that students have taken anatomy and physiology before enrolling in this course. Offered online, Fall of even-numbered years.

**BIOL 860 – Concepts of Genetics 3 credit hours**

Application based course covering the classical and molecular principles of inheritance. Concepts covered include various historical concepts surrounding transmission, molecular, and population genetics, current state of the discipline, and the future outlook for the field. Students are required to demonstrate their knowledge and critical thinking skills through quizzes, tests, and writing assignments.  
Additional Course Fee Required

**BIOL 861P – Human Genetics 3 credit hours**

The course focuses on contemporary human genetics with emphasis on genetic diseases. A study of the genetic basis and frequency of genetic defects in man and genetic counseling.

**BIOL 862 – Animal Behavior 3 credit hours**

An introduction to the science of ethology. The course will examine behavior genetics, physiology of behavior, ecology of behavior, and the evolution of behavior.

**BIOL 862P – Animal Behavior 3 credit hours**

An introduction to the science of ethology. The course will examine behavior genetics, physiology of behavior, ecology of behavior, and the evolution of behavior. Three hours of laboratory each week.  
Additional Course Fee Required

**BIOL 863 – Biological Perspectives 3 credit hours**

A review of the major advances in biology from the ancients to the present, with emphasis on paradigm shifts and science as a human endeavor. Offered online, Summer only.

**BIOL 864 – Genetics in Popular Culture 3 credit hours**

Genetics is a field of study that is always changing. In addition, the findings from Genetic analyses are altering how the society views science. In the news and in TV infomercials, we are inundated with "Science has found the gene for this ailment!" or "Use this product to control your genes!" Films like 1997's Gattaca, or art and popular culture influence how we think of Genetics, each other, and ourselves. There are also new genetic technologies being rapidly developed. All of these events will influence how we think of society and likely shape future policy decisions. In this course, the basics of genetics, as well as the societal implications of genetics and genetic technologies will be discussed. The impact of film, literature, television, the news, and other sources of information, both fact and fiction will be discussed. Offered online, Summer of even-numbered years.

**BIOL 865P – Physiology 3 credit hours**

The structure and function of the systems of the vertebrate body. Three hours of laboratory each week. Offered on-campus, Spring only. Additional Course Fee Required

**BIOL 868L – Parasitology Laboratory 1 credit hour**

The basic concepts of parasitology with emphasis on the major types of medically and economically important parasites (protozoan, helminth and arthropods) will be covered, including life cycle, diagnosis, treatment, immunity, pathology, control, and ecology and evolution. Laboratory stresses identification of the various developmental stages of these parasites.

Prerequisite: BIOL 105 and BIOL 106.

Corequisite: BIOL 868P.

**BIOL 868P – Parasitology 2 credit hours**

The basic concepts of parasitology with emphasis on the major types of medically and economically important parasites (protozoan, helminth and arthropods) will be covered, including life cycle, diagnosis, treatment, immunity, pathology, control, and ecology and evolution.

Prerequisite: BIOL 105 and BIOL 106 or permission of instructor.

Corequisite: BIOL 868L.

Additional Course Fee Required

**BIOL 869 – Conservation of Birds and Mammals 3 credit hours**

Wildlife is defined as wild birds and wild mammals. It does not include other vertebrates (fish, amphibians, or reptiles), nor does it include invertebrate animals. This is a course about the Principles of Wildlife Conservation, and is not specifically about wildlife management, or even wildlife ecology. However, both these latter subjects will be examined briefly. Wildlife conservation usually involves as much if not more of the following disciplines than it involves biology: history, sociology, and politics. It is recommended that you have taken a course in ecology and statistics before enrolling in this course. Offered online on demand.

**BIOL 870 – Insect Biology 3 credit hours**

An introduction to insects and related arthropods. Emphasis is placed on morphology, physiology, taxonomy and ecology of insects. Offered online, Spring of even-numbered years.

**BIOL 870P – Insect Biology 3 credit hours**

An introduction to insects and related arthropods. Emphasis is placed on morphology, physiology, taxonomy and ecology of insects. Three hours of laboratory or field work each week. Offered on-campus, Spring of even-numbered years.

Additional Course Fee Required

**BIOL 871P – Methods in Secondary Science Teaching 3 credit hours**

An examination of current developments in curricula, methods, and materials. Laboratory time arranged. Offered on-campus, Fall only. Additional Course Fee Required

**BIOL 872P – Ichthyology 3 credit hours**

The study of fish with a focus on classification, anatomy, distribution, ecology, physiology and management of fishes. Three hours of laboratory or field work each week. Offered on-campus, Fall of odd-numbered years. Additional Course Fee Required

**BIOL 873P – Ornithology 3 credit hours**

An introduction to birds: emphasis on bird identification skills, behavior, classification, ecology, and physiology. Three hours of laboratory or field work each week. Offered on-campus, Spring of even-numbered years. Additional Course Fee Required

**BIOL 874P – Mammalogy 3 credit hours**

Introduction to mammals: ecology, classification, physiology, and behavior. Three-hour laboratory per week for preparation and identification of specimens. Offered on-campus, Fall of even-numbered years.

Additional Course Fee Required

**BIOL 875 – Internship in Biology 1-9 credit hours**

Internship is taken as part of the professional semester, and it emphasizes the professional development of the individual. Students may apply to participate in an internship to receive credit in their degree seeking programs. To sign up for internships, the internship must have clearly defined learning objectives, have an agreed upon number of contact hours which will coincide with the credit hours, and a letter of support from the internship supervisor. Students will be required to keep a weekly journal of their activities and will submit a written assignment at the end of the semester.

Total Credits Allowed: 9.00

**BIOL 876 – Natural Science Curriculum 3 credit hours**

For practicing science teachers. Emphasis on scientific literacy and the alignment of K-12 science curricula with state and national standards and benchmarks. Offered online on demand.

**BIOL 877 – Writing in the Sciences 2 credit hours**

Academic writing in the sciences can be a daunting solitary endeavor. It is the hope of this course to take away the fear of the blank page and help to engage the class with a sense of community that is inherently beneficial to the writing process. This course is particularly geared towards students who have been away from academic writing for many years, or perhaps decades. This will be an introduction into this type of writing, complete with an overview of the materials available to you as a distance student. The primary purpose of this course is to improve your written communications skills. We will focus on your ability to prepare and write technical papers in a professional scientific format. A crucial part of learning to write technical papers is reading them and practicing writing them yourself. Plan to spend at least several hours each week on reading, writing, and practicing the skills we cover in this course. Offered online, Fall of even-numbered years.

**BIOL 880 – Seminar in Graduate Studies 1 credit hour**

An in-depth discussion of current topics in biology. Students will give presentations of various kinds weekly. Some presentations will consist of the students reading peer-reviewed, published research papers followed by an oral presentation of their contents. Others will be designed to improve oral skills in communicating with non-scientific audiences. Student participants are expected to read all journal articles presented, whether they are presenting or not.

Total Credits Allowed: 3.00

**BIOL 881 – Current Issues in Biology 1 credit hour**

This course will expose the student to many different biological research topics, stimulate discussion on these topics, promote awareness of current issues in biology, help students critically analyze relevant and contemporary primary literature and ensure students are able to prepare appropriate presentations for scientific meetings. This course is repeatable for up to 3 credit hours. Offered online, every semester.  
Total Credits Allowed: 3.00

**BIOL 882 – Seminar in Molecular Biology 1 credit hour**

An in-depth discussion of current topics in molecular biology. Presentations will be given weekly by guest speakers, faculty and students. Seminar is designed to help students analyze, understand and present current research within the field of Science, enhance critical thinking through question and answer sessions, and develop the skill set, both verbal and written, needed to present research and/or data in future careers. Offered on-campus, every semester.  
Total Credits Allowed: 5.00

**BIOL 883 – Aquatic Trophic Ecology 3 credit hours**

This course was developed to provide a thorough examination of the interactions between abiotic and biotic components of freshwater ecosystems incorporating both theoretical and applied aspects of aquatic food web management. Major themes of the course will include nutrient cycling, trophic state and eutrophication, predation and food webs, and fisheries ecology. Selected scientific literature and text readings will stress professional differences of opinion during discussion of topics, which is intended to guide students toward an understanding that ecological principles rarely are simple and that current dogma can at times be incorrect or incomplete. Finally, this course is directed at improving student communication (written and electronic information/technology based) and critical thinking skills. Offered online, Spring of even-numbered years.

**BIOL 884 – Freshwater Management Techniques 3 credit hours**

Through videotaped lectures, reading and writing assignments, and on-line discussions, students will be introduced to both freshwater ecosystems and fishery management. Students will learn to analyze freshwater management problems using multiple techniques, to suggest alternative approaches, and to identify consequences of those approaches. Offered online, Fall of even-numbered years.

**BIOL 885P – Molecular Genetics 3 credit hours**

An in-depth study of gene structure and replication in prokaryotes and eukaryotes. Gene function in developing and differentiated cells will also be studied in detail.

**BIOL 886 – Sexual Selection 1 credit hour**

Small group discussions will be used to discuss readings on the role of sexual selection in evolution. Offered online, Spring of odd-numbered years.

**BIOL 887 – Fisheries Ecology 3 credit hours**

This course was developed to provide a thorough examination of both theoretical and applied aspects of fisheries ecology. Major themes of the course will include individual ecology (feeding, growth, and reproduction), population ecology, and community ecology (predation and competition). Students will explore examples of research and current knowledge in each of these topic areas using instructor-assigned and student-selected readings, discussions, and a review on a selected species. Finally, this course is directed at improving student communication (written and electronic information/technology based) and critical thinking skills.

**BIOL 896 – Thesis 1-6 credit hours**

Offered on-campus, every semester.  
Total Credits Allowed: 6.00