



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 101 Biology for Life (4)

This course is intended for the non-science major. The principal objectives are to prepare students to be scientifically literate citizens and to connect biological principles to real-world problems. This includes the effect of biotechnology on society as well as environmental issues such as climate change and habitat destruction. This course meets for three hours of lecture per week and one three-hour laboratory per week. A student must pass the laboratory portion of any science course to pass the entire course. IAI-L1900/L1900L.

Student Learning Outcomes

Students will:

1. Distinguish science from other disciplines
2. Apply the process of scientific inquiry (general education assessed)
3. Accurately communicate scientific theories, concepts, & terminology
4. Discriminate between scientific & societal controversy
5. Interpret the validity of science in the news (general education assessed)

Course Topics

1. The scientific method
2. Cell reproduction
3. Meiosis, inheritance, and Mendelian genetics
4. DNA structure and function
5. Biotechnology
6. Natural selection
7. Diversity of Life
8. Disease ecology, viruses
9. Climate change
10. Human population growth



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 101L Biology for Life Lab (0)

Student Learning Outcomes

Students will:

1. Understand of the process of scientific inquiry in biology;
2. Use standard scientific laboratory techniques and to follow lab protocols and proper lab etiquette;
3. Develop an increased ability to work with others toward shared goals;
4. Form independent hypotheses and design experiments that test these hypotheses;
5. Analyze, interpret, and graphically present data.
6. Communicate data and interpretation in writing to a scientific audience

Course Topics

1. Microscopy
2. Mitosis and meiosis
3. Mendelian genetics
4. Forensics
5. UV Radiation Damage and repair
6. Evolutionary mechanisms
7. Evolution
8. Population growth
9. Climate change
10. Scientific method
11. Community ecology



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 108 Biology Cornerstone (1)

This course serves as an introduction to the biology program and the field of biology. The class will focus on strategies for success both in the program and after graduation, highlighting the various subfields of biology, career opportunities, graduate and professional school preparation, skills for critical reading of the primary literature, and communicating scientifically.

Student Learning Outcomes

Students will:

1. Describe the requirements and objectives of the biology major
2. Identify and compare several study and note-taking strategies
3. Differentiate between the different biology programs
4. Describe the subfields of biology and biology careers
5. Have a list of personalized internship opportunities
6. Create a resume
7. Have the skills to locate relevant primary literature
8. Read and summarize general ideas and conclusions from biology journal articles
9. Write using scientific style and use appropriate citation style
10. Deliver oral presentations that are professional, organized, and clear

Course Topics

1. Subfields in Biology
2. Note-taking and Test Preparation
3. Program Planning; path to graduation
4. Resume, careers, internships
5. Locating and citing sources
6. Reading and Summarizing sources
7. Communication: Written and Oral



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 110 Principles of Cellular and Molecular Biology (5)

This course is an introductory biology course for biology majors that emphasizes basic principles of cellular and molecular biology including the biochemical basis of life, cellular structure and function, metabolism, and genetics. The course meets for three hours of lecture per week and one three-hour laboratory per week. Prerequisite: One year of high school biology or instructor consent. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Understand and apply the scientific process through hypothesis generation, controlled experimentation, and critical evaluation of scientific information.
2. Access, utilize, and properly cite published scientific literature.
3. Demonstrate knowledge of biological principles of:
 - a. cellular biology (including cell composition, structure, and function)
 - b. information flow within cells
 - c. cellular metabolism
 - d. genetics

Course Topics

1. Scientific Method
2. Biomolecules and chemical bonds
3. Types of and characteristics of cells
4. Functions of cells and organelles
5. Cellular metabolism: respiration and photosynthesis
6. Gene expression
7. DNA replication and mitosis
8. Meiosis and inheritance
9. Biotechnology



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 110L Principles of Cellular and Molecular Biology Lab (0)

Student Learning Outcomes

Students will:

1. Understand the process of scientific inquiry in biology
2. Use standard scientific laboratory techniques and to follow lab protocols and proper lab etiquette;
3. Develop an increased ability to work with others toward shared goals;
4. Interpret and critique scientific writing in peer-reviewed journal articles;
5. Analyze, interpret, and graphically present data.

Course Topics

1. Data collection and Graphical Representation
2. Data analysis and Interpreting Results
3. Macromolecules
4. Microscopes / cells
5. Osmosis and Diffusion
6. Enzymes and Metabolism
7. Respiration
8. Photosynthesis
9. Cellular Division
10. Genetics
11. Mutation
12. UV damage and Repair
13. DNA Analysis



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 111 Principles of Organismal and Population Biology (5)

This course is an introductory biology course for biology majors which emphasizes basic principles of organismal and population biology including animal and plant structure and function, evolutionary principles and mechanisms, the diversity of life, and ecology. This course meets for three hours of lecture per week and one three-hour laboratory period per week. Prerequisite: 1 year of high school biology or instructor consent. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Demonstrate proficiency in a) technology to create figures and organize data and b) basic scientific skills such as microscopy, dichotomous keys, and dissection.
2. Practice the process of scientific inquiry in biology. Specifically, a) develop hypotheses, b) design experiments, c) collect informative data, and d) statistically analyze data.
3. Demonstrate proficiency in terminology for biological principles in the areas of evolution, taxonomy & systematics, ecology, and the diversity of life.

Course Topics

1. Introduction to Evolution
2. Population Genetics
3. Origin of Species and Macroevolution
4. Taxonomy and Systematics
5. Bacteria
6. Protists
7. Archaea
8. Fungi
9. Plant Diversity
10. Plant Reproduction
11. Diversification of Animals
12. Invertebrates
13. Vertebrates
14. Introduction to Ecology
15. Behavioral Ecology
16. Population Ecology
17. Species Interactions
18. Community Ecology
19. Ecosystems
20. Climate Change
21. Biodiversity and Conservation



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 111L Principles of Organismal and Population Biology Lab (0)

Student Learning Outcomes

Students will:

1. Understand of the process of scientific inquiry in biology;
2. Utilize standard scientific laboratory techniques and to follow lab protocols and proper lab etiquette;
3. Develop an increased ability to work with others toward shared goals;
4. Form independent hypotheses and design experiments that test these hypotheses;
5. Analyze, interpret, and graphically present data.
6. Communicate data and interpretation in writing to a scientific audience

Course Topics

1. Scientific Method
2. Evolutionary Mechanisms
3. Evolution
4. Sexual Selection
5. Taxonomy and Systematics
6. Plants
7. Animals
8. Animal Behavior
9. Population Growth
10. Community Ecology
11. Microcommunities
12. Climate Change



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 202 Scientific Communication (W) (2)

Scientists are responsible for not only generating data, but for communicating data both to other scientists and the general population. As the communication process within the sciences is in many ways different from that found in other subject areas, this course will provide students with the background needed to master those skills. Major areas of skill development include the composition of formal manuscripts and review articles, the development of figures and tables that summarize and effectively communicate findings, and the spoken presentation of original data sets to an audience. Prerequisite: Biology, biopsychology, or environmental studies major.

Student Learning Outcomes

Students will:

1. Understand the key ways in which scientific writing differs from writing in other contexts
2. Synthesize primary literature sources into a review essay that demonstrates knowledge of the topic being discussed
3. Demonstrate the ability to write a formal lab report, based on data collected in a lab setting
4. Learn methods for putting together a quality scientific presentation, both in terms of delivery and visual aids (slides, posters, etc.)
5. Provide constructive criticism to classmates, which will both improve their classmates' work and also provide insights into how to improve their own

Course Topics

1. Finding quality sources
2. Structuring and writing an essay
3. Structuring and writing a lab report
4. Organizing a presentation



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 250 Introduction to Environmental Science (3)

This course introduces the interrelationships among the natural environment, humans, and the human environment. The focus is on building a scientific framework to understand current environmental challenges while incorporating an understanding of interdisciplinary perspectives when considering potential solutions. Students will examine issues such as air and water pollution, global climate change, energy, agriculture, and biodiversity loss.

Student Learning Outcomes

Students will:

1. Apply the principles in environmental science to real-world situations such as whether or not to support environmental initiatives, how to best preserve biodiversity, and how to feed the world without destroying the environment.
2. Model the process whereby researchers test a scientific claim, including composing a valid scientific argument.
3. Accurately Integrate ideas and communicate your understanding about biology with others in a format which: is adapted to particular circumstances and audiences; addresses issues in the context of the larger community and environment; and allows for application of societal ethics to scientific inquiry and findings.
4. Interpret the validity of science in the news
5. Identify and evaluate valid sources of scientific information. Discern and analyze the information to make everyday decisions.
6. Learn about themselves and learn to work effectively with others in a group and develop and cultivate an interest in current science issues.

Course Topics

1. Understanding our environment
2. Evolution, species interactions, and biological communities
3. Biomes and biodiversity
4. Environmental conservation
5. Human populations
6. Economics and urbanization
7. Food and agriculture
8. Water resources and pollution
9. Climate
10. Energy
11. Solid and hazardous waste



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 303 Ecology (5)

Ecology is a quantitative science that focuses on the diverse interactions between organisms and their biotic and abiotic environment. This course examines factors that control energy and nutrient cycling in ecosystems, population dynamics of organisms, and the structure and function of biological communities, as well as principles that govern ecological responses to anthropogenic changes such as global climate change and habitat fragmentation. The class meets for three hours of lecture per week and one three-hour laboratory period per week. This course satisfies the ecology/evolution elective area for students pursuing a Bachelor of Arts in Biology. Prerequisites: BIO 111, 300, and C- or better in BIO 111, or instructor consent. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Understand principles of ecological relationships between organisms and their environments
2. Appreciate that ecology is a quantitative science
3. Utilize basic mathematical models in ecology
4. Describe and implement the process of scientific inquiry
5. Interpret data presented in figures, and determine how the data supports or counters known ecological theory

Course Topics

1. The Scientific Method
2. Ecosystem Ecology
3. Life History
4. Population Growth
5. Invasive Species
6. How Disease Spreads
7. Competition
8. Predation, Herbivory, Parasitism
9. Keystone Predators
10. Community Dynamics
11. Biogeography



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 303L Ecology Lab (0)

Student Learning Outcomes

Students will:

1. Formulate testable hypotheses in ecology that are relevant and important
2. Develop rationale for hypotheses from previous published research
3. Make decisions about what data is needed to address hypotheses
4. Apply quantitative skills to analyze data
5. Apply critical thinking to interpret and report statistical results using analysis and figures
6. Apply critical thinking to integrate results within the context of ecological principles & literature
7. Communicate results both orally and in scientific writing
8. Manage the collaborative environment that is science
9. Identify personal strengths and weaknesses and practice providing constructive feedback and criticisms
10. Have fun with dirt and bugs

Course Topics

1. Field work
2. Literature review
3. Research proposal
4. Data collection
5. Writing and revisions
6. Peer Review
7. Posters
8. Presentations



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 308 and BIO 308L Human Anatomy and Physiology I and Lab (5)

This course provides an in-depth study of the muscular, skeletal, nervous, endocrine, and reproductive systems. For each organ system, anatomy, physiology, and role within the whole organism are discussed concurrently. Gross anatomy is explored in lab utilizing dissections and/or models; characteristics of tissues and cells is investigated with microscopy. Function of each organ system is investigated in lab by physiological observation and experimentation. This course satisfies the organismal elective area. This course meets for three hours of lecture per week and two two-hour laboratory periods per week. Prerequisite: BIO 101 or 110. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Identify the anatomy of a cell, including biomolecules composing each organelle
2. Describe how the cell produces each biomolecule
3. Describe how molecules enter and exit cells
4. Identify anatomical differences among tissue types
5. Identify and label features for each body system covered
6. Describe functions of each feature for each body system covered
7. Predict how changes in the structures (due to disease or other damage) would affect function for each body system covered

Course Topics

1. Review of cell biology
2. Histology
3. Integumentary System
4. Skeletal systems
5. Endocrine system
6. Nervous system
7. Muscular system
8. Reproductive system



MCKENDREE UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 309 AND BIO 309L Human Anatomy and Physiology II and Lab (5)

This course provides an in-depth study of the cardiovascular, respiratory, immune, digestive, and urinary systems. For each organ system, anatomy, physiology, and role within the whole organism are discussed concurrently. Gross anatomy is explored in lab utilizing dissections and/or models; characteristics of tissues and cells is investigated with microscopy. Function of each organ system is explored in lab by physiological observation and experimentation. This course satisfies the organismal elective area. This course meets for three hours of lecture per week and two two-hour laboratory periods per week. Prerequisite: BIO 101 or 110. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Identify the anatomy of a cell, including biomolecules composing each organelle
2. Describe how the cell produces each biomolecule
3. Describe how molecules enter and exit cells
4. Identify anatomical differences among tissue types
5. Identify and label features for each body system covered
6. Describe functions of each feature for each body system covered
7. Predict how changes in the structures (due to disease or other damage) would affect function for each body system covered

Course Topics

1. Review of cell biology
2. Histology
3. Respiratory System
4. Digestive systems
5. Urinary system
6. Cardiovascular system
7. Lymphatic system



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 325 and 325L Field Botany and Lab (4)

This is a field-oriented course that surveys local vascular flora and habitats. Field exploration focuses on identification and techniques, with emphasis given to the taxonomy, ecology, evolution, and systematics of native and naturalized plants. This course meets for two three-hour periods per week that will be divided between lecture and laboratory work. This course satisfies either the organismal or ecology/evolution elective area. Prerequisite: BIO 111 or instructor consent. A student must pass the laboratory portion of any science course to pass the entire course.

Student Learning Outcomes

Students will:

1. Gain familiarity with local habitat communities, including prairies and forests;
2. Identify environmental attributes of such communities;
3. Predict how such environmental variables impact plant distribution and success;
4. Identify local flora by family;
5. Identify common local flora to genus and species;
6. Successfully utilize both dichotomous keys and field guides for floral identification;
7. Demonstrate skills in floral collection and preservation;
8. Identify the importance of plants in the environment and in society;
9. Demonstrate an ability to work with others toward shared goals.

Course Topics

1. Plant Nomenclature
2. Plant Identification
3. Plant Reproduction
4. Common Families
5. Habitat Types



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 340 Developmental Biology (3)

This course focuses on the fundamental events of embryonic development, with an emphasis on genetic and molecular approaches used in modern experimental embryology. As modern developmental biology employs information and techniques from many different fields of biology, this course provides the challenge of learning and integrating diverse topics in biology including cell biology, genetics, molecular biology, biochemistry, and evolution. We explore the common features of development that are shared by different kinds of organisms and emphasize how diverse organisms use the same signaling and regulatory molecules during embryogenesis. This course meets for three hours of lecture per week. This course satisfies either the ecology/evolution or cell/molecular elective area. Prerequisites: BIO 110, 211, CHE 105, 106, or instructor consent.

Student Learning Outcomes

Students will:

1. Describe how cellular signaling affects differentiation of cell types and cellular mobility.
2. Identify model organisms and explain experimental techniques used to study development in each of these.
3. Describe similarities and differences in the major stages of development among classes of organisms.
4. Access, read, and interpret primary journal articles in developmental biology.
5. Suggest mechanisms behind observations in developmental biology. Students will be able to write hypotheses to explain a mechanism behind observations in developmental biology and write methods for testing these hypothesis.
6. Evaluate the validity of conclusions derived from experimental results.

Course Topics

1. History of developmental theory
2. Comparison across species at cleavage and gastrulation
3. Cell specification, fate maps, and differential gene expression
4. Morphogenesis and cell to cell communication
5. Stem Cells
6. Model organisms
7. Reading in current literature; experimental methods with model organisms
8. Neurulation
9. Somitogenesis



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 455 Biology Research Methods (2)

This is the capstone course in biology. It will provide an overview of topics important to biological research and allow students to apply information they have learned throughout the biology curriculum in a research setting. This course focuses on critical analysis of primary literature and data, as well as scientific communication in the form of both writing and presentations. Prerequisites: Biology major and senior standing, or instructor consent.

Student Learning Outcomes

Students will:

1. Integrate biological knowledge through the application of the scientific method, including successful execution of
 - a. Literature analysis
 - b. Data analysis: interpretation, analysis and presentation of data
 - c. Collaboration with scientific peers
 - d. Oral communication to broader communities
 - e. Written communication

Course Topics

1. Finding and summarizing the literature
2. Reviewing a sub-topic; writing and presenting
3. Developing 3 proposal aims with methods
4. Predicting results
5. Writing and defending a proposal



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 470 Internship in Biology (3-8)

No more than four hours of internship may be counted toward a major in biology.

Student Learning Outcomes

Students will:

1. Demonstrate knowledge and comprehension of theory, concepts, and/or skills through practical application within a professional setting.
2. Analyze, synthesize, and evaluate current best practices within a professional setting.
3. Analyze, synthesize, and evaluate their experience within a professional setting.
4. Uphold the highest level of professionalism (i.e. attendance, behavior, dress, etc.) within a professional setting.
5. Develop professional and interpersonal relationships with co-workers and supervisors.
6. Develop knowledge about the professional area

Course Topics

1. Journal Logs
2. Research connections
3. Supervisor Evaluations
4. Student reflection and discussion of evaluation
5. Summary essay



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 480 Independent Study (1-4)

Student Learning Outcomes

Students will:

1. Locate and use information from published studies to build a novel question
2. Design experiments with appropriate controls to address a specific question
3. Keep a log of activities within the laboratory
4. Collect data and organize data into tables
5. Represent data with appropriate figures
6. Use data to defend a conclusion



MCKENDREE
UNIVERSITY

The mission of McKendree University is to provide a high-quality educational experience to outstanding students.

~Responsible Citizenship ~Engagement ~Academic Excellence ~Lifelong Learning~

BIO 492 Biopsychology Capstone (1)

This course is the capstone experience for biopsychology majors. The goals are to provide students the opportunity to learn about biopsychology topics and engage with current research in the field. An emphasis will be placed on field trips and guest speakers to allow for greater lifelong learning. Same as PSY 492. Prerequisite: PSY 275.

Student Learning Outcomes

Students will:

1. Demonstrate fundamental knowledge of the career tracks in Biopsychology. Discipline-Specific Competence.
2. Know the biological, cognitive, and behavioral signatures underlying common disorders and diseases.
3. Understand and appreciate individual differences in human biology, cognition, and behavior. Diverse Perspectives.
4. Develop written, oral, and interpersonal communication skills through class assignments. Effective Communication.
5. Learn the skills needed to become desirable job and graduate school candidates. Lifelong Learning.
6. Learn and abide by the ethical standards central to biopsychological professions. Personal and Social Responsibility.
7. Develop the professional skills needed for success after graduation. Professional Development.

Course Topics

1. Group collaboration and presentation
2. Parts of a primary journal article
3. Interpreting and communicating scientific findings
4. Current topics in the field