

Denver Zoo

AIP Web+ Course Descriptions

Title: Foundations of Inquiry

BIO 654

Credits: 3

Term: 1st summer

REQUIRED

This course engages students in exploring the foundations of inquiry-based teaching and learning while students gain a new familiarity with Advanced Inquiry Program (AIP) Master Institution (MI) facilities as informal science education settings. Through making observations on zoo grounds, developing comparative questions, devising investigations to answer those questions and communicating results, participants will experience the full process of inquiry and will learn how to guide this process with their own students and in their own communities. This type of first-hand, experiential learning encourages independent and critical thinking, increasing communities' awareness and concern for the local environment and its inhabitants. We will engage in activities that demonstrate the applications of inquiry in the classroom, on zoo grounds, in the schoolyard and other settings. We will discuss case studies that illustrate the use of inquiry to improve student learning and engage students as leaders in their communities. Through this course, students will develop the investigation, critical reflection, and collaboration skills needed to lead inquiry-driven learning for diverse communities. They will learn to develop a comparative question, design an inquiry-driven scientific study, and develop their skills in scientific writing and research. Students will come away with information and techniques for applying inquiry in classroom and informal education settings, developing inquiry skills and assessing inquiry-based learning that they can use in their own communities. *This is a Miami University online course with experiential learning on-site at a Dragonfly Advanced Inquiry Program (AIP) Master Institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Construct an understanding of the nature of science, and investigate models of inquiry in the life sciences.
- Assess and interpret existing research projects in the life sciences, e.g., on the structure, function, behavior and evolution of plants and animals.
- Create and conduct their own field research projects by selecting research questions, making predictions, designing methodologies, exploring experimental design to take measurements/employing data collection strategies and analyze data to arrive at new understandings of their research topics; connect results to benefits to human and ecological communities

- Engage in and design inquiry projects as a tool for participatory learning
- Assess methods for evaluation when using inquiry-based approaches
- Become familiar with Miami University's Institutional Review Board (IRB) and the Institutional Animal Care and Use Committee (IACUC); complete CITI ethical research training prior to gathering data about humans, and complete AALAS ethical research training prior to gathering data about vertebrate animals
- Employ community resources, including the AIP Master Institution environment, to create connections and use the network as a learning resource.
- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Human Dimensions of Conservation

BIO 623C

Credits: 3

Term: 1st Fall

REQUIRED

Conserving wildlife is a complex endeavor that requires the integration of sound science from both the social and natural sciences. This course will explore how the social sciences can inform conservation. A growing field of study that draws from several of the social sciences is human dimensions of wildlife. This course will examine how human dimensions emerged as a field of scientific inquiry and why it is important. It will provide an overview of the social science concepts and methods that are the foundation of human dimensions. Students will consider how current conservation issues can be addressed through an understanding of human thought and action. Students will use the human dimensions approach to address a current conservation issue and by the conclusion of the course, they will be able to identify tools, frameworks, and concepts that can be used to influence human behavior to effectively conserve wildlife. *This is a Miami University online course with experiential learning on-site at an affiliated Dragonfly Advanced Inquiry Program (AIP) institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will be able to:

- Critically consider and discuss how human dimensions issues contribute to and influence wildlife conservation.
- Apply social science concepts and theories to wildlife conservation.
- Analyze natural resource issues from varying stakeholder perspectives and produce "stakeholder analyses."
- Design a human dimensions study that integrates methodologies and partnerships, and provide evidence to support how their design can inform management decisions.
- Build community partnerships and shared, placed-based educational materials.

- Engage in reflective and evaluative peer review to convey knowledge, analyses, new perspectives, and ideas for useful applications.

Title: Master Plan in Action

BIO 655

Credits: 3

Term: 1st Spring

REQUIRED

The AIP Master Plan (MP) represents a student's ideas and areas of interest as those ideas relate to the student's professional and community goals. By writing a Master Plan, students are able to focus their AIP journey and visualize the actions and steps that they might take toward completing their master's degree during the 2.5- to 5-year timeframe. During this course with guidance and input from peers and the AIP Cohort advisor, students work on completing their Master Plans. This method ensures that students have a workable plan that helps them anticipate ways to incorporate the projects they create as part of their AIP experiences into their professional and life goals. Students will also think about the common threads and program tenets among the projects in this cohesive body of work, which ultimately becomes their final master's portfolio due as the culminating experience at the end of their degree. *This is a Miami University online course with experiential learning on-site at a Dragonfly Advanced Inquiry Program (AIP) Master Institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Develop, expand and revise a focused research plan or social action strategy that includes a timeline for conducting anticipated projects
- Design Master Plan to ensure community engagement is well represented in a student's selected projects; projects use established methodologies including participatory action research (PAR), inquiry, and participatory education
- Examine, critique, and apply research methodologies, including investigating experimental design and data analysis, from published studies
- If not already accomplished, prepare and submit a research proposal to Miami University's Institutional Review Board (IRB) and/or the Institutional Animal Care and Use Committee (IACUC); research will occur in the semester(s) following approval
- Evaluate colleagues' Master Plans and project work, including conducting critical peer review, and respond to individual and peer discussion about their own Master Plans
- Employ community resources, including the AIP Master Institution environment, and outreach to create connections, build community partnerships and use the network as a learning resource to increase the effectiveness of the Master Plan.

- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Regional Ecology: Rocky Mountain Field Investigations

BIO 657

Credits: 3

Term: Offered Every Summer

Through both zoo-based and field-based experiences, this course explores regional wildlife conservation issues, as well as field investigation techniques that scientists and citizens can use to study and conserve local ecoregions and wildlife. Students will be exposed to observational and experimental approaches and will practice field investigation techniques that can provide rigorous, engaging inquiry experiences for students. Student-conducted investigations will be used to contribute to local ecological knowledge by describing natural systems, noting differences in habitats, and identifying environmental trends and issues. This course focuses on different ecoregions in the area and highlights different conservation issues or themes based on that ecoregion. *This is a Miami University online course with experiential learning on-site at a Dragonfly Advanced Inquiry Program (AIP) Master Institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Design and compare field investigations, including steps of the experimental design process: essential question(s), formal hypotheses/predictions (for comparative and correlative studies), data collection tools and materials, collecting and organizing data, analyzing data, presenting conclusions and discussing results.
- Develop, conduct, and analyze results from an original ecological field study
- Identify strengths and weaknesses of common field methods employed in wildlife research and conservation (e.g., vegetation sampling, insect sampling, transect/quadrat surveys, point count methods for birds, etc.).
- Discuss problems and argue solutions in conservation biology with a focus on local/regional issues; investigate regional wildlife and their biomes on zoo grounds
- Evaluate ways to increase public participation and understanding of regional ecological studies and conservation issues (e.g., citizen science initiatives).
- Collaborate on how to best use common outdoor and other non-traditional education venues (schoolyards, parks and other natural areas) for interdisciplinary, inquiry-based teaching of ecology.
- Become familiar with the Institutional Review Board (IRB) and/or the Institutional Animal Care and Use Committee (IACUC); when appropriate, receive ethical research training from one or both boards prior to gathering data about humans or vertebrate animals.
- Employ community resources, including the AIP Master Institution environment, and outreach to create connections and use the network as a learning resource.

- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Environmental Stewardship in my Community: Engaging Communities in Conservation Solutions

BIO 656

Credits: 3

Term: Offered Rotating Summers

Students in this course investigate environmental stewardship, research science and conservation opportunities and solutions in their local communities, practice inquiry-based learning, develop a conservation project to be used in their classroom or community, and reflect on ecological and carbon footprints. At the end of this course, students will have a solid understanding of community-based conservation, with a particular emphasis issues within their own communities. Students will also explore and begin to design stewardship strategies for empowering others to generate solutions and take action. *This is a Miami University online course with experiential learning on-site at a Dragonfly Advanced Inquiry Program (AIP) Master Institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Organize inquiry projects that drive learning in science and integrated topics.
- Interpret the life sciences through conservation issues and current research being conducted in local communities to understand causes and impacts; critically analyze solutions to these issues.
- Explore and apply the principles of sustainability and community-based conservation.
- Design strategies for engaging students or community members in local conservation action.
- Assess human demand on the planet's ecosystems by exploring ecological and carbon footprints, and formulate ideas for increasing and supporting sustainability within their own communities
- Employ community resources, including the AIP Master Institution environment, and outreach to create connections and use the network as a learning resource.
- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Environmental and Informal Science Education

BIO 625

Credits: 3

Term: Offered Rotating Summers

Participants will explore strategies in Informal Science Education (ISE) and Environmental and Sustainability Education (ESE) programs that not only achieve educational goals but also result in positive environmental impacts. This course will include practical applications and hands-on approaches for conducting ISE and ESE with a wide range of audiences. Participants will explore current and recent historical environmental education research and will create an analytic review of literature related to an area of interest they identify. Putting their new knowledge to work, participants will complete an action research project and measure the impact of the project on their audience. This is a Miami University online course with experiential learning on-site at an affiliated Dragonfly Advanced Inquiry Program (AIP) institution.

Student Learning Outcomes:

- Examine the history of and evaluate the current body of research on Environmental and Sustainability Education and Informal Science Education as national efforts and fields of study (EPA/NEEA, CAISE, NSF, etc.);
- Research an environmental or sustainability education topic of interest using clear, bounded search parameters and create an analytic review synthesizing the research for a general academic audience;
- Compare the value and use of inquiry in a variety of outdoor and other informal science learning settings (e.g. zoos, aquariums, museums, science centers, out-of-school programs, film and broadcast media, cyber-learning and gaming)
- Choose an audience, and create multiple strategies to engage that audience in a local and/or global conservation action;
- Employ community resources, including the AIP Master Institution environment, and outreach to create connections, build community partnerships and use the network as a learning resource
- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Ecophysiology (Biomimicry)

BIO 658A

Credits: 3

Term: Offered Rotating Falls

Students in this course will explore the ways in which humans can (and do) emulate systems and designs found in nature to create materials, medicines, social systems, computers and so much more. Students will fine tune their observation skills and complete a design challenge using nature as their guide. Through this course, students will develop their observation and collaboration skills and will acquire research experience in the life sciences on such topics as the principles of ecophysiology, form and function of organismal

adaptations, phenotypic and behavioral plasticity, and maintenance of homeostasis. Students will think critically and scientifically about the ways in which nature can benefit humankind through technological inspiration and solutions to environmental problems. Students will apply what they have learned as they develop curricula and create design challenges for professional use. *This is a Miami University online course with experiential learning on-site at a Dragonfly Advanced Inquiry Program (AIP) Master Institution.*

Course Themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Acquire research experience in the Life Sciences, e.g., on the principles of ecophysiology, form and function of organismal adaptations, phenotypic and behavioral plasticity, maintenance of homeostasis, and more.
- Investigate how organisms respond to abiotic variables such as temperature, sunlight, altitude, water depth, and salinity.
- Think critically and scientifically about the ways in which nature can benefit humankind through technological inspiration and solutions to environmental problems.
- Develop curricular or other learning resources for professional use
- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Animal Behavior and Conservation

BIO 622

Credits: 3

Term: Offered Rotating Falls

This course provides a foundation for understanding ethological research methods that can be applied to promote animal welfare and wildlife conservation. The course involves a community -based research project and direct observation of diverse animal species in a variety of settings such as zoos, botanical gardens, parks, and more. This course occurs in Dragonfly's web-based learning community.

Course themes and Student Learning Outcomes (SLOs)

Students in this course will:

- Summarize and interpret animal behaviors including communication, territoriality, sociality, fixed action patterns vs. learned /imprinted behaviors, parental favoritism, siblicide/infanticide, mating, hunting, and more.

- Discuss how ethology contributes to animal health in captive and wild environments.
- Design, conduct, and engage the local community in an investigation related to course themes.
- Engage in reflective and evaluative peer review to provide colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.

Title: Climate Change

BIO 638

Credits: 3

Term: Offered Rotating Falls

Global warming is irrevocably altering our polar ice caps, our oceans, our forests, and the world's plant and animal life. In this course, participants study the science of climate change, the diverse causes of climate change, and the impact of climate change at local, regional, and global scales. Topics include global warming's effect on weather and climate, ice caps, deforestation, and species conservation. Because the public plays a central role in how the world responds to climate change, students also investigate the factors that guide public perception, ranging from media to social interaction. Students explore the effect of climate change specific to the biology of their local region and consider what actions they and their communities can take locally. Through project assignments and research, at the end of this course participants not only have a solid understanding of current issues surrounding climate change but will also have considered and developed strategies for taking action. This is a Miami University online course with experiential learning on-site at an affiliated Dragonfly Advanced Inquiry Program (AIP) institution.

Course themes and Student Learning Outcomes (SLO)

Students in this course will:

- Engage with each other and with experts in the field to investigate and interpret global climate change issues.
- Critically analyze primary research on the causes, impacts, and proposed solutions to climate change.
- Evaluate methods by which public perception is formed and consider and critique the polling process, including national and international media and social interaction.
- Gain an understanding of climate change and global warming as a field of study locally and assess how to apply the tools of conservation science in their own communities.
- Become more proficient employing local resources, including the AIP Master Institution environment, exhibits, and community partnerships, to increase public engagement in climate change issues.

- Engage in reflective and evaluative peer review in face-to-face environments and on the web to provide 4 colleagues with personal insight, new perspectives or analyses, ideas for useful applications, and connections to other research and projects.
Environmental and Informal Science Education – BIO 625 Summer – 3 credits,
Letter Grad

Title: Graduate Research: Book Discussion
TBD

Title: Graduate Research: Internship
BIO 620
Credits:1-4; maximum 10
Term: Offered Every semester

Special problems in the biological sciences. Individual course descriptions and SLOs vary
(this is a Pass/Fail course)

Title: Independent Study
BIO 667W
Credits:1-4; maximum 10
Term: Offered Every semester