



## Advanced Inquiry Program – Web+ Course and Core Course Descriptions

35 graduate semester credits total

**21 credits in Web+ courses** (web-based instruction from Miami University combined with experiential learning at Woodland Park Zoo or in the Community)

- 11 of those credits are required courses, 10 are elective credits
- 7 of those elective credits can be earned through an approved Earth Expedition

**14 credits in AIP core courses** (web-based instruction from Miami University)

Web + Courses are listed during the semester they are offered; Core Course Descriptions can be found on the last page

**Web + Course notes:** Please note that *Foundations of Inquiry* should be taken your first summer, *Master Plan in Action* your second summer but no later than your third summer, and *Engaging Communities in Conservation Solutions* should be taken after completing Master Plan in Action.

### SUMMER COURSES – WOODLAND PARK ZOO Web+ Courses

#### **Foundations of Inquiry (BIO 654)**

**3 credits (required course); Letter Grade; Required as first Web+ course in AIP**

**(We strongly encourage you to take this course before any Miami University Online Core Course)**

Foundations of Inquiry engages participants in exploring the foundations of inquiry-based teaching and learning while gaining a new familiarity with Woodland Park Zoo as an informal science education setting. 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 open inquiry and will learn how to guide this process with their audiences. This type of first-hand, experiential learning encourages independent and critical thinking, increasing 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 outdoor settings. We will discuss case studies that illustrate the use of inquiry to improve science learning and engage students/citizens as leaders in their communities. Through this course, participants 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. Participants will come away with information and techniques for applying inquiry in classroom and informal education settings, developing inquiry skills in their audiences and assessing inquiry-based learning.

#### **Course Themes and Student Learning Outcomes:**

Participants 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 research projects by selecting research questions, making predictions, designing methodologies, exploring experimental design for data collection strategies and analyzing data to arrive at new understandings of 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 Woodland Park Zoo, 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.

### **Master Plan in Action (BIO 655)**

**2 credits (required course); Letter Grade; Foundations of Inquiry is a pre-requisite to take this course; should be taken in the second summer and required by the 3<sup>rd</sup> summer; should be taken before ECCS**

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.

Some questions we will explore in this course:

- What do you want to accomplish by the end of the AIP degree program?
- What is the focus of your Master Plan (inquiry-driven interpretation, public engagement, schoolyard ecology, community-based learning, land use, animal behavior and conservation, etc.)? Does your focus include a specific setting or audience (school, district, informal setting, state government, urban ecosystems, local businesses, at-risk youth, etc.)?
- How do you plan to build on your zoo experiences, inquiry skills, community skills, and content knowledge to make changes in local and global contexts?

### **Course Themes and Student Learning Outcomes**

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, inquiry, and participatory education
- Examine, critique, and apply research methodologies, including investigating experimental design and data analysis, from published studies
- Evaluate colleagues' Master Plans and project work, including conducting critical peer review, and respond to individual and peer discussion about their own Master Plans

### **Northwest Wildlife Conservation: Regional Ecology (BIO 657)**

**3 credits (optional course); Letter Grade; (see tentative course theme schedule below); Extra Course Fee required to cover Fieldtrip costs (paid to Woodland Park Zoo)**

Through both zoo-based and field-based experiences, this course will explore wildlife conservation in the Pacific Northwest as well as field investigation techniques that scientists and citizens alike can use to study and conserve our local wildlife and ecoregions. Participants will practice three types of field investigations that provide rigorous, engaging inquiry experiences for students: descriptive studies, comparative studies and correlative studies. Field investigations contribute to scientific knowledge by describing natural systems, noting differences in habitats and identifying environmental trends and issues. These methods align the broader range of contemporary field science practices with the scientific practices found in national science standards. The course will focus in-depth on a different ecoregion—e.g. temperate forest, sagebrush steppe, mountains, wetlands, coastal regions and urban areas—each year it is offered, using threatened species in the ecoregion as case studies in species recovery. On the first course day at Woodland Park Zoo, we will explore the characteristics and wildlife of the focal ecoregion through presentations, activities and observations of animals on zoo grounds. The focal ecoregion will then be explored through field

experiences over the subsequent three to four days, including visits to local natural areas and meeting scientists involved in conserving Pacific Northwest species and habitats.

#### **Course Themes and Student Learning Outcomes:**

The theme of the course changes every summer to rotate through different ecoregions in WA state. While the exact sequence can change, the anticipated sequence is:

- Olympic Peninsula Ecoregion (Elwha dam restoration) – Summer 2022
- North Cascades Ecoregion (Carnivores) – Summer 2023
- Columbia River Basin/Wetlands (Amphibians and reptiles) – Summer 2024
- Shrub Steppe Ecoregion (pygmy rabbits and raptors) – Summer 2025

Participants in this course will:

- 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

## **FALL COURSES – WOODLAND PARK ZOO Web+ Courses**

### **Animal Behavior & Conservation / Habitats, Adaptations, & Evolution (Formally these classes were under the header Zoo Expeditions)**

**3 credits (One Required; Second Optional); Letter Grade; Two different courses are offered; students are required to take one but can take both if they like. Foundations of Inquiry is a pre-requisite to take either of these courses.**

#### **1) Habitats, Adaptations & Evolution (BIO 694)**

**\*Offered in Fall 2023, Fall 2024**

In this course, participants will explore habitats, evolutionary theory and adaptation based in the dynamic setting of Woodland Park Zoo – home to a diverse collection of plants and over 300 species of animals. Through inquiry investigations, zoo tours, group activities and discussion, participants will explore key questions about species diversity and the relationship between species and their habitats. This course will examine the implications of evolution for species survival in modern times. Course participants will investigate the conceptual basis of the life sciences and implement strategies for engaging audiences in developing inquiry science skills.

#### **Course Themes and Student Learning Outcomes:**

Participants in this course will:

- Apply inquiry-based learning strategies to the study of the history of life and the theory of evolution
- Create and conduct research projects by selecting research questions, making predictions, designing methodologies, exploring experimental design for data collection strategies and analyzing data to arrive at new understandings of research topics; connect results to add to our understanding of species diversity and relationships between species and their habitats
- Engage with and assess multiple data collection instruments and behavioral methodologies; explore the tools needed to investigate observational questions about animal ecology; build understanding that leads to informed action
- Develop and evaluate strategies for leading students/audiences in analyzing and describing species diversity and relationships between species and their habitats within the context of the theory of evolution

#### **2) Animal Behavior & Conservation (BIO 662)**

**\*Offered in Fall 2021, Fall 2022**

In this course, participants investigate wildlife conservation and behavior through direct observation at Woodland Park Zoo to explore key questions about how and why species act the way they do in different situations. This

course will provide a foundation for understanding ethological research methods and animal conservation issues that can be applied and adapted to increased understanding about animal welfare and wildlife conservation in local educational and community settings. Opportunities will be provided for comparative studies on topics including social structure, reproductive behavior and animal communication. This course will provide a foundation for understanding zoo-based and field-based animal behavior research methods and how these methods contribute to wildlife conservation solutions. The course will focus on a different animal group – e.g. birds, arthropods, carnivores, etc. – each year it is offered.

#### **Course Themes and Student Learning Outcomes:**

Participants in this course will:

- Represent and explain the classification and taxonomy of the focus animal group
- Understand and summarize types of animal behavior and ethology
- Apply inquiry-based learning strategies to the study of animal behavior and conservation
- Discuss understanding of how ethology helps in maintaining animal health in captive environments, aids in wildlife management, and helps determine conservation needs in the wild
- Create and conduct research projects by selecting research questions, making predictions, designing methodologies, exploring experimental design for data collection strategies and analyzing data to arrive at new understandings of research topics; connect results to benefits to animal health, wildlife management and conservation efforts
- Assess and communicate the multi-layered conservation issues for the chosen animal(s)
- Engage with and assess multiple data collection instruments and behavioral methodologies; explore the tools needed to investigate observational questions about animal behavior; build understanding that leads to informed action

#### **Environmental Stewardship: Engaging Communities in Conservation Solutions (BIO 656)**

**3 credits (Required Course); Letter Grade; Master Plan in Action is a pre-requisite to take this course.**

Students in this course investigate environmental stewardship, research science and conservation opportunities and solutions in their local communities, practice community-based social marketing, develop a conservation project to be used in their classroom or community, and reflect on ecological impacts. This course will also examine the role of empathy and place-based learning to understand and care for the natural world in our own backyards. At the end of this course, students will have a solid understanding of community-based conservation, with a particular emphasis on current issues facing local habitats in the communities where they live. Students will also explore and begin to design stewardship strategies for empowering their own students or community members to generate solutions and take action.

#### **Course Themes and Student Learning Outcomes:**

Participants in this course will:

- 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 and evaluate a project for engaging an audience in local conservation action
- 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

### **SPRING COURSES – WOODLAND PARK ZOO Web+ Courses**

#### **Graduate Research: Perspectives in Environment & Culture (BIO 620)**

**2 credits (Optional Course); Pass/Fail grade**

**\*Offered in Spring 2022 and Spring 2024**

*\*Note – this course falls under Graduate Research credits; students may earn a maximum of 10 Graduate Research credits total.*

Through the lenses of geography, anthropology and biology, this course explores past, present and future human-environment interactions across the world, particularly those involving wildlife. The course may include an evening presentation by a National Geographic Live presenter as well as two full days at Woodland Park Zoo that builds on the content of the evening presentation (specific content will be determined according to the speaker's area of expertise).

Using a multidisciplinary approach, participants will gain a deeper understanding of cultural interactions with the natural environment through experiences on zoo grounds, presentations and activities that can be used to engage students in exploring these issues.

#### **Course Themes and Student Learning Outcomes:**

Participants in this course will:

- Analyze and describe how the environment has affected people and how people have affected the environment, with a focus on human-wildlife interactions
- Explore how a variety of factors, such as biodiversity and resource use, can affect the ability of an ecosystem to maintain healthy populations of people and wildlife
- Employ strategies for integrating science and cultural studies to understand past, present and future environmental and societal challenges
- Develop materials and resources for teaching about human-environment interactions, and
- Examine how the topic of human-environment interactions can be utilized to provide interdisciplinary, hands-on classroom and outdoor learning opportunities
- Employ community resources, including Woodland Park Zoo, to create connections and use the network as a learning resource

#### **Global Biomes (BIO 627)**

**2 credits (Optional Course); Letter Grade**

**\*Offered Spring 2021, Spring 2023**

A bioclimatic zone, or biome, is a region broadly defined by the relationship of the area's temperature patterns, annual precipitation and living organisms. This course will introduce the biomes of the world through zoo-based explorations of the characteristic vegetation and wildlife of biomes represented at Woodland Park Zoo and current conservation issues relevant to each. The course may include an evening presentation by a National Geographic Live presenter as well as two full days at Woodland Park Zoo that build on the content of the evening presentation (specific content will be determined according to the speaker's area of expertise). The course may take a different specific regional focus, such as Biomes of Asia or Biomes of Africa, each time it is offered.

#### **Course Themes and Student Learning Outcomes:**

Participants in this course will:

- Analyze and describe the relationships between characteristics of the biome (geographic location, geology, annual temperature and precipitation patterns) and adaptations of living organisms in the course's focal biome(s)
- Examine how past and present human activity, including current human-wildlife conflict and demand for limited resources, impacts the wildlife within the focal biome(s)
- Explore and assess how conservation efforts are working to mitigate these impacts in the focal biome(s), analyze differences and similarities in threats to wildlife across biomes and how conservation efforts vary depending on the cultural and geographic context
- Develop and evaluate strategies for guiding students/audiences in analyzing and describing biomes and exploring conservation efforts to mitigate impacts to wildlife and habitats in specific biomes
- Develop and evaluate strategies for engaging students/audience in appropriate conservation action to support wildlife conservation in the course's focal biome(s)

### **THE FOLLOWING COURSES MAY BE TAKEN ANY SEMESTER AFTER YEAR 1 WITH ADVISOR PERMISSION**

#### **WOODLAND PARK ZOO Web+ Courses**

#### **Internship (BIO 640)**

**1 to 3 credits (up to 4 maximum credits combined Internship/Independent Study per semester) (Optional Course); Credit/No Credit; may be taken any semester after year 1; requires WPZ advisor permission**

*\*Note – this is a credit/no credit course; students may earn a maximum of 8 credits for their AIP in the credit/no credit category (Master Capstone is a 2-credit class categorized in the credit/no credit category, so only 6 optional credit/no credit class credits can be earned in this category)*

This course provides AIP students with the opportunity to work one-on-one with zoo professionals and/or community leaders on projects that directly contribute in specific ways to the student's Master Plan and overall

skillset. The experience is intended to be pragmatic, and the student is expected to take on significant independent responsibilities within the chosen internship.

#### **Independent Study (BIO 677)**

**1 to 3 credits (up to 4 maximum credits combined Internship/Independent Study per semester) (Optional Course); Credit/No Credit; may be taken any semester after year 1; requires WPZ advisor permission**

*\*Note – this is a credit/no credit course; students may earn a maximum of 8 credits for their AIP in the credit/no credit category (Master Capstone is a 2-credit class categorized in the credit/no credit category, so only 6 optional credit/no credit class credits can be earned in this category)*

This course provides AIP students with the opportunity to do intensive research on a topic of particular interest to the student and/or that directly contributes to the student's Master Plan. The final project may include a written research paper or other product (short movie, website, multimedia presentation, etc.) but must also include an extensive literature review. This experience is intended to add depth and insight into a chosen topic agreed upon by the student and their advisor/instructor. The student is expected to take on significant responsibilities within the chosen independent study topic.

## **AIP Core Courses – Miami University – All Courses Required\* and Online Only**

(\* You will enroll in either the MA Master Capstone or MAT Master Capstone depending on your degree path)

### **BIO 631 Conservation Science & Community**

3 credits – Fall Semester every year; also will be offered in Spring Semester 2023 (online)

This course explores the theory and practice of conservation science, including discussion of threats to biodiversity as well as methods to collaboratively address social-ecological problems. Vital to this course is a project in which students work directly with their local community to better understand and address real ecological problems.

### **BIO 632 Biology in the Age of Technology (BAT)**

3 credits – Spring Semester only (online)

This course explores the beneficial and negative impacts of technology for conservation biology and environmental action. Topics include wildlife mapping via GPS and GIS, use of drones, satellite imagery, radio-collars, citizen/community science, social media, impacts of media on children including Nature Deficit Disorder. Through projects, students research a biological problem of interest and design a participatory media product to engage community members in that topic.

### **BIO 634 Issues in Evolution**

3 credits – Fall Semester every year; also will be offered in Spring Semester 2023 (online)

An understanding of evolution is critical for those seeking to better protect life on earth. In this course, students learn and discuss foundational evolutionary concepts as well as emerging topics. Students design a project that presents information on an evolutionary topic of choice in the form of a lesson plan, infographic or review paper.

### **BIO 636 Science Leadership & Media Workshop**

3 credits – Spring Semester only (online)

This course focuses on science writing for many purposes, including peer-reviewed literature, grants, and general community outreach. Students provide critical peer review of others' work and are challenged to explore a leadership dimension within their professional careers.

### **BIO 637 Master's Capstone**

2 credits – Fall and Spring Semesters (online)

The cornerstone exit course for students earning a Master of Arts in Biology as part of the Advanced Inquiry Program (AIP) master's degree from Miami University. Students reflect on the projects and artifacts they have created throughout their master's experience and how those projects have helped lead them to a deeper understanding of the master's program core tenets of local, regional and global understanding; inquiry; environmental stewardship; and community participation/voice.

### **BIO 639 Master's Capstone: MAT**

2 credits – Fall and Spring Semesters (online)

A required exit course for students earning a Master of Arts in Teaching (MAT) in the Biological Sciences as part of the Advanced Inquiry Program (AIP) master's degree from Miami University. Students review, analyze, and synthesize their own work throughout the degree and create a master's portfolio. They share their portfolio with peers and discuss their academic and personal progress through their master's experience. Student portfolios must demonstrate relevance to learning and teaching in formal education settings in addition to the master's program core tenets.

For summarized information on the topics, themes, and assignments in these courses, please also view the [Overview and Details of Foundational Web-based Coursework](#).