ANIMAL BEHAVIOR, ECOLOGY, AND CONSERVATION (BS)

Chair: Sue Margulis, PhD (%20margulis@canisius.edu)

Introduction
The Animal Behavior, Ecology, and Conservation Program combines the rigorous scientific study of Animal Behavior with a values-focused curriculum in the liberal arts tradition. It is for students who want to thoroughly understand the facts and theoretical underpinnings of animal behavior and who want to use that understanding to promote animal welfare and wildlife conservation. For a more detailed description of the program, faculty, facilities, academic and co-curricular opportunities please go to the ABEC website (https://www.canisius.edu/academics/programs/animal-behavior-ecology-and-conservation/).

Qualifications
Students must maintain a 2.0 GPA in their major and a 2.0 overall average to graduate with a degree in Animal Behavior, Ecology, and Conservation.

Advisement
All students should have an advisor in the major and should contact the department directly to have an advisor assigned if they do not already have one. Meetings with academic advisors are required prior to students receiving their PIN for course registration each semester. All majors should work closely with their advisor in discussing career expectations, choosing their major electives, developing their entire academic program and planning their co-curricular or supplemental academic experiences.

Double Majors
Students who wish to expand their educational opportunities may decide to declare a double major. This decision may be based on career goals, planned graduate studies, and/or other student interests. Before a student declares a double major, it is important to meet with the appropriate academic departments for advisement. In order to declare a double major, the student must complete the appropriate double major request form and get the signature of each department chairperson and the appropriate associate dean.

Per college policy, each additional major requires a minimum of 15 credits that do not apply to the student’s first or subsequent major. Some double major combinations can be completed within the minimum 120 credit hour degree requirement, but in other cases additional course work may be required. Please note that students will receive only one degree, regardless of the number of majors they complete.

Minors in Other Disciplines
Minors provide students the opportunity to pursue additional interests but generally do not require as many courses as a major. Minors generally range from five to eight required courses. The minors page (http://catalog.canisius.edu/undergraduate/minors/) provides a complete list of minors and provides links to each minor. Some majors and minors can be completed within the minimum 120 credit hour degree requirement, but in some cases additional coursework may be required. Students must complete the appropriate minor request form.

ABEC majors often choose to pursue one or more of the minors offered within the department (p. 3). Additionally, ABEC majors interested in informal education should consider the education minor (http://catalog.canisius.edu/undergraduate/school-education-human-services/educator-preparation/#minortext) offered in the School of Education and Human Services.

Major Experiences
Many elective courses involve travel, field work, and/or service. The department also offers numerous internship opportunities. Students are encouraged to participate in these experiences.

Curriculum
An Ignatian Foundation
All undergraduate students must complete either the Canisius Core Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/core-curriculum/) or the All-College Honors Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/all-college-honors-program/). Many schools refer to their college-wide undergraduate requirements as “general education” requirements. We believe that the core curriculum and the honors curriculum are more than a series of required classes; they provide the basis for a Jesuit education both with content and with required knowledge and skills attributes that are central to our mission.

Free Electives
Students may graduate with a bachelor’s degree with more but not less than 120 credit hours. Free electives are courses in addition to the Canisius Core Curriculum or All-College Honors Curriculum and major requirements sufficient to reach the minimum number of credits required for graduation. The number of credits required to complete a bachelor’s degree may vary depending on the student’s major(s) and minor(s).

Major Requirements
The ABEC major requires 7 courses, plus a total of 24 additional credits from elective courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABEC 101</td>
<td>Introductory Animal Behavior I</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 102</td>
<td>Introductory Animal Behavior II</td>
<td>3</td>
</tr>
<tr>
<td>BIO 111</td>
<td>Introductory Biology I &amp; 111L</td>
<td>4</td>
</tr>
<tr>
<td>BIO 112</td>
<td>Introductory Biology II &amp; 112L</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Select one of the following conservation courses:</td>
<td>3</td>
</tr>
<tr>
<td>BIO 322</td>
<td>Conservation Biology</td>
<td></td>
</tr>
<tr>
<td>ABEC 333</td>
<td>Conservation Behavior</td>
<td></td>
</tr>
<tr>
<td>ABEC 335</td>
<td>Conservation Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following math courses:</td>
<td>3-4</td>
</tr>
<tr>
<td>MAT 131</td>
<td>Statistics for Social Sciences</td>
<td></td>
</tr>
<tr>
<td>MAT 141</td>
<td>Inferential Statistics and Computers for Science</td>
<td></td>
</tr>
<tr>
<td>PSY 201</td>
<td>Basic Statistics for Behavioral Sciences</td>
<td></td>
</tr>
<tr>
<td>PHI 245</td>
<td>Animal Ethics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Major Electives (chosen from the list below)</td>
<td>24</td>
</tr>
</tbody>
</table>

Total Credits: 47-48
Major Electives

Twenty four credits must derive from the following electives:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABEC 216</td>
<td>Topics in Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 220</td>
<td>Animal Learning &amp; Animal Learning Lab</td>
<td>4</td>
</tr>
<tr>
<td>ABEC 250</td>
<td>Zoo Animal Husbandry</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 251</td>
<td>Zoo Animal Management</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 301</td>
<td>Research Participation (credit)</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 302</td>
<td>Photographing Animal Behavior</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 303</td>
<td>Shelter Behavior</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 305</td>
<td>Assessing Animals</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 332</td>
<td>Animal Welfare</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 333</td>
<td>Conservation Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 335</td>
<td>Conservation Education</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 339</td>
<td>Animal Enrichment</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 340</td>
<td>Research Methods in Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 341</td>
<td>Urban Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 341L</td>
<td>Urban Ecology Lab (optional)</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 342</td>
<td>Animal Geographies</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 345</td>
<td>Herpetology</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 345L</td>
<td>Herpetology Lab</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 351</td>
<td>Zoo Exhibiry</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 360</td>
<td>Observational Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>ABEC 363</td>
<td>Canine Evolution, Behavior and Cognition</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 370</td>
<td>Animal Cognition</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 403</td>
<td>Tropical Ecology</td>
<td>1</td>
</tr>
<tr>
<td>ABEC 404</td>
<td>Wildlife Ecology and Conservation in Africa</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 405</td>
<td>Field Studies in Political Ecology &amp; Wildlife Conservation</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 490</td>
<td>Canisius Ambassadors for Conservation (credit may vary)</td>
<td>4</td>
</tr>
<tr>
<td>ABEC 491</td>
<td>Internship 1</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 492</td>
<td>Internship 2</td>
<td>3</td>
</tr>
<tr>
<td>ABEC 495</td>
<td>Independent Research</td>
<td>3</td>
</tr>
<tr>
<td>BIO 301</td>
<td>Research Methods (credit)</td>
<td>1</td>
</tr>
<tr>
<td>BIO 312</td>
<td>Primatology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 316</td>
<td>Social Organization of Mammals</td>
<td>3</td>
</tr>
<tr>
<td>BIO 316L</td>
<td>Social Organization of Mammals Lab (optional)</td>
<td>1</td>
</tr>
<tr>
<td>BIO 317</td>
<td>Sex, Evolution and Behavior</td>
<td>3</td>
</tr>
<tr>
<td>BIO 320</td>
<td>Field Ecology &amp; Field Ecology Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIO 322</td>
<td>Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 325</td>
<td>Reproductive Biopsychology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 343</td>
<td>Entomology &amp; Entomology Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIO 355</td>
<td>Behavioral Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>BIO 357</td>
<td>Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIO 364</td>
<td>Zoology: Diversity of Animal Life</td>
<td>3</td>
</tr>
<tr>
<td>BIO 364L</td>
<td>Zoology: Diversity of Animal Life Laboratory (optional)</td>
<td>1</td>
</tr>
<tr>
<td>BIO 366</td>
<td>Ornithology</td>
<td>3-4</td>
</tr>
<tr>
<td>BIO 375</td>
<td>Community Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIO 375L</td>
<td>Community Ecology Laboratory (optional)</td>
<td>1</td>
</tr>
<tr>
<td>BIO 377</td>
<td>Freshwater Biology &amp; Freshwater Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIO 378</td>
<td>Wetlands</td>
<td>3</td>
</tr>
<tr>
<td>BIO 378L</td>
<td>Wetlands Laboratory (optional)</td>
<td>1</td>
</tr>
<tr>
<td>EVST 235</td>
<td>Environmental Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

Roadmap

Recommended Semester Schedule for Major Course Requirements:

**Freshman**
- **Fall**: ABEC 101
- **Spring**: ABEC 102
- **Fall**: BIO 111 & 111L
- **Spring**: BIO 112 & 112L

**Sophomore**
- **Fall**: BIO 316 (ABEC elective)
- **Spring**: BIO 317 (ABEC elective)

**Junior**
- **Fall**: ABEC elective
- **Spring**: ABEC elective
- **Fall**: ABEC elective
- **Spring**: ABEC elective

**Senior**
- **Fall**: ABEC elective
- **Spring**: ABEC elective

Learning Goals & Objectives

**Student Learning Goal 1**

Students will demonstrate factual knowledge and theoretical understanding in the field of animal behavior.

Students will:

- **Objective A**: Demonstrate mastery of topics: animal phylogeny-taxonomy, evolution of behavior, proximate causes of behavior, and anthropogenic impacts on non-human animals and the environment

- **Objective B**: Separate observations from inferences

**Student Learning Goal 2**

Students will demonstrate practical knowledge and appropriate application of animal behavior and conservation in two of the following settings: domestic animals, captive wildlife, free-ranging wildlife

Students will:

- **Objective A**: Generate realistic and effective solutions to simulated behavior problems in captive or domestic animals
Objective B: Generate realistic and effective solutions to simulated conservation problems

Objective C: Critically evaluate ethical implications of use or management of non-human animals

Student Learning Goal 3
Students will demonstrate scientific literacy and communication about science in written or oral form
Students will:
Objective A: Critically evaluate primary literature
Objective B: Interpret data
Objective C: Clearly articulate scientific ideas, concepts, and controversies

Minors
The ABEC program offers four minors for students who wish to concentrate in specific areas:

- Anthrozoology Minor (http://catalog.canisius.edu/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/anthrozoology-minor/)
- Conservation Minor (http://catalog.canisius.edu/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/conservation-minor/)
- Zoo Biology Minor (http://catalog.canisius.edu/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/zoo-biology-minor/)

For the ABEC minors, courses may be taken independently of the others and in any order. Interested students usually begin with the course that best fits their schedule. Most of the courses are offered every other year, so interested students should plan accordingly.

Additionally, the ABEC department contributes to the Education Minor (http://catalog.canisius.edu/undergraduate/school-education-human-services/educator-preparation/#minortext). ABEC majors with an interest in informal education may be interested in this minor. This minor does not lead to teacher certification.

Courses

ABEC 101 Introductory Animal Behavior I 3 Credits
This course covers a broad overview of animal behavior, from the ideas and theories that have shaped the field to basic approaches used to study behavior. We will discuss behavior from a variety of animals, ranging from insects to mammals (including humans!). Special attention will be given to examining the research that shapes the field.
Offered: every fall.

ABEC 102 Introductory Animal Behavior II 3 Credits
Foundational evolutionary and ecological theories in Animal Behavior. Explore key behaviors that lead to an animal’s survival including foraging, mating, habitat selection, and social behavior as well as methods to study animal behavior. Also compare animal behavior in the news to the scientific literature.
Offered: every spring.

ABEC 210 Animal Learning 3 Credits
Animal learning and memory research with emphasis on practical animal training. Lab required.
Prerequisites: ABEC 101 & ABEC 102. Corequisite: ABEC 220L.
Offered: every spring.

ABEC 220L Animal Learning Lab 1 Credit
Required animal learning lab that emphasizes practical animal training.
Prerequisites: ABEC 101 & ABEC 102. Corequisite: ABEC 220.
Offered: every spring.

ABEC 220 Animal Learning 3 Credits
ABEC 220L Animal Learning Lab 1 Credit
Required animal learning lab that emphasizes practical animal training.
Prerequisites: ABEC 101 & ABEC 102. Corequisite: ABEC 220.
Offered: every spring.

ABEC 250 Zoo Animal Husbandry 1 Credit
Topics in animal husbandry in the zoo setting. Focus is on the specific needs of different taxonomic groups, environmental management, veterinary monitoring, nutrition, and programming.
Prerequisites: ABEC 101 & ABEC 102.
Offered: Spring of odd-numbered years.

ABEC 251 Zoo Animal Management 3 Credits
Modern practices in zoo mission implementation. Focus on managing many facets of zoos: individual animals, populations of animals, visitors, research, education, staff, and budgets. The course is highly project-based and involves considerable group work and participation.
Prerequisites: ABEC 101 & ABEC 102.
Offered: every spring.

ABEC 300 Research Participation (no credit) 0 Credits
Recognition for ABEC research assistants, does not carry credit.
Restriction: permission of instructor.
Offered: every semester.

ABEC 301 Research Participation (credit) 1 Credit
Recognition for ABEC research assistants. Can be taken up to 3 times for major elective credit; more than three times credit is free-elective.
Restriction: permission of instructor.
Offered: every semester.

ABEC 303 Shelter Behavior 1 Credit
This course will expose students to a variety of animal sheltering models. Students will assess the impacts of each type of model on the behavior of shelter animals and prospective adopters. Students will also take an in-depth look at why so many animals are relinquished to shelters and at the programs shelters have established to help keep pets in their homes.
Prerequisites: ABEC 101 and ABEC 102.
Offered: every fall.
ABEC 305 Assessing Animals 3 Credits
Assessing Animals will focus on applied behavioral analysis of non-human animals through various methodologies including functional assessments. Students will learn how to use such assessments to achieve behavioral goals through problem solving strategies for non-human animals. Occasional (1-2) weekend days may be required. Prerequisites: ABEC 101 & ABEC 102. Offered: every fall.

ABEC 319 Anthrozoology 3 Credits
An engagement with the fundamental issues of the field of Anthrozoology by evaluating the history of human/nonhuman interactions, the categories into which humans have sorted animals, and a variety of science-based and value-based approaches to humans’ inevitable intersection with other living beings. Prerequisite: ABEC 101 & ABEC 102. Restriction: juniors and seniors only. Fulfills College Core: Advanced Writing-Intensive Offered: every spring.

ABEC 332 Animal Welfare 3 Credits
This course will examine critical debates and controversies surrounding our care and use of animals. We will use a case study approach, and use scientific research to evaluate real world issues in animal welfare. The case studies will cover companion animals, wildlife, zoo animals, and animals used in agriculture and research. This course involves significant writing. Prerequisite: ABEC 101 & ABEC 102. Offered: every spring.

ABEC 333 Conservation Behavior 3 Credits
How human activity has altered the planet and how those modifications affect the behavior of animals. Review of key principles through the lens of Behavioral Ecology in regards to species requirements for survival, major threats to species existence, and conservation solutions to reduce those threats. Identification of positive human behavior for conservation outcomes. Prerequisites: ABEC 101 & ABEC 102. Offered: every fall.

ABEC 335 Conservation Education 3 Credits
Applying the theories and principles of conservation psychology to education in informal settings (zoos, aquariums, wildlife refuges). Assessing attitude and behavioral outcomes of conservation education programs. Prerequisites: ABEC 101 & ABEC 102. Offered: most fall semesters.

ABEC 336 Child Animal Studies 3 Credits
This course considers how animals play distinct roles in child development, children’s cultures, and even in the social construction of ‘childhood.’ It draws upon psychology, ethology, ethics, cultural studies, education, and anthropology. Prerequisites: ABEC 101 & ABEC 102. Restriction: juniors and seniors only. Offered: spring of odd-numbered years.

ABEC 339 Animal Enrichment 3 Credits
This course emphasizes the role of enrichment in various contexts (laboratory, shelter, and zoo). Multiple opportunities to design and implement enrichment are provided. The course uses the S-P-I-D-E-R framework for enrichment design and effectiveness. Prerequisites: ABEC 101 & ABEC 102. Offered: spring of even-numbered years.

ABEC 340 Research Methods in Animal Behavior 3 Credits
Observational and experimental research methods commonly used in studies of wild, captive, and domesticated animals. Evaluate peer-reviewed journal articles, research questions and hypotheses, collect behavioral data in observational and experimental contexts, and analyze and interpret data. Prerequisites: ABEC 101, ABEC 102, & one of the following: MAT 131, MAT 141, or PSY 202. Fulfills College Core: Advanced Writing-Intensive Offered: every fall.

ABEC 341 Urban Ecology 3 Credits
Critical examination of the natural ecosystems in which cities are embedded, from soil and vegetation to biodiversity and landscape scale processes. Investigations into how cities are both centers of human production and consumption that shape global ecologies as well as areas of critical habitat for nonhuman animals, with an aim to understand and promote coexistence. Prerequisites: ABEC 101 & ABEC 102. Offered: fall of even-numbered years.

ABEC 341L Urban Ecology Lab 1 Credit
Using Buffalo as a natural laboratory, visit urban sites of varying characteristics to analyze the effects of different types of urban development and management on ecosystems. Speak to local managers, collect and analyze ecological data, observe urban impacts to wildlife and ecosystems, as well as the connection between social and ecological systems in Buffalo. Prerequisites: ABEC 101 & ABEC 102. Corequisite: ABEC 341. Offered: fall of even-numbered years.

ABEC 342 Animal Geographies 3 Credits
Study of the entanglings of human-animal relations with space, place, location, environment and landscape. Prerequisites: ABEC 101 & ABEC 102. Restriction: juniors and seniors only. Offered: spring of even-numbered years.

ABEC 345 Herpetology 3 Credits
This course will explore the diversity, evolutionary relationships, ecology, behavior, and conservation of reptiles and amphibians. Prerequisite: BIO 111 & BIO 112. Offered: occasionally.

ABEC 345L Herpetology Lab 1 Credit
Optional laboratory for ABEC 345 (herpetology) covers field techniques, applied conservation methods, taxonomic diversity, and identification of local species. Seats in the laboratory section are first come, first serve. Prerequisite: BIO 111 & BIO 112. Corequisite: ABEC345. Offered: occasionally.

ABEC 351 Zoo Exhibits 1 Credit
Critical evaluation of zoo design principles. Involves travel to obtain first-hand study of distant zoological institutions. Additional fee required. Cost varies based on destination, but generally are between $200 and $350. Prerequisite: ABEC 101 or ABEC 102. Offered: annually.

ABEC 360 Observational Research Methods 4 Credits
Study of the principal procedures used in animal behavior research. Involves the conduct of independent research project, from formulation of hypothesis through to presentation of results. Statistical analysis of data is a key component of the class, and students are expected to have completed their statistics requirement. Prerequisites: ABEC 101, ABEC 102, & one of the following: MAT 131, MAT 141, or PSY 201. Restriction: juniors and seniors only. Fulfills College Core: Advanced Writing-Intensive Offered: spring of odd-numbered years.
ABEC 363 Canine Evolution, Behavior and Cognition  
Introduction to the latest theories regarding how dogs evolved and were domesticated; how dogs communicate with humans and with each other, exposure to ground-breaking research into dog behavior, learning, cooperation, and cognition.  
Prerequisites: ABEC 101 & ABEC 102. Restriction: juniors and seniors only.  
Offered: every spring.  

ABEC 370 Animal Cognition  
This course will critically examine the mental lives of animals. We will attempt to better understand what animals are thinking and how and why they make particular decisions. The emphasis of this course is on critically evaluating research claiming to demonstrate or refute the presence of cognitive abilities across species. Topics studied will include perception, tool use, communication, emotions, and many more.  
Prerequisite: ABEC 101 & ABEC 102. Restriction: juniors and seniors only.  
Offered: every spring.  

ABEC 403 Tropical Ecology  
Students will travel to tropical areas in Central or South America over Spring Break to learn tropical ecology first hand. The course will take students to both cloud forest and lowland rainforest ecosystems. Students will complete readings and mini-projects while in the field. Additional fee required and varies with location (generally about $2500) which covers all travel costs. Please contact the course instructor for current fees.  
Prerequisites: ABEC 101 or ABEC 102.  
Offered: most springs.  

ABEC 404 Wildlife Ecology and Conservation in Africa  
Field experience in Africa, emphasizing field methods for animal observation, community-based conservation, and wildlife behavior and management. This course involves early application (previous fall), AND travel during summer. Additional fee required. Please contact the course instructor for current fees.  
Prerequisite: ABEC 101 & ABEC 102. Restriction: seniors only and permission of instructor.  
Fulfills College Core: Core Capstone  
Offered: every fall.  

ABEC 405 Field Studies in Political Ecology & Wildlife Conservation  
This field course provides an in-depth look at the complex sociocultural and political aspects of wildlife conservation and environmental sustainability by immersing students in research, workshops, readings, and discussions with local community groups and conservation experts in Costa Rica. We will travel to the capital of San Jose, where we will meet with professors working at University for Peace, to learn about some of the history around conservation, indigenous peoples, and sustainability in Costa Rica. We will also learn about current work being done at the national and local level in areas of environmental education and community advocacy. We will then travel to Santa Elena to spend five days engaged in wildlife tours, participating in education workshops, and hearing from guest speakers about re-wilding projects, river protection, sustainable farming, and new ecotourism programs. Finally, we will travel to the beautiful coastal town of Manuel Antonio to stay and volunteer with Kids Saving the Rainforest, a non-profit organization dedicated to wildlife rehabilitation, environmental education, and conservation of wildlife. We will work with the public in small research projects at Manuel Antonio National Park to learn about human-wildlife interactions there. Additional fee required. Please contact the course instructor for current fees.  
Prerequisites: ABEC 101 & ABEC 102.  
Offered: fall of odd-numbered years.