

ANIMAL BEHAVIOR, ECOLOGY, AND CONSERVATION (BS)

Chair: Malini Suchak, PhD

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.

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 Major/Minor Declaration form. This form will be submitted electronically and reviewed and approved by each department chairperson as well as the appropriate associate dean.

Per university 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 unless completing the dual degree (<https://catalog.canisius.edu/undergraduate/academics/curricular-information/>) requirement including at least 150 undergraduate credit hours, regardless of the number of majors they complete. Both (all) majors appear on a student's transcript.

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. To receive a minor, the student must complete at least 9 credit hours of coursework distinct from their other credentials (i.e., majors, other minors). The complete list of minors is available on the Canisius website (<https://www.canisius.edu/academics/programs/undergraduate/?type%5B%5D=17>) and in the catalog (<https://catalog.canisius.edu/undergraduate/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 following minors offered within the department: anthrozoology minor (<http://catalog.canisius.edu/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/anthrozoology-minor/>), conservation minor (<https://canisius-curr.courseleaf.com/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/conservation-minor/>), and zoo biology minor (<https://canisius-curr.courseleaf.com/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/zoo-biology-minor/>). Additionally, ABEC majors interested in informal education should consider the education minor (<https://canisius-curr.courseleaf.com/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

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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:

Code	Title	Credits
ABEC 101	Introductory Animal Behavior I	3
ABEC 102	Introductory Animal Behavior II	3
BIO 111 & 111L	Introductory Biology I and Introductory Biology Laboratory I	4
Select one of the Introductory Biology II sequence courses:		4
BIO 112 & 112L	Introductory Biology II and Introductory Biology Laboratory II	
BIO 113 & BIO 112L	Introductory Biology II: Organismal Biology and Introductory Biology Laboratory II	
Select one of the following conservation courses:		3
BIO 322	Conservation Biology	

ABEC 333	Conservation Behavior	
ABEC 335	Conservation Education	
Select one of the following math courses:		3-4
MAT 131	Statistics for Social Sciences	
MAT 141	Inferential Statistics and Computers for Science	
PSY 201	Basic Statistics for Behavioral Sciences	
PHI 245	Animal Ethics	3
Major Electives (chosen from the list below)		24
Total Credits		47-48

Major Electives

Twenty four credits must derive from the following electives:

Code	Title	Credits
ABEC 216	Topics in Animal Behavior	3
ABEC 217	Careers in ABEC & Anthrozoology	3
ABEC 219	Diversity of Life	3
ABEC 220 & 220L	Animal Learning and Animal Learning Lab	4
ABEC 250	Zoo Animal Husbandry	1
ABEC 251	Zoo Animal Management	3
ABEC 301	Research Participation (credit)	1
ABEC 320 & 320L	Applied Dog Behavior and Applied Dog Behavior Lab	4
ABEC 332	Animal Welfare	3
ABEC 333	Conservation Behavior	3
ABEC 335	Conservation Education	3
ABEC 339	Animal Enrichment	3
ABEC 340	Research Methods in Animal Behavior	3
ABEC 341	Urban Ecology	3
ABEC 341L	Urban Ecology Lab (optional)	1
ABEC 345	Herpetology	3
ABEC 345L	Herpetology Lab	1
ABEC 346	Integrative Behavior	3
ABEC 347	Avian Conservation and Management	3
ABEC 348	Wildlife & Climate Change	3
ABEC 351	Zoo Exhibitory	1
ABEC 360	Observational Research Methods	4
ABEC 370	Animal Cognition	3
ABEC 402	Desert Conservation	1
ABEC 403	Tropical Ecology	1
ABEC 404	Wildlife Ecology and Conservation in Africa	3
ABEC 491	Internship 1	3
ABEC 492	Internship 2	3
ABEC 495	Independent Research	3
BIO 301	Research Methods (credit)	1
BIO 312	Primatology	3
BIO 317	Sex, Evolution and Behavior	3
BIO 320 & 320L	Field Ecology and Field Ecology Lab	4
BIO 322	Conservation Biology	3
BIO 343 & 343L	Entomology and Entomology Lab	4

BIO 357	Evolution	3
BIO 364	Zoology: Diversity of Animal Life	3
BIO 375	Community Ecology	3
BIO 375L	Community Ecology Laboratory (optional)	1
BIO 377 & 377L	Freshwater Biology and Freshwater Biology Laboratory	4
BIO 378	Wetlands	3
BIO 378L	Wetlands Laboratory (optional)	1
EVST 235	Environmental Policy	3
ANZ 401	Integral Ecology: Caring for our Common Home	3

Roadmap

Recommended Semester Schedule for Major Course Requirements:

Freshman

Fall	Spring
ABEC 101	ABEC 102
BIO 111 & 111L	BIO 112 & 112L

Sophomore

Fall	Spring
BIO 317 (recommended)	PHI 245
ABEC 217 (may be taken in fall or spring)	ABEC 219 (recommended)

Math course (choose one of the following)

MAT 141
MAT 131
PSY 201

Junior

Fall	Spring
ABEC elective	ABEC elective
ABEC elective	ABEC elective
Conservation course (may be taken either semester in junior year)	Conservation course (may be taken either semester in junior year)

Senior

Fall	Spring
ABEC elective	ABEC elective

Learning Goals and Objectives

Student Learning Goal 1

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

Students will:

Objective A: Demonstrate mastery of topics in animal behavior: ultimate and proximate causes of behavior

Objective B: Demonstrate mastery of topics in conservation: biodiversity, human dimensions, and anthropogenic impacts on non-human animals and the environment

Student Learning Goal 2

STUDENTS WILL DEMONSTRATE AND APPLY PRACTICAL KNOWLEDGE OF ANIMAL BEHAVIOR AND CONSERVATION

Students will:

Objective A: Generate realistic and effective solutions to behavior problems in non-human animals

Objective B: Generate realistic and effective solutions to 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, or controversies

Objective D: Separate observations from inferences

Minors

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

- Animal Behavior Minor (<http://catalog.canisius.edu/undergraduate/college-arts-sciences/animal-behavior-ecology-conservation/animal-behavior-minor/>)
- 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.

Minors are an important part of the undergraduate curriculum. If students declare a minor by sophomore year, they can usually complete it in a timely manner. Students should work with their advisor to determine if it is possible that the minor can be completed by graduation.

To receive a minor, a student must complete at least 9 credit hours of coursework distinct from their major(s) and from other minors, and students must complete more than 50% of the coursework required for the minor at Canisius. Please note that “ancillary/supporting” courses required for a major may still count as distinct courses as long as the remaining coursework still meets the 30 credit-hours required for a major. For more information about minor policies, please see the Declaring Majors and Minors (<http://catalog.canisius.edu/undergraduate/academics/student-records/declaring-majors-minors/>) page in the catalog.

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 how animal behavior is shaped by both evolution and learning principles.
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. A significant focus on the process of research and scientific literature.
Offered: every spring.

ABEC 150 Animal Nutrition 3 Credits

Nutrition and dietary science focused on the maintenance of wildlife in captivity. Practical examples at our local zoo and aquariums are included.
Offered: fall of odd-numbered years.

ABEC 216 Topics in Animal Behavior 3 Credits

Topics in animal behavior will cover varying subdisciplines within animal behavior to offer students an in-depth learning experience. The topic selected will vary each semester and be selected by the instructor.
Prerequisite: ABEC101 or ABEC102.
Offered: occasionally.

ABEC 217 Careers in ABEC & Anthrozoology 3 Credits

This course aims to introduce and explore the many ways that a degree in Animal Behavior, Ecology, and Conservation or Anthrozoology is beneficial across a variety of professions. Through readings, discussion and interviews with professionals at various stages of their careers, students will learn how to leverage their academic experience in pursuit of a successful professional career.
Prerequisite: ABEC 101 or ABEC 102 or ANZ 101 (may be taken concurrently).
Offered: once a year.

ABEC 219 Diversity of Life 3 Credits

Explore the immense diversity of life from an evolutionary perspective. This course will focus on the characteristics and ecological functions of the major groups of prokaryotes, protists, plants, fungi, and animals.
Prerequisite: ABEC 101 and ABEC 102.
Offered: once a year.

ABEC 220 Animal Learning 3 Credits

This course examines major theories and principles of learning with an emphasis on applications to animal training. Topics include classical and operant conditioning, applied behavior analysis, schedules of reinforcement, extinction, shaping, chaining, generalization and discrimination, and ethics in behavior modification. Lab required.
Prerequisites: ABEC 101 & ABEC 102 OR ANZ 101. **Corequisite:** ABEC 220L.
Offered: once a year.

<p>ABEC 220L Animal Learning Lab 1 Credit Required animal learning lab that emphasizes practical animal training. Prerequisites: ABEC 101 & ABEC 102 OR ANZ 101. Corequisite: ABEC 220. Offered: once a year.</p>	<p>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: once a year.</p>
<p>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: Every other year.</p>	<p>ABEC 335 Conservation Education 3 Credits This course examines the role of education within the conservation movement, drawing on theories of learning and pedagogical instruction that are relevant in formal and informal settings (schools, zoos, aquariums, wildlife refuges, parks, etc.) as well as in community outreach programs. Prerequisites: ABEC 101 & ABEC 102 or ANZ 101. Offered: every other year.</p>
<p>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: once a year.</p>	<p>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 OR ANZ 101. Offered: every other year.</p>
<p>ABEC 300 Research Participation no credit 0 Credits Recognition for ABEC research assistants, does not carry any credits. Restriction: permission of instructor. Offered: every semester.</p>	<p>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 201. Fulfills College Core: Advanced Writing-Intensive Offered: once a year.</p>
<p>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.</p>	<p>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 or BIO 111 & BIO 112. Offered: every other year.</p>
<p>ABEC 320 Applied Dog Behavior 3 Credits Application of domestic dog behavior and learning theory principles to dog training. Emphasis is on common dog behavior issues and humane solutions to address them. In this experiential learning course, students will create training plans and participate in hands-on training activities with dogs. Lab required. Prerequisite: ABEC 220. Corequisite: ABEC 320L. Offered: once a year.</p>	<p>ABEC 341L Urban Ecology Lab 1 Credit Optional laboratory for ABEC 341 (Urban Ecology). 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, and explore the connection between social and ecological systems in Buffalo. Prerequisites: ABEC 101 & ABEC 102 or BIO 111 & 112. Corequisite: ABEC 341. Offered: every other year.</p>
<p>ABEC 320L Applied Dog Behavior Lab 1 Credit Application of domestic dog behavior and learning theory principles to dog training. Emphasis is on common dog behavior issues and humane solutions to address them. In this experiential learning course, students will create training plans and participate in hands on training activities with dogs. ABEC 320 lecture required. Prerequisite: ABEC 220. Corequisite: ABEC 320. Offered: once a year.</p>	<p>ABEC 345 Herpetology 3 Credits This course will explore the diversity, evolutionary relationships, ecology, behavior, and conservation of reptiles and amphibians. Prerequisite: ABEC 101 & 102 or BIO 111 & BIO 112. Offered: every other year.</p>
<p>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. Emphasis is on communicating welfare information to a variety of audiences to encourage change. Prerequisite: ABEC 101 & ABEC 102 OR ANZ 101. Offered: every other year.</p>	

- 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: ABEC 101 & 102 or BIO 111 & BIO 112. **Corequisite:** ABEC345.
Offered: every other year.
- ABEC 346 Integrative Behavior** 3 Credits
Integrating numerous fields of Biology, this course will examine both proximate and ultimate causes of behavior, focusing on the neuroendocrine mechanisms that lead to the expression of behavior within given ecological contexts. Emphasis will be given to understanding historical and recent primary literature.
Prerequisite: ABEC 101 and ABEC 102.
Offered: every other year.
- ABEC 347 Avian Conservation and Management** 3 Credits
Application of ecological and behavioral principles to the conservation and management of birds. Combines classroom and field experiences to explore applied aspects of anatomy, physiology, taxonomy, and behavior in the conservation and management of major North American avian groups and their habitat.
Prerequisite: ABEC 101 & ABEC 102 or BIO 111 & 112.
Offered: occasionally.
- ABEC 348 Wildlife & Climate Change** 3 Credits
Explore the intricate relationship between climate change and the behavior of wild animals. This course will first focus on a deeper understanding of the ecological and chemical processes that have led to climate breakdown. We will then delve into the significant impact a changing climate has on the behavioral and physiological adaptations of a wide variety of animal species.
Prerequisite: ABEC 101 & 102 OR BIO 111 & 112 OR BIO 111 & 113.
Offered: fall of even-numbered years.
- ABEC 351 Zoo Exhibitry** 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 \$250 and \$450. Course may be taken more than once for credit.
Prerequisite: ABEC 101 or ABEC 102.
Offered: once a year.
- ABEC 360 Observational Research Methods** 4 Credits
Study of the principal procedures used in observational animal behavior research. Involves the conduct of independent research project at the Buffalo Zoo, from formulation of hypothesis through presentation of results. Statistical analysis of data is a key component of the class, and students are expected to have completed their statistics requirement. This is a blended online and face-to-face class.
Prerequisites: ABEC 101, ABEC 102, & one of the following: MAT 131, MAT 141, or PSY 201.
Fulfills College Core: Advanced Writing-Intensive
Offered: every other year.
- ABEC 370 Animal Cognition** 3 Credits
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 OR ANZ 101.
Offered: every other year.
- ABEC 402 Desert Conservation** 1 Credit
This field course will focus on the complex desert ecosystems of the United States and conservation efforts. A week of summer travel will include visits to National Parks and Wildlife Refuges, Nature Preserves, and remote field study sites. Additional fee required will cover all travel costs. Please contact the course instructor for current fees.
Prerequisite: ABEC101 and ABEC102.
Offered: occasionally.
- ABEC 403 Tropical Ecology** 1 Credit
This field course provides an in-depth look at the ecology of tropical ecosystems and issues associated with their conservation. During an immersive field experience in Belize, students will study the ecology of tropical forest and savannah ecosystems, learn about conservation issues that impact tropical wildlife species and local communities, and conduct field research. Additional fee required will cover all travel costs. Please contact the course instructor for current fees.
Prerequisite: ABEC 101 or ABEC 102 or BIO 111.
Offered: once a year.
- ABEC 404 Wildlife Ecology and Conservation in Africa** 3 Credits
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 491 Internship 1** 3 Credits
Internship in an animal-related setting. Joint supervision by faculty and agency personnel. Application of classroom lessons to real-world situations. Students should register for the section most closely related to the internship activities. Section A is Anthrozoology, Section B is Animal Behavior, Section C is Conservation, and Section Z is Zoo Biology.
Prerequisite: ABEC 101 & ABEC 102 or ANZ 101, must have junior or senior standing, a minimum GPA of 2.0 in the major, a positive recommendation from a faculty member, and a completed & approved internship application.
Offered: every fall & spring.
- ABEC 492 Internship 2** 3 Credits
Internship in an animal-related setting. Joint supervision by faculty and agency personnel. Application of classroom lessons to real-world situations. Students should register for the section most closely related to the internship activities. Section A is Anthrozoology, Section B is Animal Behavior, Section C is Conservation, and Section Z is Zoo Biology.
Prerequisite: ABEC 101 & ABEC 102 or ANZ 101, must have junior or senior standing, a minimum GPA of 2.0 in the major, a positive recommendation from a faculty member, and a completed & approved internship application.
Offered: every fall & spring.
- ABEC 495 Independent Research** 3 Credits
Independent project conducted under the supervision of a faculty member. This advanced research opportunity is open to students who have completed at least one full year of research and is by invitation from their research professor. Students enrolled in independent research are expected to complete a project culminating in a manuscript or conference presentation.
Prerequisites: ABEC 101 & ABEC 102. **Restriction:** permission of instructor.
Offered: occasionally.