NATURAL RESOURCES (NTRES)

NTRES 1101 - Understanding Environment and Sustainability (3 Credits)
Crosslisted with ENVS 1101
This course examines two fundamental questions about biological, chemical and physical processes that influence the biosphere. First, how do humans obtain knowledge about these environmental processes? Second, how can we assess human influences upon these environmental processes? A key conceptual framework for the course is that environmental science provides tools for predicting future states of the earth's environment. Case studies, readings, discussions, writing assignments, and group exercises provide a foundation for understanding predictions about how the biosphere is influenced by human activities.
Enrollment Information: Enrollment preference given to: Environment and Sustainability majors.
Distribution Requirements: (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Identify and weigh sources of information about environmental resources, and use them to evaluate competing claims about sustainability and environmental management efforts.
- Explain how the earth's resources support ecosystems and humanity.
- Evaluate how cultural context and spatial scale influence environmental resource management options.
- Compare policies and societal norms that influence personal and collective resource use.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 1111 - Roadmap to Success in Environment and Sustainability (1 Credit)
Crosslisted with ENVS 1111
This course is for first-year students entering or intending to enter the Environment & Sustainability (E&S) major. The multidisciplinarity of this major may make it seem complex. The purpose of this class is to position you for success with your goals in the major, at Cornell and beyond. Course content will facilitate your course planning, choice of concentration, and help you map out the resources and opportunities Cornell offers. Course activities will help you explore your personal identity and get to know your E&S student cohort.
Enrollment Information: Enrollment limited to: first-year students interested in or entering the Environment & Sustainability major.
Last Four Terms Offered: Fall 2024, Fall 2023
Learning Outcomes:

- Develop a learning community and support network.
- Describe learning goals in the E&S core curriculum, E&S concentration, E&S capstone and Cornell electives; relate them to your career goals.
- Identify the resources and services at Cornell that can help you meet your academic and career goals.
- Engage in self-reflection about how you think and learn, how you interact with others, and how you respond to new information.
- Identify and acknowledge your social identity, cultural rules and biases and the inherent value of being open to diverse perspectives.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 1200 - FWS: Special Topics in Natural Resources (3 Credits)
The department offers first-year writing seminars on environmental topics as staff is available. Consult John S. Knight Writing Seminar Program brochures for current year offerings, instructors and descriptions.
Last Four Terms Offered: Spring 2025, Fall 2020, Fall 2018, Spring 2017
Schedule of Classes (https://classes.cornell.edu/)

NTRES 1201 - Global Water Sustainability (3 Credits)
Crosslisted with ENVS 1201
This course will cultivate an interdisciplinary, solution-oriented perspective on water resource challenges from local to global scales. Water is central to all of life, yet its management represents a wicked challenge in sustainability science because tradeoffs and feedbacks among multiple objectives are commonplace. Readings and parallel mini-lectures from natural and social science instructors will embrace the diversity of perspectives involved in managing water resources, and students will engage in collaborative problem-solving during class to deepen their understanding of each weekly theme. Meetings with case study experts from around the world will ground this dialog in reality, and all students will participate in debate-style examination of major controversies in water sustainability. Reflective writing assignments will encourage students to assess their own role in achieving water sustainability.
Distribution Requirements: (PSC-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Identify and weigh sources of information about water resources, and use them to evaluate competing claims about management needs.
- Explain how water resources support both nature and humanity.
- Evaluate how cultural context and spatial scale influence water resource management options.
- Compare policies and societal norms that influence personal and collective resource use.
- Individually and in collaboration with classmates, devise and assess strategies to enhance water resource sustainability.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2010 - Environmental Conservation (4 Credits)
Our lives are touched increasingly by questions about environmental degradation at local, regional, and global scales. Business-as-usual is being challenged. This course stimulates students to go beyond the often-simplistic portraits of environmental dilemmas offered by the mass media to gain a firmer basis for responsible stewardship and informed action on environmental issues. Students will practice and apply critical-thinking skills.
Distribution Requirements: (HA-AG, OPHLS-AG, SCH-AG), (SCT-IL)
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Demonstrate an understanding of the history of environmental thought and how ideas in the past shape present-day environmental management.
- Apply the basic principles of physical, chemical, biological and social sciences to explain environmental problems and solutions to those problems, including climate change, human population growth, agriculture, energy and the environment, ecosystem and species management, biodiversity, and pollution.
- Demonstrate an ability to think critically by arguing for a solution to an environmental problem while recognizing the counter arguments.
- Debate the fundamental concepts of environmental management, both in written and oral format.
- Analyze the major national and international policies enacted to manage environmental problems.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2100 - Introductory Field Biology (4 Credits)
Crosslisted with ENVS 2100
In this course, students are introduced to field identification, natural history, and study of plants, animals, and natural systems. This course emphasizes hands-on interaction with nature, recording of ecological phenomena, and awareness and understanding of the natural environment, including ecological concepts (e.g., ecosystem, community, habitat, and niches). Students will 1) work cooperatively in hands-on field lab exercises to build skills in the identification and classification of native biota and their natural history 2) conduct a field research project in which they formulate research questions from field observations, develop a research design, collect field data, and interpret those data for a research report and presentation, and 3) maintain a detailed field journal of natural history observations from field labs and independent observations
Prerequisites: one introductory college biology course.
Enrollment Information: Enrollment preference given to: Arts & Sciences and CALS sophomores and higher planning to complete or interested in the Environment & Sustainability major.
Course Fee: Course Fee, $32. To cover certain meals for weekend trips.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will be able to identify and characterize ecosystem types, ecological communities, and habitats in the northeastern region based on key structural features, associated taxa, and the physical environment.
- Students will be able to identify approximately 200 common taxa of plants and animals in the northeastern region and will understand the natural history of those species and their relationship to the environment.
- Students will develop an understanding of field research methods and approaches in a variety of ecological disciplines.
- Students will be able to formulate research questions from field observations, develop a sample design, collect field data, and interpret and discuss their results in relation to research questions.
- Students will demonstrate equitable collaboration as they design, plan, execute and communicate the results of a field research project.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2201 - Society and Natural Resources (3 Credits)
Crosslisted with GDEV 2201, BSOC 2201
The actions of people are crucial to environmental well-being. This course addresses the interrelationships between social phenomena and the natural (i.e., biophysical) environment. It is intended to (1) increase student awareness of these interconnections in their everyday lives; (2) introduce students to a variety of social science perspectives, including sociology, economics, psychology, and political science, that help us make sense of these connections; (3) identify the contributions of each of these perspectives to our understanding of environmental problems; and (4) discuss how natural resource management and environmental policy reflect these perspectives.
Distribution Requirements: (SBA-AG)
Exploratory Studies: (CU-SBY); (AFAREA)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Identify the theories and approaches that social scientists use and apply to environmental issues.
- Articulate and explain the interconnections between social phenomena and the environment in everyday life, with a strong campus-community focus.
- Apply methods and theories from the social sciences, including sociology, economics, psychology, and political science, that help us recognize and make sense of these connections.
- Identify the contributions of each of these perspectives to our understanding of environmental problems.
- Identify how natural resource management and environmental policy reflect these perspectives.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2380 - Quantitative Thinking in Sustainability Science (3 Credits)
This course will focus on the quantitative side of sustainability science, with an attempt to balance introduction to the mechanics (how to do certain things with data, for example), with the underlying motivations (why are you looking at data a certain way?) - not simply how to do it. Completing the course will better prepare students for the quantitative elements of upper-level elective classes. Because the course balances why? with how?, students taking this class will not be able to claim mastery of either, but?will have a much better insight as to the coupling of the two. Students will be exposed to data collection, analysis, and the interpretation and application of both.
Prerequisites: completion of first-year course requirements within E&S major, or permission of the instructor.
Distribution Requirements: (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Learning Outcomes:
- Students will be able to Describe the differences between qualitative and quantitative data, the role of experiments, what a model is, and what 'significance' really means.
- Students will be able to use basic conceptual and analytical tools for describing and quantifying the sorts of data often encountered in sustainability science.
- Students will be able to work with data in the R and RStudio setting and will develop a basic facility to go from data to visualization to understanding the pattern(s) in the data.
- Students will develop (or improve) a basic 'quantitative vocabulary' as is often encountered in sustainability science. Students will be able to articulate in written and oral form their understanding of both the concepts and analytical tools, and the role of sources of uncertainty, in application to problems in conservation and sustainability.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2400 - Field Methods in Avian Ecology (3 Credits)
Crosslisted with ENVS 2400
Students will learn and practice a variety of methodologies used for studying wild birds including banding, census methods (point counts, transects, spot mapping), and behavioral observations. In a 50-minute classroom session each week, students will discuss relevant scientific literature and prepare for the lab session. The weekly field session will be held at various locations and students should be prepared to handle variable weather conditions. Students seeking to conduct independent research in avian ecology are encouraged to enroll. Note that one weekend field trip is required.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:
- Recognize the birds of the Finger Lakes region by sight and sound.
- Develop an appreciation for the diversity of life-history strategies pursued by these birds.
- Perform a variety of field techniques used for studying birds including banding, census methods (point counts, transects, spot mapping), and behavioral observations.
- Record an appropriately detailed field journal.
- Develop and test ecological hypotheses through an independent project, to summarize and analyze data, and to present scientific information appropriately in both written and oral form.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2470 - Green Cities: Creating the Living City (3 Credits)
This course examines the history and future of the ecological city and the technological and social forces that continue to shape it. Metropolitan transformation is explored in conjunction with alternative transportation, renewable energy, green infrastructure, recycling and resource management, and sustainable economics as means toward advancing cities to become the basis of an ecologically sound and socially just society. The first part of the course introduces students to the long, but often overlooked, history of environmental city development in the western planning tradition. The second part of the course reviews present-day efforts to apply these approaches in the face of modern metropolitan challenges to creating ecologically responsible cities. Specific case studies are studied within the theoretical context and political struggles that frame them.
Distribution Requirements: (SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Winter 2023
Learning Outcomes:
- Recognize key drivers of environmental change and the status of key environmental resources.
- Understand the cultural context and conceptual basis of sustainable resource management.
- Expand their ability to describe - both in writing and orally - approaches required to understand how natural systems influence and are influenced by human activities.
- Begin to identify disciplines and approaches that are of particular interest to them in pursuing a career that integrates knowledge from natural and social science disciplines in improving the management of shared environments and natural resources.
- Demonstrate an understanding of the history of environmental thought and how ideas in the past shape present-day environment management.
- Apply the basic principles of biological and social sciences to understand environmental problems and solutions to those problems, including climate change, human population growth, agriculture, energy and the environment, ecosystem and species management, biodiversity, and pollution.
- Demonstrate an understanding of critical thinking by arguing for a solution to an environmental problem but also recognizing the counter argument.
- Critically think about how ecological and social factors affect conservation threats and outcomes.
- Recognize key drivers of environmental change and the status of key environmental resources.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2480 - Sustainability Leadership (3 Credits)
While individual sustainability actions are crucial, the collective power of organizations - such as nonprofits, schools, businesses, and communities - can significantly amplify the impact toward sustainability goals through changes in organizational culture, environmental actions, policies, social norms, and behaviors. This course explores how anyone can become a sustainability educator and a sustainability leader within their organization to motivate their colleagues and peers to address social and environmental challenges. Through this course, aspiring sustainability leaders will explore how to foster transformative changes, sustainability learning, and environmental norms in their organizations, communities, and neighborhoods. As agents of change, students in this undergraduate-level course will develop strategies that inspire and guide individuals and organizations toward sustainability and equity.
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Summer 2024
Learning Outcomes:

- Analyze and evaluate conceptual frameworks, empirical research and case studies about sustainability learning, leadership, policy, and actions in organizations.
- Assess sustainability needs in your organization, school, community, or neighborhood.
- Create a sustainability action plan for your organization by synthesizing theoretical frameworks, ideas from case studies, and data from your community to create an action plan that influences policy, social norms, and decision-making in your organization or community.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2600 - Field Research in the Ecological Arts (3 Credits)
Crosslisted with ENVS 2600
Taught by an artist and scientist, this experiential, project-oriented field course emphasizes methodologies used by ecological artists and scientists who conduct expeditionary and place-based field work. The beginning of the class presents a conceptual and historical foundation in the ecological arts through lectures, readings, and artist talks. Techniques in the sciences as well as conventional and unconventional methodologies in the arts and humanities will be employed to research sites to collect, analyze, and interpret data, objects, natural phenomena, and sensorial experiences in the field through five projects: a site-specific research presentation, bioacoustics, video, sculpture and the final. Work is submitted and graded through a student-built website resulting in a solid portfolio.
Enrollment Information: Enrollment preference given to: Environment & Sustainability majors, and intended majors.
Course Fee: Course Fee, $40. For materials.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2022
Learning Outcomes:

- Interrelate field study, scientific research, cultural and artistic practices to deepen a sense of place.
- Design, conduct, and present site-specific research.
- Use software tools to edit video, sound and to design websites.
- Acquire knowledge of a wide range of current topics in environmental studies while broadening aesthetic and sensorial capacities to respond to and bolster field-based scientific research.
- Name, describe and critique the work of a diversity of international artists and scientists who exemplify a holistic study of nature, sustainability, and humanities, while learning about the strategies and critical concepts they employ in their work.
- Gain new perspectives to diversify approaches to students' discipline-specific problems.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 2830 - DNA, Genes and Genetic Diversity (4 Credits)
Crosslisted with ENVS 2830
Covers molecular, Mendelian and population genetic principles as they relate to population biology and biodiversity. A laboratory section is devoted to problem solving, computer exercises and discussions. We will focus on mechanisms generating and shaping genetic variation within and among populations, examine the relation of gene expression, and consider conservation relevance of variation at multiple levels. Recommended as a preliminary to upper-level ecology, evolution, and natural resources management courses.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Explain the key mechanisms that generate and shape patterns of genetic variation patterns at the individual, family, and population levels.
- Quantitatively analyze patterns of genetic variation to predict inheritance patterns within families and allele frequency changes in populations.
- Accurately interpret the consequences of genetic variation on human health, species endangerment, evolutionary potential, and ecosystem function.
- Describe the ethical dimensions of genetic information related to privacy, genetic testing, and transgenics.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3020 - Earth Projects (3 Credits)
Crosslisted with ENVS 3020
Taught by an artist and scientist, in this experiential, place-based field course, students will engage in a range of interdisciplinary practices to understand and interpret ecological systems and land use issues using artistic and scientific approaches. The core of this course will be based on weekend field trips to diverse sites in the Finger Lakes Region of New York with varied cultural and ecological significance. Sites include Cornell's Biological field station at Shackelton Point on Oneida Lake, Arnot Forest, and several art museums. Immersive stays will allow students to gain a deep understanding of place along with uninterrupted time to work on creative projects independently, in groups, and as a class. Students will gain an understanding of the history of creative interventions and performance in the landscape, as well as scientific approaches to engage with and conceptualize Earth's topography and natural phenomena. Students will have the opportunity to interact with various visiting scientists and artists who are leaders in their fields. Lectures, readings, fireside chats, critique, and interdisciplinary experiences will contribute to students' development. The final product of this class will be an art exhibition at the Soil Factory, an interdisciplinary art space in downtown Ithaca.
Prerequisites: at least one of the following: a studio art class or a college-level biology class or a visual studies class or an environment and sustainability class or permission of instructor.
Course Fee: Course Fee, $50. To cover certain meals for weekend trips.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Interrelate field study, scientific research, cultural and artistic practices to deepen a sense of place.
- Design, conduct, and present site-specific research and artwork.
- Illustrate knowledge on a wide range of current topics in environmental studies while broadening aesthetic and sensorial capacities to respond to and bolster field-based scientific research.
- Name, describe and critique the work of a diversity of international artists and scientists who exemplify a holistic study of nature, sustainability, and humanities while learning about the strategies and critical concepts they employ in their work.
- Gain new perspectives to diversify approaches to students' discipline-specific problems.
- Use shop tools and/or software for the creation of artwork.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3030 - Introduction to Biogeochemistry (4 Credits)
Crosslisted with EAS 3030
Control and function of the Earth's global biogeochemical cycles. Begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers, and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling and limitation, trace gas fluxes, bio-active metals, the use of isotopic tracers, controls on atmospheric carbon dioxide, and carbon cycle models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed. Co-enrollment in one lab/discussion section per week is required.
Prerequisites: CHEM 2070 or equivalent, MATH 1120, and a course in biology and/or geology.
Distribution Requirements: (BIO-AS, PHS-AS), (OPHLS-AG, PSC-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

NTRES 3100 - Applied Population Ecology (3 Credits)
In-depth analysis of the ecological factors influencing the natural fluctuation and regulation of animal population numbers. Develops models of single- and multi-species population dynamics, with emphasis on understanding the relationship between ecological processes operating at the individual level and subsequent dynamics at the population level. Significant emphasis is placed on application to conservation and management. Computer exercises are used to reinforce concepts presented in lecture.
Prerequisites: Recommended prerequisite: calculus (MATH 1106, MATH 1110 - AP calculus in high school is sufficient), background in Ecology or Biology.
Enrollment Information: Enrollment preference given to: E&S majors; sophomores, juniors and seniors can enroll.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will be able to analyze ecological systems in terms of proximate and ultimate causation, and be able to work with multi-level systems interactions.
- Students will be able to use basic conceptual and analytical tools for describing and quantifying ecological relationships.
- Students will be able to quantify mechanisms of resource acquisition, environmental tolerance, and system resilience and stability.
- Students will be able to understand and use fundamental analytical methods to describe structure and dynamics of populations and communities.
- Students will be able to make predictions about population and community dynamics based on their knowledge about biotic and abiotic factors influencing species interactions.
- Students will be able to integrate their knowledge about species interactions to explain higher level ecosystem processes.
- Students will be able to integrate conceptual and theoretical understanding in application to reach specified conservation management objectives.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3110 - Fish Ecology, Conservation, and Management (3 Credits)
This course covers basic principles of fish ecology at the individual, population, and community level.These ecological principles are applied to the conservation and management of fisheries resources and aquatic habitats. Several fisheries management case studies are analyzed using these principles.Examples are taken from both the freshwater and marine environments.
Prerequisites: Recommended prerequisite: NTRES 2100, general ecology, or equivalent.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Students will understand basic ecological principles at the individual, population and community level as they pertain to fish and the aquatic habitat.
- Students will appreciate the effect of the different physical environment encountered by organisms living in water.
- Students will be able to analyze issues in fisheries conservation and management using an ecological framework.
- Students will get experience with issues in modern fisheries management that deals with commercial fisheries, sport fisheries, environmental conservation and the interactions among these stakeholder groups.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3111 - Fish Ecology Laboratory (1 Credit)
Four field trips are planned to provide hands-on-experience in fish ecology and management. They include a one-weekday Great Lakes experience aboard the USGS Kaho on Lake Ontario, a one-day field trip to a state-of-the-art fish hatchery during the walleye run, a one-day Oneida Lake weekend trip to the Cornell Biological Field Station experiencing fish collection techniques, and a two-hour trip to the Cayuga Inlet to witness the spring run of rainbow trout and possibly lamprey eels. Activities include the use of various fish sampling gears and sample analysis techniques. Each student is required to maintain a written journal describing activities and concepts learned from each field trip that is submitted at the end of the semester.
Prerequisites: Prerequisite or corequisite: NTRES 3110.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2018, Spring 2016
Learning Outcomes:

- Students will get hands-on experience with fish sampling and the properties of different fishing gear.
- Students will gain an understanding of several fisheries management issues and techniques used in New York State.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3150 - Introduction to Conservation Bioacoustics (3 Credits)
This course provides a strong foundation in the discipline of conservation bioacoustics, the use of sound to assess biodiversity, monitor animal populations, and make conservation decisions. In lecture, students will learn the basics of how sound is recorded and visualized, how animals produce and perceive sounds, and how to select recording equipment that is appropriate to the question and application. The course lectures will also build skills in acoustic data analysis including manual annotation, template detection, and machine learning approaches.
In lab, students will use recording equipment to make recordings, practice analyzing acoustic data using a variety of cutting-edge analysis approaches, and learn strategies for the curation and management of large datasets. This course is a mandatory pre-requisite for an optional marine and terrestrial field component that will take place in Hawaii. Additional information about the related trip will be provided in class.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Describe how digital audio is recorded and stored.
- Create visualizations of sound using the Raven Pro software.
- Identify conservation contexts that are compatible with passive acoustic monitoring.
- Select suitable recording equipment and settings for specific taxonomic groups and habitats.
- Select and implement analytical tools for finding and identifying sounds in long recordings.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3151 - Conservation Bioacoustics Field Course Preparation (0.5 Credits)
This course will focus on preparing students for the winter term Hawai'i field course. Specifically, we will learn about Hawai'ian ecosystems, culture, and conservation needs, and ideate potential bioacoustic project ideas related to these topics. Students will also learn about field techniques and data management practices that will be essential during our field course. This course will include lectures from Yang Center instructors and our local collaborators, discussion of relevant literature, and group work to develop project ideas and create plans for data collection.
Prerequisites: NTRES 3150.
Last Four Terms Offered: Fall 2024, Fall 2023, Spring 2023
Learning Outcomes:

- Apply theoretical and practical knowledge from NTRES 3150/6150.
- Describe the threats to Hawai'ian biodiversity and how passive acoustic monitoring can support local conservation efforts.
- Design and plan research projects in Conservation Bioacoustics.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3152 - Field Methods in Conservation Bioacoustics: Hawai'i Experience (2 Credits)
This follow-up to the Conservation Bioacoustics Field Course will focus on the analysis, refinement, and presentation of data from the winter field experience. Students will work with marine and terrestrial data collected in Hawai'i to develop and refine statistical analysis, create graphics and visualizations, and communicate their results through scientific writing and media for general audiences.
Prerequisites: NTRES 3150 and NTRES 3151.
Last Four Terms Offered: Winter 2025, Winter 2024, Winter 2023
Learning Outcomes:

- Apply theoretical and practical knowledge from NTRES 3150.
- Operate acoustic devices in marine and terrestrial environments and identify appropriate recording equipment and settings for different research goals.
- Describe the threats to Hawai'ian biodiversity and how passive acoustic monitoring can support local conservation efforts.
- Design and execute conservation bioacoustics projects related to Hawai'ian biodiversity in marine and terrestrial habitats.
- Practice teamwork skills for designing, conducting, and presenting research, and providing constructive scientific feedback.
- Design, conduct, evaluate and discuss student-led scientific research, including written and verbal presentation of results.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3153 - Advanced Topics in Conservation Bioacoustics (2 Credits)
Proficiency in scientific research arises from direct first-hand experience and through interactions with colleagues and mentors. The course Advanced Topics in Conservation Bioacoustics will provide students with hands-on experience in cutting-edge bioacoustic methods. This course will consist of four modules, each built around learning and implementing an acoustic methodology to address a real-life conservation issue.
Each module will be taught by an expert in the topic, who will provide introductory lecture material and guide students through hands-on exercises on species from whales to gibbons to owls. These exercises will consist of a curated set of learning materials including original data, analysis scripts, and information about the stakeholders, project and site.
Prerequisites: NTRES 3150 or NTRES 6150, or instructor permission.
Last Four Terms Offered: Spring 2024
Learning Outcomes:

- Analyze passive acoustic monitoring datasets using cutting-edge analytical tools and approaches.
- Match conservation-oriented research questions with suitable acoustic analyses.
- Describe the primary challenges associated with different types of acoustic analysis.
- Transform and interpret large datasets into scientifically meaningful summaries and insights.
- Translate scientific skills to new topics and challenges.
- Provide feedback regarding scientific study design and critically review scientific literature.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3220 - Global Biodiversity (3 Credits)
This course will explore the historical and ecological concepts underlying the planet's biological diversity. The goal is to develop an overview of what we know about patterns and processes of biological diversity in the past, present, and future. Pattern and process is the foundation to explore conservation and policy implications of changing biodiversity. Patterns include species richness, endemism, and extinction for plants and animals. Processes include climatic, ecological, geographic, and human induced changes. Recognizing the origin and maintenance of biological diversity is imperative in light of the tremendous increase in the human population size and the effects that humans have on life on Earth.
Prerequisites: college-level biology and general ecology course.
Distribution Requirements: (BSC-AG, OPHLS-AG, SBA-AG)
Exploratory Studies: (CU-SBY); (LAAREA)

Last Four Terms Offered: Fall 2024, Fall 2021, Fall 2020, Fall 2019
Learning Outcomes:

- Describe the historical origins of biodiversity for major taxonomic groups, and how that biodiversity has been and is distributed across the Earth.
- Describe the ecological and biogeographic concepts that influence biodiversity.
- Investigate a topic of interest and explain the importance via research and writing.
- Predict the consequences of changing biodiversity and conservation strategies.
- Synthesize course content via writing and examination.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3240 - Sustainable, Ecologically Based Management of Water Resources (3 Credits)
In-depth analyses of those ecological and biological principles relevant to the sustainable management of global fresh and marine water resources. Lectures and discussion integrate scientific literature with current management issues, including water supply, dams, irrigation, and groundwater overdraft, and coastal development. Topics include linkages between hydrologic variability and communities, groundwater-surface connections, flow paths for dispersal, patchily distributed water resources, and water quality controls on organisms, and adaptations to climate change.
Enrollment Information: Enrollment limited to: juniors, seniors or graduate students.
Distribution Requirements: (PSC-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Students will be able to synthesize relevant hydrologic, ecological, and sociological information in order to make sound recommendations for sustainable watershed management.
- Students will gain insights into, and understanding of cultural, religious, and philosophical influences on water policy decisions around the world.
- Students will be able to analyze critical hydrologic data and tools, such as hydrographs and groundwater potentiometric surface maps, to understand natural and altered processes in water resources.
- Students will be able to access web-based, federal data-bases necessary for appropriate watershed management decisions.
- Students will gain experience in critical professional skills, including interpretation of research journal articles, creation of extension fact sheets, team-based negotiation, and presenting professional quality talks using Powerpoint.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3250 - Forest Management and Maple Syrup Production (3 Credits)
This course is designed to give students a practical and experiential exposure to private lands forest management and maple syrup production in New York and the Northeast. As a result of the class, students should be able to articulate the attributes of sustainable forest management practices on private woodlots. Student learning will emphasize field-based concepts and applications rather than theories and policy. All weekly labs are outdoors, and students will need appropriate winter clothing and potentially snowshoes. By the second lab, students need to provide a basic hardhat (construction type) and magnetic field compass with a rotating dial. The Thursday lab prior to spring break is mandatory.
Enrollment Information: Priority given to: juniors and seniors.
Distribution Requirements: (AFS-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Be able to describe the inter-relationship of the various tools and concepts necessary to sustainably manage a private forest.
- Be able to discuss forest management with others who do, and do not, have a background in forest management.
- Anticipate how forest management interacts with the management of other natural resources.
- Be able to articulate the utility (and limitations) of using forest management as a tool to achieve specific landowner objectives.
- Be able to demonstrate skill with: orienteering, tree identification, silvics, woodlot inventory, and maple sap collection and processing.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3260 - Applied Conservation Ecology (3 Credits)
Crosslisted with ENVS 3260
An interactive-field and lab course designed to provide direct experience with some of the most important field methods and analytical techniques used to examine species, ecosystem and community-level function, structure, and value, especially within the context of contemporary conservation ecology and evolutionary theory. Tools include field sampling techniques, resource and conservation mapping, spatial referencing, GIS, measures of biodiversity, and manual and automated techniques for studying soil, stream, forest, terrestrial, and marine biota and related physical factors. The class is designed to provide a strong background in field research methods and theory related to ecological conservation.
Prerequisites: college-level biology or permission of instructor.
Enrollment Information: Enrollment limited to: seniors and juniors who have taken college-level biology. All others need permission.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Students will understand and discuss perceptions, personal values, and effective tools to motivate people towards conservation.
- Encourage critical analyses, broad philosophical understanding, and integration of a variety of information sources including web-based and media reports, along with scientific publications.
- Students will be able to use scientific measurements and analyses to distinguish opinion from fact-based decisions.
- Students will participate in weekly class discussions based on diverse perspectives and philosophies.
- Students are required to give individual and group presentations, as well as numerous short essays and a final written report. The use of multiple forms of media will be encouraged and rewarded.
- Students will be evaluated based on independent work, quizzes, and presentations, along with weekly group exercises and two group presentations.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3311 - Environmental Governance (3 Credits)
Crosslisted with BSOC 3311, STS 3311, GDEV 3311
Environmental governance is defined as the assemblage of institutions that regulate society-nature interactions and shape environmental outcomes across a range of spatial and temporal scales. Institutions, broadly defined, are mechanisms of social coordination including laws (formal) and social norms (informal) that guide the behavior of individuals. Participants in the course will explore the roles of governments, markets, and collective action in environmental management and mismanagement. We will emphasize interactions among leading environmental policy strategies: public regulation, market-based incentives, and community-based resource management. The course is focused around a set of analytic perspectives. These theoretical frameworks allow us to synthesize empirical observations and material changes in ways that inform our understanding of contemporary evolution of environmental policy and management.
Distribution Requirements: (SBA-AG, SCH-AG), (SSC-AS)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will gain familiarity with the concepts, theories, and applications of institutional analysis applied to environment.
- Students will develop critical awareness of the strengths and weakness of states, markets, and collective structures as resources for social regulation.
- Students will develop an historical appreciation of environmental policy in order to reflect critically on contemporary status and trends.
- Students will develop an interdisciplinary understanding of environmental policy through exploration of economic, sociological, and political scientific perspectives.
- Students will be exposed to a broad range of environmental problems and policy and management responses. Coverage includes national and international cases, and analyses at multiple scales.
- Students will develop capacity to conduct institutional analysis including the specification of a research question, policy research, synthesis, and communication.
- Students will build generic competencies including reading of scientific and popular texts, writing, oral communication, group work, and critical analysis.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3330 - Ways of Knowing: Indigenous and Place-Based Ecological Knowledge (3 Credits)
Crosslisted with AIIS 3330, AMST 3330
Based on indigenous and place-based ways of knowing, this course (1) presents a theoretical and humanistic framework from which to understand generation of ecological knowledge; (2) examines processes by which to engage indigenous and place-based knowledge of natural resources, the nonhuman environment, and human-environment interactions; and (3) reflects upon the relevance of this knowledge to climatic change, resource extraction, food sovereignty, medicinal plant biodiversity, and issues of sustainability and conservation. The fundamental premise of this course is that human beings are embedded in their ecological systems.
Enrollment Information: Enrollment limited to: juniors and seniors.
Distribution Requirements: (CA-AG, D-AG, ETH-AG, KCM-AG, SBA-AG, SCH-AG), (ETM-AS)
Exploratory Studies: (CU-CEL, CU-ITL, CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2020
Learning Outcomes:

- To appreciate natural resource development from a human ecological perspective.
- To apply the interdisciplinary lens of human ecology to understand human and environmental relations.
- To appreciate the complex interconnectivity between the ecological and the cultural.
- To comprehend that individual actions informed by cultural systems manifest themselves in social structures that rely on ecological foundations.
- To extend the notion of transdisciplinary to include indigenous and place-based knowledge.
- To situate indigenous and local knowledge within a humanistic framework of knowledge generation.
- To illustrate the participatory and experiential basis of indigenous and place-based knowledge.
- To propose a method best suited for researching such knowledge processes.
- To value the contributions of indigenous and place-based knowledge in the context of socio-cultural and environmental change and natural resource utilization.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 3400 - Molecular Tools for Ecology, Conservation, and Natural Resource Management (3 Credits)
Molecular genetics has become one of the fastest growing fields in the life sciences, and application of molecular methods has spread to virtually all fields of modern biology. In this course, we will examine how DNA analysis and modern 'omics' technologies can be used to address important issues in ecology, conservation, and natural resource management such as identification of species, populations, and individuals, reconstruction of phylogenetic and kinship relationships, and inference of migration patterns, behavior, and abundance. The focus will be on practical applications, and students will develop both a theoretical understanding of the methods and hands-on experience with all steps from sample collection, molecular biology laboratory techniques, data analysis, and communication of results.
Prerequisites: Recommended prerequisite: BIOMG 2800 or NTRES 2830 or equivalent.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Fall 2022, Fall 2021, Spring 2019, Spring 2018
Learning Outcomes:

- Identify the major types of genetic variation, their function in the genome, and their utility for molecular ecological analyses.
- Explain and perform basic molecular biology laboratory techniques such as DNA extraction, polymerase chain reaction (PCR), and gel electrophoresis.
- Analyze raw molecular sequence and genotyping data and interpret the results in an applied context.
- Summarize the strengths and limitations of molecular ecological methods and identify scientific questions in ecology, conservation, and natural resource management that can be addressed with a molecular approach.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4100 - Advanced Conservation Biology: Concepts and Techniques (4 Credits)
Decision making in conservation biology requires measurement and analysis of variation at various levels (individual, population, and landscape). Emphasis in this course is on quantitative tools for the formal analysis of variation at all three levels and principles guiding maintenance and management of biological diversity.
Prerequisites: CALS math requirement. Prerequisite or corequisite: NTRES 3100, NTRES 2830 or equivalents, or permission of instructor.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will be able to use conceptual and analytical tools to describe demographic and genetic factors influencing population persistence.
- Students will be able to quantify the relative importance of various demographic factors affecting population size projections.
- Students will be able to understand and use fundamental analytical methods to quantify genetic structure at the individual, population and metapopulation scale and infer demographic and evolutionary processes shaping patterns of variation.
- Students will be able to make predictions about population viability based on their knowledge about demographic and genetic factors influencing population size and mean population fitness.
- Students will be able to integrate conceptual and theoretical understanding to reach specified conservation management objectives.
- Students will be able to articulate in written and oral form their understanding of both the concepts and analytical tools, and the role of sources of uncertainty, in application to problems in conservation.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4120 - Wildlife Population Analysis: Techniques and Models (3 Credits)
This course will explore the theory and application of statistical methods used in the conservation and management of wildlife and fish populations, including capture-mark-recapture and occupancy modeling as well as other cutting-edge methodologies. This course will focus on estimating population parameters, such as survival, recruitment, movement, and abundance, as well as the dynamics associated with temporal changes in these parameters. Individual modules will integrate hypothesis development, data analysis, and inference to reinforce concepts discussed throughout the course. Students will become fluent in the R programming language and be exposed to a wide variety of real-world applications.
Prerequisites: NTRES 3100 or NTRES 4100 (or equivalent or permission of instructor).
Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Apply appropriate tools and methods of scientific inquiry to wildlife and fisheries research.
- Articulate the role of parameter estimation in the development and application of statistical models as used in the conservation and management of biotic resources.
- Use fundamental statistical methods to describe structure and dynamics of populations and communities.
- Critically read, interpret and critique peer-reviewed literature on the estimation of population parameters.
- Articulate the importance of accounting for detection uncertainty in the analysis and interpretation of change in wildlife and fish populations over space and time.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4150 - Conservation with Communities for One Health (2 Credits)
This course integrates life, social, and medical sciences with the humanities to explore the concept of One Health, the idea that the health of the environment, animals, and people are all inextricably linked. The course provides a comprehensive framework that enables students to critically examine varied perspectives and expand their view of the world, skills that are essential to a career in the interdisciplinary fields of One Health, Planetary Health and Conservation Medicine. The course also serves as a preparatory course for a subset of students who will be selected for international field experiences to work with communities to conserve endangered rhinoceroses and great apes with our partners in Indonesia (Ujung Kulon National Park and Alliance of Integrated Forest Conservation) and Africa (Jane Goodall Institute).
Prerequisites: BIOEE 2670/NTRES 2670 or VTMED 6735.
Exploratory Studies: (CU-SBY); (SAAREA)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Students will use basic vocabulary linking the One Health disciplines to explore the history of conservation and human impacts on the earth.
- Students will be able to articulate basic principles associated with each of the three components of One Health: environmental health, animal health, human health - and identify their intersections and interactions with art and culture, the humanities, government and policy and the social sciences.
- Students will synthesize, reflect on, and think critically about the ways in which ecological and social dimensions relate to One Health.
- Students will be able to demonstrate the impact of language, art, history and governance on conservation and communities.
- Students will be able to integrate and apply concepts across disciplines to explore and develop strategies to support conservation and communities.
- Students will be able to reflect on and analyze their own biases and belief systems to develop a foundation for meaningful engaged learning.
- Upon completion of this course, students will be able to collaborate effectively in a team across disciplines to analyze real-world challenges and propose comprehensive solutions using concepts learned in class.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4155 - Conservation Medicine: A One Health Laboratory (3 Credits)
The program integrates students into the issues and challenges at the core of the preservation of species diversity through direct exposure to risks and mitigation strategies being used to protect the Indonesian Rhino and the African Great Ape. It provides students with general concepts relative to species risk, but also directly engages them in addressing these problems within the necessary cultural and economic context of competing pressures between human and animal populations. As such, through direct engagement, the course represents an immersion in the concept of One Health. This concept of a more holistic approach to medicine that considers animal and environmental, as well as human health is made tangible through exposure to the current threats to the survival of key species. Multi-term course with NTRES 4161, students must enroll in both sections.
Prerequisites: NTRES 4150.
Distribution Requirements: (OPHLS-AG)
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Summer 2025
Learning Outcomes:

- Students will use basic vocabulary linking the One Health disciplines to explore the history of conservation and human impacts on the earth.
- Students will be able to articulate basic principles associated with each of the three components of "One Health": environmental health, animal health, human health – and identify their intersections and interactions with art and culture, the humanities, government and policy and the social sciences.
- Students will synthesize, reflect on, and think critically about the ways in which ecological and social dimensions relate to One Health.
- Students will be able to demonstrate the impact of language, art, history and governance on conservation and communities.
- Students will be able to integrate and apply concepts across disciplines to explore and develop strategies to support conservation and communities.
- Students will be able to reflect on and analyze their own biases and belief systems to develop a foundation for meaningful engaged learning.
- Upon completion of this course, students will be able to collaborate effectively in a team across disciplines to analyze real-world challenges and propose comprehensive solutions using concepts learned in class.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4160 - Conversations in Conservation for One Health (1 Credit)
This is a seminar series on community conservation projects conducted through Engaged Cornell with partners in Indonesia (Ujung Kulon National Park and Alliance of Integrated Forest Conservation) and Africa (Jane Goodall Institute). Each meeting consists of a presentation, open to students and members of the community, given by a veterinary or undergraduate participant of the Engaged Learning Program and followed by a discussion with enrolled students. The course brings together faculty and student mentors with prospective students interested in conservation medicine, providing opportunities for dialogue on One Health projects from proposal and implementation to impact and reflection. Debriefing uses material from field portfolios and relevant literature to augment case-based sharing of unique conservation experiences at the wildlife-domestic animal interface, great ape-human interactions, and environmental-public policy.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2019
Learning Outcomes:

- Students will provide others with knowledge and ideas that help form the foundation on which to find opportunities, further training, and build a career in the field of conservation.
- Students will foster critical thinking and interest in their home communities concerning their collective experiences in conservation.
- Students will promote a sensitivity to the needs of local hosting communities and to the ethical roles of the conservationist in society.
- Students will synthesize and communicate the diverse social, ecological, and health issues underpinning their field experiences.
- Students will evaluate the impact of their contributions, taking into account the various perspectives of stakeholders related to their field experiences.
- Students will respectfully articulate the cultural context of socioecological challenges related to their field experiences.
- Students will identify and apply the concepts and lessons learned in their field experiences to other global One Health challenges.
- Students will demonstrate how working as part of interdisciplinary teams is helpful for examining linkages and finding creative solutions in conservation.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4280 - Principles and Practices of Applied Wildlife Science (3 Credits)
Covers the theory and practice of solving wildlife-related, resource management issues. The integration of human dimensions inquiry and applied wildlife science are examined. Important aspects of contemporary wildlife management issues will be critically evaluated and discussed. Important policies, legislation, management actions, and case studies are highlighted. This course includes sessions with information and practices important for sustaining threatened or endangered wildlife populations, and also international aspects of wildlife management.
Prerequisites: NTRES 3100 or equivalent.
Enrollment Information: Enrollment limited to: juniors and seniors who have taken an upper-level ecology or management course.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Students will be able to read, synthesize, and critically review published literature in wildlife ecology, management, and human dimensions journals.
- Students will write, discuss, and knowledgeably present the key wildlife management aspects of contemporary environmental and sustainability issues.
- Students will be able to design experiments and field surveys based on scientific hypotheses.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4300 - Environmental Policy Processes I (0.5 Credits)
This on-campus and off-campus course sequence focuses on how environmental policy issues move through the federal policy-making process. Students select an environmental policy topic during the fall semester session (NTRES 4300) for analysis during the second part of the course (NTRES 4301), which takes place in Washington, D.C. The second session continues course focus on contemporary environmental problems, how they are defined, aggregating interests, agenda-setting, formulating alternative solutions, implementation and evaluation, and roles of lobbyists, advocates, the legislative, executive, judicial branches of government, and other actors. DC activities also include organized meetings with policy makers, advocates and experts as guest panelists. The spring semester session (NTRES 4302) requires presenting an oral policy briefing and writing both short and long policy briefs based on the DC interviews and additional research.
Enrollment Information: Enrollment limited to: juniors or seniors.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Define what constitutes an environmental policy problem.
- Describe the stages of policymaking.
- Compare the ways that actors, institutions, and constraints interact to influence environmental policies.
- Analyze specific case studies of environmental policy problems and efforts to address them.
- Prepare and use notes from interviews with policymakers to summarize diverse perspectives regarding a contemporary environmental policy problem.
- Evaluate, synthesize, and contrast sources of information in preparing an objective environmental policy analysis.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4301 - Environmental Policy Processes II (1.5 Credits)
This on-campus and off-campus course sequence focuses on how environmental policy issues move through the federal policy-making process. Students select an environmental policy topic during the fall semester session (NTRES 4300) for analysis during the second part of the course (NTRES 4301). The second session continues course focus on contemporary environmental problems, how they are defined, aggregating interests, agenda-setting, formulating alternative solutions, implementation and evaluation, and roles of lobbyists, advocates, the legislative, executive, judicial branches of government, and other actors. DC activities also include organized meetings with policy makers, advocates and experts as guest panelists. The spring semester session (NTRES 4302) requires presenting an oral policy briefing and writing both short and long policy briefs based on the DC interviews and additional research.
Enrollment Information: Enrollment limited to: juniors or seniors.
Course Fee: Course Fee, $600. Fee amount approximate, $550 to $600 for lodging and use of facilities at the Wolpe Cornell Center in Washington, D.C.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Winter 2025, Winter 2024, Winter 2023, Winter 2022
Learning Outcomes:
- Define what constitutes an environmental policy problem.
- Describe the stages of policymaking.
- Compare the ways that actors, institutions, and constraints interact to influence environmental policies.
- Analyze specific case studies of environmental policy problems and efforts to address them.
- Prepare and use notes from interviews with policymakers to summarize diverse perspectives regarding a contemporary environmental policy problem.
- Evaluate, synthesize, and contrast sources of information in preparing an objective environmental policy analysis.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4302 - Environmental Policy Processes III (1 Credit)
This on-campus and off-campus course sequence focuses on how environmental policy issues move through the federal policy-making process. Students select an environmental policy topic during the fall semester session (NTRES 4300) for analysis during the second part of the course (NTRES 4301). The second session continues course focus on contemporary environmental problems, how they are defined, aggregating interests, agenda-setting, formulating alternative solutions, implementation and evaluation, and roles of lobbyists, advocates, the legislative, executive, judicial branches of government, and other actors. DC activities also include organized meetings with policy makers, advocates and experts as guest panelists. The spring semester session (NTRES 4302) requires presenting an oral policy briefing and writing both short and long policy briefs based on the DC interviews and additional research.
Enrollment Information: Enrollment limited to: juniors or seniors.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Students will be able to define what constitutes an environmental policy problem.
- Students will be able to describe the stages of policymaking.
- Students will be able to compare the ways that actors, institutions, and constraints interact to influence policymaking.
- Students will analyze specific case studies of environmental policy problems and efforts to address them.
- Students will prepare and use notes from interviews with policymakers to summarize diverse perspectives regarding a contemporary environmental policy problem.
- Students will evaluate, synthesize, and contrast sources of information in preparing an objective environmental policy analysis.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4380 - Agroforestry (3 Credits)
Hands-on, experiential learning in agroforestry and forest farming. Students will learn skills related to planning and implementing agroforestry systems, focusing on non-timber forest products (NTFPs), forest site assessment, site design, biodiversity considerations, and group projects. Weekly activities and field trips include hands-on applications, species outlines and discussions, reading and presentation assignments, and participatory demonstrations.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4400 - Nature-Based Climate Solutions? (3 Credits)
Crosslisted with ENVS 4400
The risks and costs associated with climate change, and the uneven distribution of the risks and costs, produce hot politics. In the past 20 years, 'Natural Climate Solutions' (NCS) has emerged as an important environmental policy and management response. NCS encompasses a range of strategies focused on managing agriculture, forests, grasslands, and aquatic environments to store carbon in order to meet GHG reduction goals. Planning, implementation, finance, governance and assessment raise multiple questions, and NCS represents a research and policy frontier for scientists, policy makers, practitioners, and activists. Through interdisciplinary active learning strategies, students in the course will engage critical questions as part of an effort to assess and to develop NCS.
Distribution Requirements: (OPHLS-AG, SBA-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4500 - Climate Solutions Capstone (3 Credits)
Crosslisted with ENVS 4500
Interested in working toward solutions to the climate crisis? In this course, you will choose and implement a climate action from Project Drawdown's (www.drawdown.org) list of 82 climate solutions. You will also apply social sciences research to influence your friends or family to implement your climate action alongside you. For the capstone team project, you will work with other students and a community partner (Cornell Cooperative Extension or Climate Action Now) to support education related to plant-rich diet, low-emissions agriculture, forest regeneration, or other climate solutions. Interested students should have a general understanding of climate change science.
Distribution Requirements: (GLC-AS), (SBA-AG)
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Compare approaches to mitigating climate change and choose an individual climate mitigation action.
- Apply social sciences research to develop and implement an action plan to influence one of your social networks (e.g., friends, family, Instagram followers) to take that action alongside you.
- Create your own arguments for the responsibility of individuals, corporations, and the broader collective to foster climate and food justice.
- Collaborate professionally and equitably with community partners to develop educational materials related to sustainable food, agricultural, and forestry practices and policies.
- Communicate through a variety of media including writing, presentations, and apps. 6. Evaluate and respond to constructive peer feedback on discussion boards and during real-time online discussions.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4520 - Land Use and Sustainable Livelihoods in the Nilgiris (3 Credits)
This course addresses land use and land governance in the Nilgiri Biosphere Reserve. Students explore how changes in land use shape prospects for sustainable livelihoods in connection with agriculture, non-timber forest products, and tourism. This course is offered in conjunction with Cornell Abroad's program: Cornell in India: Nilgiris Field Learning Center (NFLC). The NFLC is an engaged learning and research program where Cornell students and members of local communities live, study, and research together for 16 weeks each spring.
Prerequisites: CRP 3750.
Enrollment Information: Enrollment limited to: students admitted to the Nilgiris Field Learning Center study abroad program with 3.0 GPA.
Exploratory Studies: (CU-CEL, CU-ITL, CU-SBY)

Last Four Terms Offered: Spring 2022, Spring 2020, Spring 2019, Spring 2017
Learning Outcomes:

- Understand relationships between land use and diet, health, economic security, culture, and ecological integrity at household, community, and regional scales.
- Develop cross-cultural learning capabilities.
- Develop capacity to participate in design and execution of interdisciplinary, problem-based, community engaged research on questions of sustainability.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4560 - Stream Ecology (4 Credits)
Crosslisted with BIOEE 4560
Lecture examines patterns and processes in stream ecosystems, including geomorphology and hydrology, watershed-stream interactions, trophic dynamics, biogeochemistry, disturbance, and conservation and management. Field and laboratory exercises focus on experimental and analytical techniques used to study stream ecosystems, including techniques to measure stream discharge, physical habitat, water chemistry, and stream biota. Field project with lab papers.
Prerequisites: BIOEE 1610 or permission of instructor.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Fall 2023, Fall 2021, Fall 2019, Fall 2017
Learning Outcomes:

- Students will understand the morphology and classification of streams based on channel formation and characteristics of stream networks and watersheds.
- Students will understand the basic chemical and physical dynamics of stream ecosystems.
- Students will be familiar with the important organic matter sources that fuel running water ecosystems.
- Students will understand the major longitudinal, vertical, and lateral linkages that connect streams to the surrounding land- and riverscape.
- Students will gain knowledge and appreciation of the tremendous diversity of stream ecosystems found around the world, along with basic characteristics that distinguish them.
- Students will learn common groups of stream biota including fish, invertebrates, and stream algae.
- Students will gain knowledge of the importance of different biotic interactions and abiotic factors that shape patterns and processes in stream ecosystems.
- Students will learn basic conceptual models that link stream ecosystem structure and function.
- Students will gain basic knowledge of stream conservation biology, factors contributing to degradation of stream environments, and strategies for the restoration of damaged running water ecosystems.
- Students will conduct field and lab exercises throughout the course to familiarize them with methods for collecting and analyzing stream ecological data. Students will engage in a semester-long project in which they set up a field experiment, collect and analyze samples from their experiment, and summarize and interpret experimental results.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4600 - Planning for Environmental Conservation and Sustainability (3 Credits)
Crosslisted with ENVS 4600
An interactive course designed to provide students with experience applying some of the most important techniques that are used to develop plans to protect and sustain valuable environmental resources, such as species, ecosystems, land, and water. The class focuses on highly charged controversies over conservation, and students learn how planning can help them to identify and address the full range of ecological and social factors that lead to conservation success in these contexts. Students adopt the roles of stakeholders and work on intensive case studies of conservation issues, learning how ecological and social insight are integrated for effective conservation planning. Topics covered in the course include: rational planning, adaptive management, stakeholder engagement, and conflict resolution.
Enrollment Information: Enrollment limited to: juniors and seniors, all others require permission of instructor.
Distribution Requirements: (SBA-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will learn to define conservation issues, develop plans (including goals, objectives, strategies, and actions) to address those issues, and identify potential positive and negative consequences of these plans.
- Students will be able to recognize and describe the range of ecological and social factors that influence the success of conservation efforts.
- Students will be able to identify and describe the stages of the planning process and learn how to carry out the activities that occur during these stages.
- For specific current issues in environmental conservation, students will recognize key stakeholder groups and be able to describe: these stakeholders' interests and concerns, points of contention between different stakeholders, and possible strategies and actions for addressing these points of contention.
- Students will develop their written and oral communications skills.
- Students will develop their abilities to work individually and in groups.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4601 - Decision Making in Natural Resource Management (2 Credits)
This course will provide an introduction to the principles and practice of structured decision making and its application in natural resource management. Students will become familiar with methods for finding optimal solutions to decision problems, and will apply these methods to natural resource problems. Students will become familiar with the application of quantitative decision modeling tools: single and multiple-objective trade-off techniques, decision trees, Bayesian belief and decision networks, linear programming, and dynamic optimization.
Prerequisites: NTRES 4600 is highly recommended, but not required.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021
Learning Outcomes:

- Students will be able to analyze decision systems in terms of proximate and ultimate causation and actions, and be able to work with multi-level systems interactions and decision structures.
- Students will be able to use basic conceptual and analytical tools for describing and quantifying decision structures for dynamical systems.
- Students will be able to develop optimization models for decision making as applies to natural resource management. In particular, students will become familiar with the application of quantitative decision modeling tools: single and multiple-objective trade-off techniques, decision trees, Bayesian belief and decision networks, linear programming, and dynamic optimization.
- Students will be able to integrate conceptual and theoretical understanding to reach specified conservation management objectives.
- Students will be able to articulate in written and oral form their understanding of both the concepts and analytical tools, and the role of sources of uncertainty, in application to problems in conservation and resource management.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4700 - Art and Science of the Mohawk River Watershed (3 Credits)
Crosslisted with ENVS 4700
This experiential, community-engaged interdisciplinary course will introduce students to a range of artistic and ecological practices to understand, interpret, and communicate past and present environmental issues of the Mohawk River Basin. We will dive deep into current topics related to the river basin using the New York Water Resource Institute's Action Agenda items including A) Understanding inequitable distribution of flood, drought, and water scarcity vulnerability in New York State. B) Exploring traditional ecological knowledge and people's history of the river to help to communicate those knowledge systems. C) Learn about water quality, restoration, and riparian systems.
Course Fee: Course Fee, $50. For food and lodging.
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Spring 2025, Spring 2024
Learning Outcomes:

- Discuss the geological, geographical, environmental and people's history of the Mohawk River Watershed.
- Articulate current issues and scientific research of the Mohawk River Basin.
- Summarize the NY Water Resource Institute's Action Agenda, specifically the Mohawk River Action agenda items.
- Exhibit an understanding of traditional knowledge and history of the Haudenosaunee people as it relates to the Mohawk River.
- Interrelate field study, scientific research, cultural and artistic practices to deepen a sense of place, specifically the Mohawk River Valley.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4750 - Environmental Justice and Policy (3 Credits)
Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (USEPA, 2017). This hands-on seminar course addresses key topics and themes in environmental justice. This course investigates the disproportionate impacts of climate change and related adaptation and mitigation efforts on vulnerable groups, especially communities of color and indigenous communities. In addition, this course looks at policy drivers and levers that may carve opportunities for change for the future.
Enrollment Information: Enrollment limited to: upper-level undergraduates.
Distribution Requirements: (D-AG)
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Spring 2023, Spring 2022
Learning Outcomes:

- Recognize and explain the connections and intersections between inequality (social, economic, political) and environmental quality/ sustainability.
- Illustrate and express why certain social groups and geographic communities are systematically overburdened with pollution and other environmental hazards.
- Relate concepts like environmental (in) justice, environmental racism, and racial capitalism to real people and communities through in-depth readings, course discussions, and engagement with community organizations.
- Give examples of the root causes of environmental injustices.
- Understand the history of environmental justice and identify key questions and obstacles to meeting goals of environmental justice.
- Research and develop innovative policy solutions to environmental injustice.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4800 - Wildlife Corridor Conservation & Crossing Design (3 Credits)
Crosslisted with ENVS 4800
Habitat fragmentation is one of the biggest threats to biodiversity conservation. Ecological connectivity conservation is a growing approach to counter fragmentation and enhance landscape and seascape climate resilience. This course will develop comparative case study assessments of wildlife corridors and wildlife crossing designs as examples of connectivity conservation. Students will learn about ecological connectivity, large landscape/seascape conservation, and road ecology.
Exploratory Studies: (CU-SBY); (LAAREA)

Last Four Terms Offered: Spring 2025
Learning Outcomes:

- As a result of participating in this course, students will be able to: Work effectively as a team, collaborating with peers, outside experts, and instructors.
- Design and manage a team project that defines feasible goals and executes them.
- Integrate knowledge from diverse disciplines and prior courses to critically analyze a complex problem in sustainability.
- Communicate their findings to both academic and public audiences via written reports and oral presentations.
- Adapt to challenges and evolving stakeholder requests without sacrificing the rigor and objectivity of their assessment.
- Understand the complex regulatory, policy, public relations, scientific, and engineering constraints that influence ecological connectivity initiatives.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 4940 - Special Topics in Natural Resources (1-4 Credits)
The department teaches trial courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4960 - Internship in Natural Resources (1-3 Credits)
On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and the student, stating the learning objectives, conditions of the work assignment, nature of on-the-job supervision, and reporting requirements, including the formal basis on which the faculty supervisor will assign a grade. All 4960 internship courses must adhere to the CALS guidelines at cals.cornell.edu/academics/student-research/internship.
Exploratory Studies: (CU-SBY, CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4961 - Perspectives in Global Development (1 Credit)
Crosslisted with GDEV 4961, AEM 4961
A variety of speakers present seminars on international development topics relating to sustainable development throughout the world. Students attend each seminar and submit a five-page essay at the end of the semester reflecting on the speakers' presentations and analyzing connections between topics.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4970 - Individual Study in Environmental Social Science and Resource Policy (1-4 Credits)
Individual study under faculty supervision. Topics in environmental social science resource policy are arranged depending on the interests of students and availability of staff.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4971 - Individual Study in Applied Ecology and Conservation Ecology (1-4 Credits)
Individual study under faculty supervision. Topics in applied ecology or conservation biology are arranged depending on the interests of students and availability of staff.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4972 - Individual Study in Ecosystem Science and Biochemistry (1-4 Credits)
Individual study under faculty supervision. Topics in ecosystem science and biogeochemistry are arranged depending on the interests of students and availability of staff.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4980 - Undergraduate Teaching in Natural Resources (1-4 Credits)
Designed to give students an opportunity to obtain teaching experience by assisting in labs, field trips for designated sections, discussions, and grading. Students gain insight into the organization, preparation, and execution of course plans through application and discussions with instructor.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 4990 - Undergraduate Research (1-6 Credits)
Undergraduate research projects in natural resources; contingent on finding a faculty person to work with.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 5110 - Fish Ecology, Conservation, and Management (3 Credits)
This course covers basic principles of fish ecology at the individual, population, and community level. These ecological principles are applied to the conservation and management of fisheries resources and aquatic habitats. Several fisheries management case studies are analyzed using these principles. Examples are taken from both the freshwater and marine environments.
Prerequisites: NTRES 2100, general ecology, or equivalent recommended.
Last Four Terms Offered: Spring 2024, Spring 2022
Learning Outcomes:

- Students will understand basic ecological principles at the individual, population and community level as they pertain to fish and the aquatic habitat.
- Students will appreciate the effect of the different physical environment encountered by organisms living in water.
- Students will be able to analyze issues in fisheries conservation and management using an ecological framework.
- Students will get experience with issues in modern fisheries management that deals with commercial fisheries, sport fisheries, environmental conservation and the interactions among these stakeholder groups.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 5400 - Molecular Tools for Ecology, Conservation, and Natural Resource Management (3 Credits)
Molecular genetics has become one of the fastest growing fields in the life sciences, and application of molecular methods has spread to virtually all fields of modern biology. In this course, we will examine how DNA analysis and modern 'omics' technologies can be used to address important issues in ecology, conservation, and natural resource management such as identification of species, populations, and individuals, reconstruction of phylogenetic and kinship relationships, and inference of migration patterns, behavior, and abundance. The focus will be on practical applications, and students will develop both a theoretical understanding of the methods and hands-on experience with all steps from sample collection, molecular biology laboratory techniques, data analysis, and communication of results.
Prerequisites: Recommended prerequisite: BIOMG 2800 or NTRES 2830 or equivalent.
Last Four Terms Offered: Fall 2022, Fall 2021
Learning Outcomes:

- Identify the major types of genetic variation, their function in the genome, and their utility for molecular ecological analyses.
- Explain and perform basic molecular biology laboratory techniques such as DNA extraction, polymerase chain reaction (PCR), and gel electrophoresis.
- Analyze raw molecular sequence and genotyping data and interpret the results in an applied context.
- Summarize the strengths and limitations of molecular ecological methods and identify scientific questions in ecology, conservation, and natural resource management that can be addressed with a molecular approach.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 5750 - Environmental Justice and Policy (3 Credits)
Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (USEPA, 2017). This hands-on seminar course addresses key topics and themes in environmental justice. This course investigates the disproportionate impacts of climate change and related adaptation and mitigation efforts on vulnerable groups, especially communities of color and indigenous communities. In addition, this course looks at policy drivers and levers that may carve opportunities for change for the future.
Enrollment Information: Enrollment limited to: upper-level undergraduates and graduate students.
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Spring 2023, Spring 2022
Learning Outcomes:

- Recognize and explain the connections and intersections between inequality (social, economic, political) and environmental quality/ sustainability.
- Illustrate and express why certain social groups and geographic communities are systematically overburdened with pollution and other environmental hazards.
- Relate concepts like environmental (in) justice, environmental racism, and racial capitalism to real people and communities through in-depth readings, course discussions, and engagement with community organizations.
- Give examples of the root causes of environmental injustices.
- Understand the history of environmental justice and identify key questions and obstacles to meeting goals of environmental justice.
- Research and develop innovative policy solutions to environmental injustice.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 5900 - Professional Projects - M.P.S. (1-15 Credits)
For M.P.S. graduate students working on professional master's projects.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6000 - Introduction to Graduate Study in Natural Resources (1 Credit)
Students will attend weekly seminar in Natural Resources and engage in follow up discussion of the scientific content presented and implications for the management and conservation of resources. Additional goal of the course is to examine how scientists pursue career paths toward effective participation in this realm. Discussions focus on the practices of scientists and institutions that provide a framework for scientific endeavors.
Enrollment Information: Enrollment limited to: graduate students in Natural Resources or permission of instructor.
Last Four Terms Offered: Fall 2024, Spring 2024, Fall 2023, Spring 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6040 - Seminar on Selected Topics in Resource Policy and Management (1-4 Credits)
Special topics seminar on subjects related to resource policy and management.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6100 - Collaborative and Reproducible Data Science in R (2-3 Credits)
As datasets grow larger and more complex across all areas of science, computational skills are increasingly in high demand. This course introduces a series of practical tools that enable researchers to spend less time wrestling with software or repeating error-prone manual data processing and more time getting research done in efficient and transparent ways that facilitate collaboration and reproducibility. We will work in R/RStudio. Topics covered include 1) tidy data formatting, 2) rearrangement, filtering, exploration, and visualization of complex datasets, 3) basic programming, 4) version control with Git and GitHub, and 5) using R Markdown to combine text, code, tables, and figures into reports, websites, and presentations. The course emphasizes practical skill development and is structured around hands-on (the keyboard) learning.
Forbidden Overlaps: AEM 2850, GDEV 4290, GDEV 5290, NTRES 6100, STSCI 3040, STSCI 5040
Last Four Terms Offered: Fall 2024, Spring 2023, Spring 2022, Spring 2021
Learning Outcomes:

- Describe strategies for ensuring that their data analysis is reproducible.
- Demonstrate best practices for coding and project-oriented workflows in RStudio.
- Import and clean messy data files using a variety of packages and functions in R.
- Subset, reorganize, and merge diverse datasets in R.
- Effectively explore and visualize patterns in complex datasets with ggplot in R.
- Write simple functions/programs and data analysis pipelines in R.
- Automate repeated analysis tasks in R.
- Track the history of file changes (version control) and collaborate effectively on scripts with others with Git and GitHub.
- Use R Markdown to combine text, equations, code, tables, and figures into reports, websites, and presentations.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6120 - Wildlife Population Analysis: Techniques and Models (3 Credits)
This course will explore the theory and application of statistical methods used in the conservation and management of wildlife and fish populations, including capture-mark-recapture and occupancy modeling as well as other cutting-edge methodologies. This course will focus on estimating population parameters, such as survival, recruitment, movement, and abundance, as well as the dynamics associated with temporal changes in these parameters. Individual modules will integrate hypothesis development, data analysis, and inference to reinforce concepts discussed throughout the course. Students will become fluent in the R programming language and be exposed to a wide variety of real-world applications.
Prerequisites: NTRES 3100 or NTRES 4100 (or equivalent or permission of instructor).
Last Four Terms Offered: Spring 2022, Spring 2020, Spring 2018, Spring 2016
Learning Outcomes:

- Apply appropriate tools and methods of scientific inquiry to wildlife and fisheries research.
- Articulate the role of parameter estimation in the development and application of statistical models as used in the conservation and management of biotic resources.
- Use fundamental statistical methods to describe structure and dynamics of populations and communities.
- Critically read, interpret and critique peer-reviewed literature on the estimation of population parameters.
- Articulate the importance of accounting for detection uncertainty in the analysis and interpretation of change in wildlife and fish populations over space and time.
- Analyze connections between core concepts of the class and graduate research.
- Apply understanding of these connections through teaching others about population analysis techniques relevant to their research.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6140 - Conservation Controversies Literature Seminar (2 Credits)
This seminar course is designed to give graduate students mid-level understanding of a suite of timely topics in environmental conservation and sustainability. We will discuss contentious topics, exploring different scientific perspectives as well as feedbacks among science, policy, management, and public perceptions. The overall learning objective is to encourage students to think critically and openly discuss the scientific and sustainability dimensions of major challenges in managing the Earth system in the21st century. A recurrent theme will be how these thorny issues are communicated and understood among scientists, decision makers, and the public. The semester will be divided into four thematic modules: 30x30 and the efficacy of protected areas, Carbon as a currency of sustainability, Feeding 9 billion, and Sustainability of renewable energy.
Last Four Terms Offered: Spring 2025, Fall 2021, Fall 2018, Fall 2014
Learning Outcomes:

- Think critically about pressing challenges in managing the Earth system in the 21st century, and become familiar with current literature on key sustainability issues.
- Gain experience communicating about contentious sustainability issues, and how these topics are understood among scientists, decision makers, and the public.
- Integrate Diversity, Equity, Inclusion, and Justice dimensions into analysis of sustainability issues.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6150 - Introduction to Conservation Bioacoustics (3 Credits)
This course provides a strong foundation in the discipline of conservation bioacoustics, the use of sound to assess biodiversity, monitor animal populations, and make conservation decisions. In lecture, students will learn the basics of how sound is recorded and visualized, how animals produce and perceive sounds, and how to select recording equipment that is appropriate to the question and application. The course lectures will also build skills in acoustic data analysis including manual annotation, template detection, and machine learning approaches.
In lab, students will use recording equipment to make recordings, practice analyzing acoustic data using a variety of cutting-edge analysis approaches, and learn strategies for the curation and management of large datasets. This course is a mandatory pre-requisite for an optional marine and terrestrial field component that will take place in Hawaii. Additional information about the related trip will be provided in class.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Describe how digital audio is recorded and stored.
- Create visualizations of sound using the Raven Pro software.
- Identify conservation contexts that are compatible with passive acoustic monitoring.
- Select suitable recording equipment and settings for specific taxonomic groups and habitats.
- Select and implement analytical tools for finding and identifying sounds in long recordings.
- Graduate students will be able to: interpret and evaluate the potential of emerging analysis approaches.
- Graduate students will be able to: analyze and teach others about specific topics in sound analysis.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6151 - Conservation Bioacoustics Field Course Preparation (0.5 Credits)
This course will focus on preparing students for the winter term Hawai'i field course. Specifically, we will learn about Hawai'ian ecosystems, culture, and conservation needs, and ideate potential bioacoustic project ideas related to these topics. Students will also learn about field techniques and data management practices that will be essential during our field course. This course will include lectures from Yang Center instructors and our local collaborators, discussion of relevant literature, and group work to develop project ideas and create plans for data collection.
Prerequisites: NTRES 3150/NTRES 6150.
Last Four Terms Offered: Fall 2024, Fall 2023, Spring 2023
Learning Outcomes:

- Apply theoretical and practical knowledge from NTRES 3150/6150.
- Describe the threats to Hawai'ian biodiversity and how passive acoustic monitoring can support local conservation efforts.
- Design and plan research projects in Conservation Bioacoustics.
- Research, identify, and apply advanced statistical methods with acoustic data, including conducting preliminary analysis on mock datasets that match the structure of the data that the students propose to collect.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6152 - Field Methods in Conservation Bioacoustics: Hawai'i Experience (2 Credits)
This field methods course will consist of a 2-week experience in Hawaii that provides hands-on experience with conservation bioacoustics projects across marine and terrestrial ecosystems on the Big Island of Hawai'i. Activities will include the design and execution of field projects, presentations and meetings with local researchers and conservation practitioners, group discussions on how to maximize conservation outputs from the projects, and analysis of acoustic data. Students will learn acoustic data collection techniques through participating in ongoing monitoring projects with researchers from the Hawai'i Marine Mammal Consortium and the University of Hawai'i. Throughout the course, teams of students will execute their conservation bioacoustic projects, including question development spanning hypothesis testing, study design, data collection, analysis, and writing. At the close of the course, students will present their findings in a symposium and write up their project results as a chapter in our annual field course book.
Prerequisites: NTRES 3150/6150 and NTRES 3151/6151.
Last Four Terms Offered: Winter 2025, Winter 2024, Winter 2023
Learning Outcomes:

- Apply theoretical and practical knowledge from NTRES 3150/6150.
- Operate acoustic devices in marine and terrestrial environments.
- Describe the threats to Hawai'ian biodiversity and how passive acoustic monitoring can support local conservation efforts.
- Design and execute conservation bioacoustics projects related to Hawai'ian biodiversity in marine and terrestrial habitats.
- Practice teamwork skills for designing, conducting, and presenting research, and providing constructive scientific feedback.
- Design, conduct, evaluate, and discuss student-led scientific research, including written and verbal presentation of results.
- Design and refine research questions based on observations in the field.
- Teach the basic steps to conducting bioacoustics research.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6153 - Advanced Topics in Conservation Bioacoustics (2 Credits)
Proficiency in scientific research arises from direct first-hand experience and through interactions with colleagues and mentors. The course Advanced Topics in Conservation Bioacoustics will provide students with hands-on experience in cutting-edge bioacoustic methods. This course will consist of four modules, each built around learning and implementing an acoustic methodology to address a real-life conservation issue.
Each module will be taught by an expert in the topic, who will provide introductory lecture material and guide students through hands-on exercises on species from whales to gibbons to owls. These exercises will consist of a curated set of learning materials including original data, analysis scripts, and information about the stakeholders, project and site.
Prerequisites: NTRES 3150 or NTRES 6150, or instructor permission.
Last Four Terms Offered: Spring 2024
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6240 - Sustainable Water Resource Management in the Face of Climate Change (4 Credits)
In-depth analyses of those ecological and biological principles relevant to the sustainable management of global fresh and marine water resources. Lectures and discussion integrate scientific literature with current management issues, including water supply, dams, irrigation, and groundwater overdraft, and coastal development. Topics include linkages between hydrologic variability and communities, groundwater-surface connections, flow paths for dispersal, patchily distributed water resources, and water quality controls on organisms, and adaptations to climate change.Students taking the course for graduate credit are required to meet one additional day each week outside the normal class times in order to participate in a collaborative graduate group project, which includes reading supplemental materials, weekly discussions, data collection/synthesis and write-up.
Enrollment Information: Enrollment limited to: graduate students or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Gain an increased understanding of the complex dimensions of applied, real-world water challenges.
- Gain experience working successfully in an interdisciplinary team setting on all the steps of a contemporary water challenge, starting with identification of an appropriate problem and ending with creation of a report and/or presentation or other appropriate product(s) which summarizes their conclusions and recommendations.
- Be exposed to relevant literature/web sources and increase their understanding of the current literature covering multidisciplinary perspectives and solutions to the selected water topic.
- Learn how to identify the range of relevant options to the selected water resource problem, and specifically learn how to apply sustainable, ecologically-based solutions.
- Learn to communicate and work collaboratively in a team setting with students representing engineering, landscape architecture, economics, ecology, regional planning and other relevant stakeholder disciplines (varies annually) in order to identify sustainable, collaborative solutions to the water problem. This outcome is particularly important and takes considerable effort as students entering the course speak different disciplinary jargons, frequently have no overlapping training, and build off of different philosophical frameworks associated both with their own personal backgrounds and with their respective disciplines.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6250 - Forest Management and Maple Syrup Production (3 Credits)
This course is designed to give students a practical and experiential exposure to private lands forest management and maple syrup production in New York and the Northeast. As a result of the class, students should be able to articulate the attributes of sustainable forest management practices on private woodlots. Student learning will emphasize field-based concepts and applications rather than theories and policy. All weekly labs are outdoors, and students will need appropriate winter clothing and potentially snowshoes. By the second lab, students need to provide a basic hardhat (construction type) and magnetic field compass with a rotating dial. The Thursday lab prior to spring break is mandatory.
Enrollment Information: Priority given to: graduate students.
Last Four Terms Offered: Spring 2024, Spring 2022
Learning Outcomes:

- Be able to describe the inter-relationship of the various tools and concepts necessary to sustainably manage a private forest.
- Be able to discuss forest management with others who do, and do not, have a background in forest management.
- Anticipate how forest management interacts with the management of other natural resources.
- Be able to articulate the utility (and limitations) of using forest management as a tool to achieve specific landowner objectives.
- Be able to demonstrate skill with: orienteering, tree identification, silvics, woodlot inventory, and maple sap collection and processing.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6260 - Applied Conservation Ecology (3 Credits)
An interactive-field and lab course designed to provide direct experience with some of the most important field methods and analytical techniques used to examine species, ecosystem and community-level function, structure, and value, especially within the context of contemporary conservation ecology and evolutionary theory. Tools include field sampling techniques, resource and conservation mapping, spatial referencing, GIS, measures of biodiversity, and manual and automated techniques for studying soil, stream, forest, terrestrial, and marine biota and related physical factors. The class is designed to provide a strong background in field research methods and theory related to ecological conservation.
Prerequisites: college-level biology or permission of instructor.
Enrollment Information: Enrollment limited to: graduate students.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Students will understand and discuss perceptions, personal values, and effective tools to motivate people towards conservation.
- Encourage critical analyses, broad philosophical understanding, and integration of a variety of information sources including web-based and media reports, along with scientific publications.
- Students will be able to use scientific measurements and analyses to distinguish opinion from fact-based decisions.
- Students will participate in weekly class discussions based on diverse perspectives and philosophies.
- Students are required to give individual and group presentations, as well as numerous short essays and a final written report. The use of multiple forms of media will be encouraged and rewarded.
- Students will be evaluated based on independent work, quizzes, and presentations, along with weekly group exercises and two group presentations.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6280 - Principles and Practices of Applied Wildlife Science (3 Credits)
Covers the theory and practice of solving wildlife-related, resource management issues. The integration of human dimensions inquiry and applied wildlife science are examined. Important aspects of contemporary wildlife management issues will be critically evaluated and discussed. Important policies, legislation, management actions, and case studies are highlighted. This course includes sessions with information and practices important for sustaining threatened or endangered wildlife populations, and also international aspects of wildlife management.
Prerequisites: NTRES 3100 or equivalent.
Enrollment Information: Enrollment limited to: juniors and seniors who have taken an upper-level ecology or management course.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Students will be able to read, synthesize, and critically review published literature in wildlife ecology, management, and human dimensions journals.
- Students will write, discuss, and knowledgeably present the key wildlife management aspects of contemporary environmental and sustainability issues.
- Students will be able to design experiments and field surveys based on scientific hypotheses.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6300 - Current Topics in Molecular Ecology and Population Genomics (1 Credit)
This graduate seminar will take the form of a journal club that meets weekly to discuss the burgeoning literature on genomic approaches used to address ecological and evolutionary questions in non-model organisms (i.e. organisms that have not been selected by large research communities for extensive study). The class time is used for discussion of recent primary research articles. Paper topics will be determined based on student interest and will include both novel results and methodological advances, primarily in evolutionary and ecological genomics or molecular ecology. To earn course credit, students are required to actively participate in class discussions each week and lead the discussion of at least one paper over course of the semester.
Prerequisites: introductory genetics plus a background in population or ecological genomics, or permission of instructor.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Spring 2023, Spring 2022, Spring 2021
Learning Outcomes:

- Interpret and critique papers from the primary literature in the fields of molecular ecology and population genomics.
- Discuss examples of how cutting-edge genomic methodology can be applied to address ecological and evolutionary questions in non-model organisms.
- Articulate ideas and questions in a group discussion on shared readings.
- Lead a group discussion on shared readings.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6310 - Environmental Governance (3 Credits)
Crosslisted with GDEV 6320
Considers the question of environmental governance, defined as the assemblage of social institutions that regulate natural resource use and shape environmental outcomes. Participants explore the roles of public policy, market exchange, and collective action in resource (mis)management. Introduces theoretical concepts from a variety of social science perspectives to support case studies and student-led discussions. Comparative analysis of how governance is pursued in different countries, historical periods, and ecological contexts (forestry, endangered species, water quality) highlight scope for institutional innovation. Students taking the course for graduate credit are required to read supplemental materials, undertake more complex research assignments, and participate in seminar discussion section.
Enrollment Information: Enrollment limited to: graduate students or permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2021, Fall 2019
Learning Outcomes:

- Describe the history and processes of environmental governance.
- Apply terms, concepts, and methods of critical institutional analysis to environmental governance.
- Take positions on classical and contemporary debates animating environmental policy processes.
- Apply knowledge to a specific question, concept, or problem selected for the term paper.
- Demonstrate content-specific oral and communication skills.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6330 - Ways of Knowing: Indigenous and Place-Based Ecological Knowledge (4 Credits)
Based on indigenous and place-based ways of knowing, this course (1) presents a theoretical and humanistic framework from which to understand generation of ecological knowledge; (2) examines processes by which to engage indigenous and place-based knowledge of natural resources, the nonhuman environment, and human-environment interactions; and (3) reflects upon the relevance of this knowledge to climatic change, resource extraction, food sovereignty, medicinal plant biodiversity, and issues of sustainability and conservation. The fundamental premise of this course is that human beings are embedded in their ecological systems. Graduate students are required to read supplemental materials, undertake more complex research assignments, and participate in seminar discussion section.
Enrollment Information: Enrollment limited to: graduate students or permission of instructor.
Exploratory Studies: (SAAREA)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2019
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6350 - Planning for Environmental Conservation and Sustainability (3 Credits)
An interactive course designed to provide students with experience applying some of the most important techniques that are used to develop plans to protect and sustain valuable environmental resources, such as species, ecosystems, land, and water. The class focuses on highly charged controversies over conservation, and students learn how planning can help them to identify and address the full range of ecological and social factors that lead to conservation success in these contexts. Students adopt the roles of stakeholders and work on intensive case studies of conservation issues, learning how ecological and social insight are integrated for effective conservation planning. Topics covered in the course include rational planning, adaptive management, stakeholder engagement, and conflict resolution.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students will learn to define conservation issues, develop plans (including goals, objectives, strategies, and actions) to address those issues, and identify potential positive and negative consequences of these plans.
- Students will be able to recognize and describe the range of ecological and social factors that influence the success of conservation efforts.
- Students will be able to identify and describe the stages of the planning process and learn how to carry out the activities that occur during these stages.
- For specific current issues in environmental conservation, students will recognize key stakeholder groups and be able to describe: these stakeholders' interests and concerns, points of contention between different stakeholders, and possible strategies and actions for addressing these points of contention.
- Students will develop their written and oral communication skills.
- Students will develop their abilities to work individually and in groups.
- For graduate credit, students will compare and contrast different approaches to planning for environmental conservation decisions.
- For graduate credit, students will analyze the strengths and weaknesses of common approaches to conflict resolution.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6380 - Agroforestry (3 Credits)
Hands-on, experiential learning in agroforestry and forest farming. Students will learn skills related to planning and implementing agroforestry systems, focusing on non-timber forest products (NTFPs), forest site assessment, site design, biodiversity considerations, and group projects. Weekly activities and field trips include hands-on applications, species outlines and discussions, reading and presentation assignments, and participatory demonstrations.
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6500 - Climate Solutions Capstone (3 Credits)
Interested in working toward solutions to the climate crisis? In this course, you will choose and implement a climate action from Project Drawdown's (www.drawdown.org) list of 82 climate solutions. You will also apply social sciences research to influence your friends or family to implement your climate action alongside you. For the capstone team project, you will work with other students and a community partner (Cornell Cooperative Extension or Climate Action Now) to support education related to plant-rich diet, low-emissions agriculture, forest regeneration, or other climate solutions. Interested students should have a general understanding of climate change science.
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Compare approaches to mitigating climate change and choose an individual climate mitigation action.
- Apply social sciences research to develop and implement an action plan to influence one of your social networks (e.g., friends, family, Instagram followers) to take that action alongside you.
- Create your own arguments for the responsibility of individuals, corporations, and the broader collective to foster climate and food justice.
- Collaborate professionally and equitably with community partners to develop educational materials related to sustainable food, agricultural, and forestry practices and policies.
- Communicate through a variety of media including writing, presentations, and apps. Evaluate and respond to constructive peer feedback on discussion boards and during real-time online discussions.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6601 - Decision Making in Natural Resource Management (2 Credits)
This course will provide an introduction to the principles and practice of structured decision making and its application in natural resource management. Students will become familiar with methods for finding optimal solutions to decision problems, and will apply these methods to natural resource problems. Students will become familiar with the application of quantitative decision modeling tools: single and multiple-objective trade-off techniques, decision trees, Bayesian belief and decision networks, linear programming, and dynamic optimization.
Prerequisites: NTRES 4600 is highly recommended, but not required.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021
Learning Outcomes:

- Students will be able to analyze decision systems in terms of proximate and ultimate causation and actions, and be able to work with multi-level systems interactions and decision structures.
- Students will be able to use basic conceptual and analytical tools for describing and quantifying decision structures for dynamical systems.
- Students will be able to develop optimization models for decision making as applies to natural resource management. In particular, students will become familiar with the application of quantitative decision modeling tools: single and multiple-objective trade-off techniques, decision trees, Bayesian belief and decision networks, linear programming, and dynamic optimization.
- Students will be able to integrate conceptual and theoretical understanding to reach specified conservation management objectives.
- Students will be able to articulate in written and oral form their understanding of both the concepts and analytical tools, and the role of sources of uncertainty, in application to problems in conservation and resource management.

Schedule of Classes (https://classes.cornell.edu/)

NTRES 6940 - Special Topics in Natural Resources (1-4 Credits)
The department teaches trial courses under this number. Offerings vary by semester and are advertised by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6960 - Perspectives in Global Development (1 Credit)
Crosslisted with GDEV 6960, AEM 6960
A variety of speakers present seminars on international development topics relating to sustainable development throughout the world. Students attend each seminar and submit a five-page essay at the end of the semester reflecting on the speakers' presentations and analyzing connections between topics.
Exploratory Studies: (LAAREA)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6970 - Graduate Individual Study in Natural Resources (1-4 Credits)
Study of topics in natural resources more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 6995 - Deep Learning in Earth and Environmental Science (4 Credits)
Last Four Terms Offered: Spring 2025
Schedule of Classes (https://classes.cornell.edu/)

NTRES 7900 - Graduate-Level Thesis Research (1-15 Credits)
Thesis research for Ph.D. students only before A exam has been passed.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 8900 - Master's Thesis Research (1-15 Credits)
Thesis research for master's students.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

NTRES 9900 - Doctoral-Level Thesis Research (1-15 Credits)
Thesis research for Ph.D. candidates after A exam has been passed.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)