

# PLANT BIOLOGY AND CONSERVATION

Degree Types: MS, PhD

The Program in Plant Biology and Conservation focuses on preparing students for future leadership positions in botanical science and plant conservation. In response to growing national and international threats to biodiversity and impending global mass extinctions, the program is designed to train future botanists who have the skills to meet and address this crisis.

Conducted jointly by Northwestern University (NU) and the Chicago Botanic Garden (CBG), the program offers a master of science and doctoral degree through The Graduate School at Northwestern University. Advanced courses are taught by NU professors and CBG scientists in a variety of fields, including conservation biology, genetics, plant and soil ecology, evolution, plant science, environmental science and policy, geology, environmental economics, and anthropology. Many courses offered by CBG are taught at the Garden.

## Additional resources:

- Department website (<https://www.plantbiology.northwestern.edu/>)
- Program handbook(s) (<https://northwestern.box.com/s/ep9t9c1zoaldv1s3an2rl7a4npdhr83/>)

## Degrees Offered

- Plant Biology and Conservation Bachelor's/MS (<https://catalogs.northwestern.edu/tgs/plant-biology-conservation/plant-biology-conservation-bach-mast/>)
- Plant Biology and Conservation MS (<https://catalogs.northwestern.edu/tgs/plant-biology-conservation/plant-biology-conservation-ms/>)
- Plant Biology and Conservation PhD (<https://catalogs.northwestern.edu/tgs/plant-biology-conservation/plant-biology-conservation-phd/>)

## Plant Biology and Conservation Courses

### PBC 401-0 Plant Evolution & Diversity Lab (1 Unit)

Modern systematics emphasizing application and major themes in the evolution of vascular plants. Taught with BIOL\_SCI 350-0.

### PBC 402-0 Plant Community Ecology (1 Unit)

The purpose of this class is 1) to introduce students to the scope of the science of ecology at more complex levels of organization, and 2) to develop sophistication in understanding community and ecosystem ecology literature through the exploration of both classical and recent literature. Taught with BIOL\_SCI 349-0.

### PBC 405-0 Ecosystem Ecology (1 Unit)

Concepts and principles of ecosystem ecology, with an emphasis on terrestrial ecosystems under the context of global change. Mass and energy flows through living and non-living ecosystem components as well as their environmental controls.

### PBC 410-0 Plant-Animal Interactions (1 Unit)

This course explores interactions between plants and animals, including antagonistic ones (e.g., herbivory), mutualistic ones (e.g., pollination, seed dispersal, ant-plant associations), and interactions among multiple species and across trophic levels. Through survey of the primary

literature, we will investigate the causes of the interactions and their consequences for individual organisms, populations, communities, and entire ecosystems. Finally, we will examine how these various interactions are responding to global change, including habitat destruction and climate change.

### PBC 415-0 Spring Flora (1 Unit)

This course takes a field-based approach to learning the process of identifying major components of the local flora in an evolutionary context. Understanding vegetative and reproductive structures of plants, and use of this knowledge to identify plants with taxonomic keys is emphasized. Ecological interactions, and related conservation issues are also covered.

### PBC 418-0 Soils and the Environment: The Earth's Critical Zone (1 Unit)

Taught with ENVR\_SCI 390-0.

### PBC 420-0 Field Methods in Plant Conservation (1 Unit)

The science of plant conservation broadly encompasses the knowledge of many ecological field techniques. This course is designed to give students a real understanding of and hands-on experience in plant conservation practices with conservation practitioners in the greater Chicago area. Students will be exposed to a broad range of conservation issues, learn how they are being addressed, conduct relevant field projects, analyze the data, and interpret the results. Every other class meeting will be an all day trip to a field site. The alternating class meetings will deal with the analysis of the data collected. On field days, be sure to dress appropriately for the weather.

### PBC 425-0 Molecular Ecology (1 Unit)

The aim of this course is to explore the relevance of Evolutionary theory and modern molecular lab techniques to Ecological Research. Ecology is the study of the distribution and abundance of living organisms and how they are affected by interactions with other organisms and their environment. Evolution has played an important role in determining a species, and a populations, origin, distribution and the intraspecific and abiotic interactions they experience, and these factors will go on to affect the future evolutionary trajectory of that species or population. Hence in this course we will explore important evolutionary concepts in reference to ecological processes and biological concepts.

### PBC 430-0 Conservation Genetics (1 Unit)

In this course we will learn how basic evolutionary and genetic principles inform the conservation and management of wildlife, game, and plant populations. We will read and discuss current research in the primary literature, examine case studies of current practices, and engage in group problem-solving and computer simulation exercises. Taught with BIOL\_SCI 332-0.

### PBC 435-0 Quantitative Methods for Ecology & Conservation (1 Unit)

Methods for analyzing data sets in ecology and conservation biology will be taught in a computer lab setting. Students will also conduct research projects using original or publicly available data and results will be presented to the class in a professional, publication ready form.

### PBC 450-0 Field and Laboratory Methods in Plant Biology and Conservation (2 Units)

This course is aimed to provide students with the knowledge, critical thinking, and practical skills to design, execute, and analyze plant biology and conservation research in order to help find solutions to real conservation problems. As this often requires the mastery of many skill sets across disciplines, the course is team taught and includes hands on training in topics such as experimental design, sampling methods, managing data, soil analyses, pollinator and breeding studies, DNA extraction, PCR, and DNA fingerprinting.

### PBC 451-0 Critical Topics in Ecology and Conservation (1 Unit)

This course provides students with the conceptual and theoretical framework within the field of plant biology (especially ecology) and conservation. This is a seminar style class based on reading and discussion of works ranging from historical literature to recent studies including topics such as conservation policy, economics of conservation, climate change, invasive species, habitat fragmentation, and applied conservation case studies. Taught with BIOL\_SCI 339-0.

**PBC 470-0 Special Topics in Plant Biology and Conservation (1 Unit)**

This seminar-style course will focus on a wide range of rotating current topics in the field of conservation science and practice. Taught with ENVR\_SCI 390-0.

**PBC 499-0 Independent Study (1-3 Units)**

This is a required course for the master's degree in plant biology and conservation in which students will work with an instructor of their choice conducting independent literature, lab, or field research.

Prerequisites: Permission of instructor.

**PBC 590-0 Research (1-4 Units)**

This course will allow students in our new PhD program to sign up for research credit once they have completed a set of core basic courses. Students will be working on their independent research projects while taking this course.