

# LANDSCAPE ECOLOGY, CERTIFICATE

Requirements for an undergraduate certificate may be completed at any campus location offering the specified courses for the certificate.

## Program Description

Landscape ecologists are in increasing demand in the areas of conservation management, urban planning, and Earth system science. Landscape-level management also increasingly depends on an understanding of coupled natural-human systems, and landscape ecologists need to be trained to understand interdisciplinary linkages between social and ecological sciences, which is a strength in geographic thought. This 12-credit certificate provides training necessary to make inferences about ecological dynamics at landscape scales through training in spatial analysis, environmental modeling, and geographically relevant ecosystem processes. Learning objectives: apply techniques of spatial analysis and environmental modeling to complex socio-ecological landscape systems, draw from social and ecological sciences to address challenges in coupled natural-human systems, and apply these tools for landscape-level management of human-environment processes.

## What is Landscape Ecology?

Landscape ecology is a key focus within the physical and environment-society subdisciplines of geography. Geographers focusing on landscape ecology use field studies, models, and laboratory activities to measure, quantify, and forecast how ecosystems change across space and time. They work at scales ranging from microbial to sub-continental. Through such geographic analyses, landscape ecologists seek to understand how natural and human disturbances (such as fire or suburban development) influence landscape sustainability, and they make recommendations for managing the landscape. Landscape-level management increasingly depends on an understanding of coupled natural-human systems, and landscape ecologists need to be trained to understand interdisciplinary linkages between social and ecological sciences. The certificate in Landscape Ecology is more focused than the complementary Physical Geography and Environment-Society certificates, and it incorporates training in geospatial technologies.

## You Might Like This Program If...

- You are curious about how demand for more commodities and services from global ecosystems has led to an ecological crisis.
- You want to study how climate change affects spatial distribution of plant species or the frequency of wildfires.
- You want to learn about the role of people on landscape patterns and processes ranging from wilderness to cities.
- You want to apply techniques of spatial analysis and environmental modeling to address challenges in complex human-natural systems.

## Program Requirements

To earn an undergraduate certificate in Landscape Ecology, a minimum of 12 credits is required.

| Code                    | Title  | Credits |
|-------------------------|--|---------|
| <b>Required Courses</b> |  |         |
| GEOG 210                | Geographic Perspectives on Environmental Systems Science | 3       |
| GEOG 314                | Biogeography and Global Ecology                          | 3       |
| GEOG 414                | Principles and Applications in Landscape Ecology         | 3       |
| Select 3 credits from:  |  | 3       |
| GEOG 362                | Image Analysis   |         |
| GEOG 365                | Introduction to GIS Programming                          |         |
| GEOG 430                | Human Use of Environment                                 |         |
| GEOG 431                | Geography of Water Resources                             |         |
| GEOG 465                | Advanced Geographic Information Systems Modeling         |         |

Some "additional" course selections have prerequisites not included in the certificate: GEOG 160 or 260 is prerequisite for GEOG 362 and 365; GEOG 363 is prerequisite for GEOG 465.

### Non-Course Requirements

Per University policy, all credit courses for a certificate require a grade of 'C' or higher, and at least two-thirds (2/3) of the credits used to complete a certificate must be earned at Penn State. If student is completing multiple certificates in Geography, no more than one (1) course may double-count for each.

## Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information need to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy>)

## University Park

### Jodi Vender

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## Career Paths

Students earning the Landscape Ecology certificate learn a wide range of research and analytical skills that are highly valued by employers. Students trained in landscape ecology find jobs in all levels of government, non-profit organizations, and in industry. This is one of several geography-related certificates that students can use to tailor their educational experience in preparation for the job market. In addition to Landscape Ecology, the Department of Geography offers certificates in Environment and Society Geography, Geospatial Big Data Analytics,

Geographic Information Systems, Human Geography, and Physical Geography.

## **Careers**

Students earning the certificate in Landscape Ecology are well positioned to find employment across the business, government, and nonprofit sectors. Landscape ecologists are in increasing demand in the areas of conservation management, urban planning, and Earth system science. Employers may include (but are not limited to): Conservation International; Federal Emergency Management Agency; NASA, National Oceanic and Atmospheric Administration; National Park Service; Natural Resources Defense Council; Resources for the Future; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; U.S. Forest Service; U.S. Geological Survey; local, regional, and state planning agencies; environmental and engineering consulting firms; policy research institutes; and private corporations.

MORE INFORMATION (<http://www.geog.psu.edu>)

## **Opportunities for Graduate Studies**

A certificate in Landscape Ecology is useful for students who are interested in pursuing graduate degrees in the environmental and social sciences. Alumni enter graduate and professional studies in a variety of programs, including (but not limited to) geography, environmental sciences, ecology, sustainability, public policy, emergency management, planning, and law. They sometimes begin graduate or professional programs directly after finishing undergraduate studies, but often get several years' work experience before returning to school, either full-or part-time.

MORE INFORMATION (<http://www.geog.psu.edu>)

## **Professional Resources**

- American Association of Geographers (AAG) (<http://www.aag.org>)
- American Geophysical Union (AGU) (<https://sites.agu.org>)
- Ecological Society of America (ESA) (<https://www.esa.org/esa>)
- U.S. Regional Association of the International Association for Landscape Ecology (<http://www.usiale.org>)

## **Contact**

### **University Park**

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