AGRI 0260 - FOREST ECOLOGY

Catalog Description

Hours: 90 (36 lecture, 54 laboratory)
Description: Ecological principles applied to forest management. Production ecology, biogeochemistry, disturbances, environmental factors, populations, community ecology, forest succession, and forest classification/description. (CSU)

Course Student Learning Outcomes

- CSLO #1: Examine ecological principles in a variety of ecosystems in the field.
- CSLO #2: Evaluate forest ecosystems in a systematic way by integrating climate, physiography, soil, and vegetation, and understanding these characteristics within their broader landscape context.
- CSLO #3: Understand the regeneration ecology of forest species, including methods of reproduction, dispersal, germination, establishment, and growth, and evaluate the underlying genetic and physiological bases of these relationships.
- CSLO #4: Understand why plants grow where they do, including site–species relationships, the roles of mutualistic and competitive relationships among organisms, and species responses to natural disturbance and forest management.
- CSLO #5: Learn the adaptations that enable tree species to persist in the faces of disturbances and other environmental stresses.
- CSLO #6: Learn how to read the natural history of a landscape in the field.
- CSLO #7: Predict future trends in forest succession and structural development in relation to natural disturbances and forest management.
- CSLO #8: Gain experience with some of the common field sampling and data analysis methods for evaluating forest ecosystems.

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

Lecture Objectives

1. Define forest ecology and describe scales of ecological inquiry
2. Identify key abiotic controls on forest distribution
3. Explain how energy and nutrients move through forest ecosystems
4. Describe the role of decomposers and detritus in ecosystem function
5. Species Interactions and Community Dynamics
6. Identify major types of species interactions
7. Describe successional processes and predict community change
8. Describe the physical structure of a forest and how it changes over time
9. Interpret structural data to infer stand dynamics
10. Define disturbance and describe its ecological roles
11. Analyze case studies of disturbance and forest response
12. Explain how climate shapes forest distribution
13. Evaluate potential forest responses to global change
14. Describe human influences on forest ecosystems
15. Integrate ecological principles into management and restoration contexts
16. Synthesize ecological principles to explain forest patterns and processes

Laboratory Objectives

1. Practice careful field observation and ecological description
2. Learn to record environmental data in a field notebook
3. Identify forest structure and abiotic influences
4. Understand how soil properties influence forest composition and productivity
5. Perform basic soil testing techniques
6. Relate soil observations to plant communities
7. Quantify variation in light and temperature within a forest canopy
8. Understand how microclimate affects forest layers and regeneration
9. Understand decomposition as an ecosystem process
10. Design and set up a long-term field experiment
11. Predict how environment affects decomposition rates
12. Identify common tree species and classify by growth form
13. Assess species richness and diversity indices
14. Identify examples of competition or facilitation
15. Identify signs of past disturbance and successional stages
16. Interpret evidence of change in forest composition
17. Practice reading ecological “clues” on the landscape
18. Quantify forest structural metrics (DBH, basal area, spacing)
19. Relate structure to ecological processes
20. Interpret annual growth rings and growth variation
21. Assess how growth reflects competition and environment

22. Identify and interpret evidence of forest disturbance
23. Understand how forests recover and adapt to change
24. Connect global and regional climate patterns to forest distribution
25. Analyze climate data and species ranges
26. Evaluate how management decisions affect ecological processes
27. Reflect on social and ecological trade-offs in forest use
28. Synthesize ecological principles into restoration design
29. Propose realistic stewardship strategies for forest resilience

General Education Information

- Approved College Associate Degree GE Applicability
  - AA/AS - Natural Sciences
  - AA/AS - Natural Sciences Laboratory
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Classroom Discussions
  - Example: Students will take part in a group discussion on forest disturbance and resilience, comparing different perspectives and connecting them to current forest management practices. Participation and thoughtful integration of course concepts will form the basis of evaluation. Course objectives: 7, 10, 11, 14, 15, 17
- Objective Examinations
  - Example: Students will take an objective examination on forest ecology. Example Question: Which of the following best describes primary succession in a forest ecosystem? A. Regrowth of vegetation after logging B. Colonization of newly exposed rock or substrate by pioneer species C. Replacement of shade-intolerant species by shade-tolerant species D. Seasonal change in leaf coloration Answer: B Objectives: 5, 7
- Problem Solving Examinations
  - Example: Students will apply ecological reasoning to real-world forest scenarios. Through three questions on disturbance, nutrient cycling, and climate impacts, they'll interpret data, explain ecological processes, and propose evidence-based responses. Evaluation emphasizes ecological understanding, use of evidence, clarity, and the ability to connect concepts across topics. Objectives: 3, 4, 10, 11, 12, 13, 15, 16
- Projects
  - Example: Students will apply course concepts and field data to analyze and interpret a forest ecosystem of their choice. They will produce a written report and a short presentation describing the forest's structure, key ecological processes, and indicators of health and change, supported by data and course readings. Evaluation will be based on ecological understanding, use of evidence, organization, reflection, and presentation quality. Objectives: 3, 4, 8, 15, 9, 13, 14, 15, 16

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Students and faculty wil go on a field walk and observe forest ecology. During the field walk, students will apply ecological concepts in real time by observing forest structure, identifying key species, collecting simple data (such as canopy cover, soil characteristics, or regeneration patterns), and discussing how ecological processes shape the site. The instructor will guide observation, prompt critical thinking through questions, and help students connect what they see to broader course themes like succession, disturbance, and forest health.

Lecture:

1. Instructor will present in lecture format various forest adaptions that enable tree species to persist when they face disturbances and their relation to forest ecology. Students will then work collaboratively, in small groups, analyzing case studies and highlighting environmental conditions leading to these adaptions.

Distance Learning

1. Instructor presents a lecture via the learning management system explaining forest regeneration ecology of forest species. The lecture format includes transcript or closed captions, audio, and video information. Students complete an electronic version of a concept map or a summary table assessing the key components of the topic presented.

Typical Out of Class Assignments

Reading Assignments

Students will read or view current media like the New York Times article "For 1st Time, Fires Are Biggest Threat to Forests' Climate-Fighting Power" (July 24, 2025), which details how wildfires in 2023-2024 burned nearly 24 million hectares of forests, surpassing other threats to carbon storage. In a 1-page reflection preparing for in class discussion, on how this impacts global forest health strategies and propose one policy recommendation for mitigation.

Writing, Problem Solving or Performance

Students will be provided a resource like the one described here: Drawing from the IUFRO Jeju Conference summary on "Climate Crisis: Conifer Forests at Risk 2025," students will write a opinion piece analyzing how rising temperatures and droughts are driving global conifer decline, linking it to broader ecological disruptions like biodiversity loss. Incorporate at least two additional sources; emphasizing actionable conservation steps for affected regions.

Other (Term projects, research papers, portfolios, etc.)

Investigate current forest ecology challenges like how tropical forests in the Americas are failing to adapt to rapid climate shifts, using the Wake Forest University study (March 7, 2025) as a foundation to explore migration patterns, species resilience, and restoration techniques. Include data visualizations, peer-reviewed citations (min. 15), and implications for international policy; final draft due end of semester with oral presentation.

Required Materials

- Forest Ecology
  - Author: Kashian, D. M., D. R. Zak, B. V. Barnes, and S. H. Spurr
  - Publisher: Wiley
  - Publication Date: 2023
  - Text Edition: 5
  - Classic Textbook?:
  - OER Link:
  - OER:
- Forest Ecology and Conservation: An Interdisciplinary Perspective
  - Author: Delilah Erickson
  - Publisher: Callisto Reference
  - Publication Date: 2025
  - Text Edition: 1
  - Classic Textbook?: Yes
  - OER Link:
  - OER:
- Handbook of Forest Ecology
  - Author: Kelvin S.-H. Peh, Richard T. Corlett, Yves Bergeron
  - Publisher: Routledge
  - Publication Date: 2025
  - Text Edition: 2
  - Classic Textbook?: Yes
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.