Summer Session 2018

BIOE 458 Forest and Grassland Ecology

Syllabus

3 credits; Lectures, Labs, Field Work

Course dates: August 6–17, 2018

Instructor: Dr. Andrew Larson

Email a.larson@umontana.edu


Prerequisites: consent of instructor.

Course Description

This course introduces students to aspects of population, community, landscape and ecosystem ecology, including the interactive biophysical attributes and processes of the forests and intermountain grasslands. Students observe and learn about plant distributions and plant community structure, including principles of plant ecology, ecophysiology, and ecological disturbances in these environments. Energy and materials transfer and feedbacks are used to describe complex interrelationships driving the dynamics of these systems, including both natural and human components as modifiers of systems dynamics. Students learn how data are collected to maximize information used to answer scientific questions. Field trips and field laboratory exercises are complemented with quantitative analysis of student-collected data, including tree demographic analysis, community composition and structural change, and analysis of net primary productivity and forest carbon stocks.

Student Learning Objectives

After completing this course students will have acquired the skills and knowledge to:

- Evaluate alternative ecological hypotheses based on interpretation of quantitative analyses.
- Explain feedbacks between forests, rivers, and floodplains.
- Apply mensuration techniques to quantify ecosystem structure.
- Describe patterns and explain mechanisms of forest succession following high-severity disturbance.
- Describe the core principles of experimental design and explain the basis for each principle.
- Compare interspecific and intraspecific competition, and facilitation.
- Identify and differentiate between woody plant species based on diagnostic characteristics.
- Generalize relationships between plant population density and ecosystem productivity and carbon storage across plant communities.
- Explain the disturbance regime concept.
- Interpret biotic and physical limitations to tree establishment and survival, and assess their relative contributions to the maintenance of grassland and alpine communities.

Required Text: Selected readings will be available.

Reference Texts: Available at the Biological Station.
Course and Field Supplies/Equipment: (*available for purchase at the FLBS Bookstore) Students must be prepared for spending time in the field. It is important that students adequately prepare for field trips by making certain they have the appropriate equipment and resources for the trip. Weather in the N. Rockies is highly variable and can change quickly so students should always carry layers for warmth and rain gear. Note: Students will be camping overnight. Food and cooking equipment are provided.

- Field notebook ("Rite-in-the-Rain" all-weather type)*
- Plenty of pencils, regular or mechanical; permanent ink pens*
- Hot/cold mug – useful at FLBS and for drives to field sites*
- Laptop computer
- Comfortable hiking boots that you’re willing to get wet
- Pack suitable for day trips
- Packable water bottles (total cap > 2 qts)
- Lunch pack-up container (resealable plastic)

- Mess kit, cooking gear and utensils
- Sunscreen, sun hat and sunglasses
- Compact personal hygiene kit for field use
- Binoculars (optional)
- Flashlight or headlamp and batteries
- 30 ft of rope for hanging food and pack out of bears’ reach
- Cooking stove and fuel (optional)
- Drinking water purifier or filter (optional, but desirable)

- Required Overnight Field Gear and Other Items to Bring Checklists: http://flbs.umt.edu/urls/lists

Student Learning Outcomes:
- Introduction to sampling techniques for plant community research and monitoring
- Accurate use of traditional (compass, diameter tape) and modern (laser rangefinder, GPS) equipment
- Introduction to fundamentals of experimental design
- Understanding of physical environmental limitations to plant establishment, growth, and survival.
- Knowledge of plant disturbance adaptations and implications for community resilience
- Identification of woody plant species of the Northern Rockies.
- Knowledge of forest-river interactions and feedbacks including large wood and floodplain succession

Evaluation and Grading:
- Participation: 30%
- Final oral exam: 35%
- Data analysis and research paper: 35%

Course Policies:
Students will adhere to University of Montana Student Conduct Code and Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation Policy (policy website: http://www.umt.edu/safety/policies/) and to the Biological Station Code of Conduct form signed during student registration. Students must also follow FLBS Rules and Regulations and abide by the Safety Orientation Checklist. Students who have not already completed the University of Montana PETSA training may access the Moodle module at this link: http://www.umt.edu/petsa/.
Schedule:

Note: Make sure you pack your brown bag lunch each day at breakfast!

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Topic and activities</th>
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<tbody>
<tr>
<td>6-Aug-18 (M)</td>
<td>Napa Point</td>
<td>Map and compass use, intro field methods, white bark pine ecosystems.</td>
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<tr>
<td>7-Aug-18 (T)</td>
<td>Glacier NP</td>
<td>Forest structural development, coarse woody debris, succession.</td>
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<td>8-Aug-18 (W)</td>
<td>Priest River EXF</td>
<td>Fire ecology and disturbance interactions. <strong>Overnight camping.</strong></td>
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<td>9-Aug-18 (Th)</td>
<td>Priest River EXF</td>
<td>Long-term experiment re-measurement: tree mortality, principles of experimental design. <strong>Overnight camping</strong></td>
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<td>10-Aug-18 (F)</td>
<td>Priest River EXF</td>
<td>Net primary productivity, biomass accumulation, forest carbon storage</td>
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<tr>
<td>13-Aug-18 (M)</td>
<td>Glacier NP</td>
<td>Subalpine forests and alpine tree line. <strong>Overnight at Nyack</strong></td>
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<td>14-Aug-18 (T)</td>
<td>MF Flathead</td>
<td>Forest-stream interactions, LWD, floodplain succession, density dependent growth and mortality, self-thinning</td>
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<td>15-Aug-18 (W)</td>
<td>FLBS</td>
<td>Data analysis: Tree demography, forest carbon stocks and net primary productivity</td>
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<tr>
<td>16-Aug-18 (Th)</td>
<td>Swan Valley</td>
<td>Frequent-fire forests and grasslands, culturally modified trees, old-growth</td>
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<td>17-Aug-18 (F)</td>
<td>FLBS</td>
<td>Final exam/paper</td>
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Students with disabilities may request reasonable modifications by contacting the instructor. The University of Montana assures equal access to instruction for students with disabilities in collaboration with instructors and Disability Services for Students (406.243.2243, [http://www.umt.edu/dss/default.php](http://www.umt.edu/dss/default.php)). The University does not permit fundamental alterations of academic standards or retroactive modifications.