
FORS 333: Fire Ecology

W.A. Franke College of Forestry and Conservation
University of Montana

LOGISTICS

Time: Tuesday, Thursday, 9:30 – 10:50 am

Location: Education (EDPJW) 214

Required Field Trip: (1) Fire effects and post-fire veg. change: Fri. Sep. 15 OR Sat. Sep. 16 (8:00 am – 6:00 pm); (2) USFS Fire Lab, Thur. Nov. 14 (9 am - 1 pm)

Web Site: <https://moodle.umt.edu>

INSTRUCTOR

Philip Higuera, Associate Professor

Office: CHCB 460b

Office Hours: W, 12:30-2:00 pm., Th, 11:00-12:30

E-mail: philip.higuera[at]umontana.edu

(Include "FORS 333" in subject)

Phone Number: (406) 243-6337

TEACHING ASSISTANT

Kyra Wolf, Graduate Student

Office: CHCB 452

Office Hours: M, W, 10:30-11:30

E-mail: kyra.wolf[at]umontana.edu

(Include "FORS 333" in subject)

COURSE OVERVIEW

Fire is a dominant ecological process affecting individual organisms, populations, communities, and ecosystems worldwide. If you want to understand the ecology of most terrestrial ecosystems, one needs to understand the role that fire plays in the system. Fire is also a useful tool and tightly linked to human values of natural resources, stability and predictability, and safety and property. The role of fire in ecosystems is thus often controversial, and balancing goals can be difficult. Understanding the scientific process and the science of fire ecology is key to developing and implementing sound management approaches. Throughout this course we will study fire through three main perspectives:

Fire as a biophysical process: How do physical and biological processes interact to determine when, where, and how fires burn in an ecosystem? How do changes in biophysical components affect the pattern of fire over years, decades, and centuries?

Fire as an ecological process: How does fire interact with other biotic and abiotic components of an ecosystem? How are organisms, communities, and landscapes impacted by fire? How can we quantify the role that fire plays in an ecosystem over different spatial and temporal scales? How does this role vary through time and across space, and what does this imply about the future?

Fire, people, and management: How does a scientific understanding of fire ecology inform land management policies and practices? How does fire science inform societal and management issues including fuels treatments, salvage logging, fire suppression, and ecosystem resilience in the context of climate change?

Learning Outcomes

By the end of this course, students should be able to:

1. Quantify and interpret patterns of fire across space and time, and use key concepts and principals to describe the mechanisms causing these patterns.
2. Infer species' response to fire based on physical and life-history traits, and scale inferences up from individuals to landscapes, and from years to centuries.
3. Describe and classify the ecological role of fire in a variety of ecosystems.
4. Synthesize fire science research and apply concepts of fire ecology to predict outcomes.

Course Organization

We will cover the following topics, roughly in this order, through class presentations, class exercises, guest lectures from experts in the field, a field trip to study fire effects and post-fire revegetation, and a field trip to the USFS Fire Science Lab. See Moodle for the current course calendar.

Theme	Topics
Fire as a biophysical process	Fire in the Earth system
	Biological and physical controls of fire
	The fire regime concept
	<i>Current topics:</i> Fire and climate change
Fire as an ecological process	Fire and disturbance ecology
	Characterizing and reconstructing fire regimes
	Fire effects on plants and ecosystems
	Fire effects on animals
	Fire ecology of mixed-conifer forests
	Fire ecology and disturbance interactions in Rocky Mountain subalpine forests
	*Fire ecology of whitebark pine ecosystems of the Northern Rockies
	Fire ecology of pinion-juniper and montane aspen ecosystems
	*Fire history in mixed-severity fire regimes of the Interior Northwest
	Global fire ecology: grasslands, tropical rain forests, boreal forest, tundra
Fire and ecological feedbacks	
<i>*Current topics:</i> Climate change and post-fire tree regeneration	
Fire, people, & management	<i>Current Topics:</i> Fire, Resilience, and Ecosystem Change
	<i>*Current topics:</i> Cutting-edge fire science at the USFS Missoula Fire Lab
	Human impacts on fire regimes: land-use legacies, fire suppression, & fire management

*Guest presentation by topical expert

Prerequisites

FORS 230, Forest Fire Management OR an introductory course in ecology, botany, biology, dendrology, or biogeography.

Textbook and Readings

Baker, W.L. 2009. Fire Ecology in Rocky Mountain Landscapes. Island Press.

The required textbook is available at the University of Montana Book Store and online, and one copy is on reserve at the Mansfield Library. We will also read primary literature from scientific journals. These papers can be accessed in the "Course Reading Material" folder on Moodle.

Moodle and Computer Access

You need reliable internet access to keep up to date with course materials, to successfully access and hand in assignments, and to access course readings via Moodle.

Assignments and Exams

Weekly Readings and Reading Questions

Readings are an essential part of the course and are assigned in the course calendar. Multiple readings are presented (from top to bottom) in the order in which you should read the material (for Tue. and Thur. class period, respectively). It is important that you complete the readings before class periods to be able to participate in class.

During most weeks, questions for the following week's readings will be posted on Moodle by Tuesday (or earlier). Your answers to these questions are due by 9 am on the following Tuesday via Moodle (unless otherwise noted) and should take around 45-60 minutes to complete. It is strongly recommended that you write your answer in a text document first, and then paste this into Moodle. Failing to do so inevitably leads to lost work.

Answers will be evaluated based on a five-category scale, for 10 points total: Excellent = 10 points (i.e., a well-reasoned and well-written response); good = 8 points (i.e., demonstrates that the reading was done); pass = 6 points (i.e., some of the reading likely done), or fail = 0 points (i.e., no evidence that the reading was done). Both content and grammar count towards your score, so be sure to proof read your answer for spelling, grammar, and clarity. In your answer, you should cite any references you use for ideas (e.g., "Baker 2009"). If you are citing the reading for that week, you do not need to provide the full citation (because I know of the source); if you are citing material that is external to class, then you need to provide the full source at the end (this is not typically required for weekly questions). Use quotations for any text taken directly from a source, and provide the page number. However, avoid simply quoting text whenever possible, as this does not demonstrate comprehension of the material or concept; rather, synthesize and communicate ideas in your own words.

Fire Effects and Post-fire Regeneration Field Trip: Fri. Sep. 15th OR Sat. Sep. 16th

The course includes a *required* one-day field trip, to a local wildland fire. The trip will run from ca. 8 am to 6 pm, and you are encouraged to make arrangements with your other commitments, including UM courses, as soon as possible. If you cannot attend the field trip, let the instructor know ASAP. There are no opportunities to make up the field trip, and you will lose points associated with participation and post-trip data entry.

In addition to seeing fire effects on the ground, this trip facilitates an individual research project, which accounts for 25% of the course grade. We will collect data as a class to help answer

specific research questions, and each student will individually develop a field trip report, in the format of a scientific paper. The report will be submitted in two stages, first during Week 9 of the class, and the final version during Week 15. The first version can and should be reworked for final submission. Details and a grading rubric will be located on Moodle and discussed in class.

USFS Missoula Fire Lab Field Trip: Tuesday November 14th (9 am - 1 pm)

The course includes a *required* ½-day field trip, to the USFS Fire Lab in Missoula. The Fire Lab is a unique local opportunity to learn about cutting-edge fire science research from world experts, including live fire experiments, and it is consistently a favorite component of the course. The trip will run from 9 am to 1 pm on a Tuesday (as the Fire Lab is closed on the weekends). You are encouraged to make arrangements with your other commitments, including UM courses, as soon as possible. If you cannot attend the field trip, please let the instructor know ASAP.

Exams

Two exams will cover materials from class periods, readings, and the field trip preceding the exam. *Material not covered in class but assigned in readings can be included in the exams.* The final exam is cumulative but will focus on the second half of the course. Exams will consist primarily of short answers and/or essay questions, but also include multiple choice, true/false, and/or matching questions.

Exam 1: Thursday October 12th, in class

Final Exam: Thursday Dec. 14th, 2017, 10:10 am - 12:10 pm, in class

Grading

This class is offered for a traditional letter grade only; it is not offered under the credit/no credit option. Final grades will be based on the following point distribution:

Assignment	Points
Participation: attendance	75
Participation: in-class contributions	75
Weekly reading questions / assignments (lowest of 11 dropped)	100
Field trip and write up	250
Mid-term Exam	250
Final Exam	250
TOTAL	1000

Break points between number grades and percentages will be based on the table below.

Grade	Percentage of Points Required
A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79

C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	<60

Tips for success

1. **Participate in class** by: attending, taking notes, focusing, and asking questions.
 2. **Read** the assigned readings. I will not cover all material in the assigned readings in class, yet the content is a key part of the course. Give yourself the needed time to complete the readings prior to class.
 3. **Keep up to date with the class** by checking the calendar and assignments on Moodle.
 4. **Be curious:** ask questions inside and outside of class (i.e., during office hours) if you do not understand the material presented.
 5. **Write legibly and clearly:** Give yourself enough time to proof read before submitting written assignments. Communicate professionally with your instructor and classmates. Take advantage of office hours and the [Writing Center](#) as needed.
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COURSE POLICIES

Class expectations

Please respect your fellow student's learning experience. Do not talk among yourselves during class (but feel free to raise your hand to ask a question), arrive on time, and do not leave class early or pack up before class is over.

Cell phones and mini-computers

Please turn off electronic devices during class, unless they are being used for an in-class exercise. I expect you NOT to be texting, browsing, or checking e-mail during class. If you feel you need to engage with your electronic device, please remove yourself from the classroom.

Attendance

Attendance is expected and contributes to the “Class participation” portion of your course grade. I do not post class presentations, and I strongly encourage you to take notes during class. Absences will not be excused unless you have extenuating circumstances and have contacted me at least 48 hours in advance of the class. If you know you are going to miss class, for whatever reason, I appreciate learning via a brief e-mail (but that does not imply the absence is excused).

Assignment due dates

Due dates are firm. Late assignments will not be accepted unless you have unusually extenuating circumstances *and* have made arrangements with me at least 60 hours prior to the due date. This includes missing an exam: *there are no make-up exams* without prior arrangement.

Out-of-class inquiries

I encourage you to see me if you have questions about course material or assignments. If you have questions about your grade or your standing in the course, please meet with me during office hours. I am happy to help outside of class, particularly when students demonstrate an interest in learning, but to do so, I ask that you follow these guidelines:

Coming to office hours is the best way to get questions answered. E-mail is a less effective way to communicate with the instructor, unless requested to do so. If you do e-mail the instructor, please do the following so that the e-mail is read and understood: (a) include "FORS 333" in the subject line, (b) write in complete sentences, with proper grammar, and (c) sign the e-mail with your name. Reply times will vary and may be up to 60 hours.

When you try to conduct business with me in the moments before class starts or when I'm not expecting you, I often feel rushed and cannot give your question or issue the attention it deserves. It is much better if you make an appointment to discuss your concerns, or see me during office hours or immediately after class.

Academic Honesty, Plagiarism, and Student Conduct

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with and adhere to the [Student Conduct Code](#).

Academic dishonesty of any form is unacceptable and will be taken seriously by the instructor, the College of Forestry and Conservation, and the University of Montana. This includes plagiarism, when you copy materials from other sources without citing the source or copy someone's work, and cheating, copying material from other students during tests or quizzes. In both cases, you will fail the assignment/exam and the information will be passed on to the Dean of Students Office. It is your responsibility to be familiar with, and adhere to, the [University's definition of plagiarism](#).

Students with Disabilities

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students \(DSS\)](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommason 154 or 406.243.2243. I will work with you and DSS to provide an appropriate modification.

Course Withdrawal Deadlines

Important dates restricting opportunities to drop a course are listed on the [Fall 2017 Official Dates and Deadlines calendar](#) and summarized below:

September 21: Last day to drop classes on Cyberbear with refund.

September 22 – November 2: Drop requires form with instructor and advisor signature, \$10 fee from registrar's office, and student will receive a "W" on transcript.

November 3 - December 12: Students are only allowed to drop a class under very limited and unusual circumstances.