

COURSE SYLLABUS

Instructor

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Term:	Spring 2017
Class time & location:	Online
Course Credits:	3

Course Overview

Fire is a fundamental ecological process in many terrestrial ecosystems. Fire regimes (the combination of fire timing, behavior, and spatial patterning) vary spatially and temporally depending on vegetation (aka fuels), weather, climate, topography, and humans. Many plants and animals exhibit a variety of adaptations that allow them to survive - and even thrive - in the presence of fire. Others do not. This course is organized around the concept of the fire regime, how variations in fire behavior, spatial patterns, and timing affect individual organisms, and the morphological, physiological, and behavioral traits that allow species to persist through or replace themselves after fire (or not). The first few weeks of the course will cover what affects variation in fire regimes across environmental gradients and what evidence we can use to characterize fire regimes. Next we consider some specific traits that individual plants and animals have to fire, and how fire affects community structure. Finally, we discuss current issues in fire ecology and fire management, especially focused on Rocky Mountain ecosystems but also considering other ecosystems around the world. Themes we explore through the semester include: spatial and temporal scales and heterogeneity in fire regimes; evolutionary context and life history responses to fire regime variation; methods for characterizing fire regimes; varying human and climate influences on fire regimes; and fire in ecosystem management and ecological restoration.

Course Objectives

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

- Define and use terminology, methods, and concepts common in fire ecology and fire science in general;
- Describe some plant and animal evolutionary responses to fire, and the tolerance (or intolerance) of plants and animals to fire as an ecological factor;
- Identify and interpret how variations in characteristics of fire regimes are used in natural resources management and ecological restoration;
- Apply fire ecology facts and concepts for defining objectives of fire management for sustainable ecosystems, especially in light of current issues of climate change, human land use, and invasive species.

Course Prerequisites

None

Required Texts and Materials

There is no textbook. Instead, we will discuss and evaluate several papers each week on select topics in fire ecology. Since this is a graduate-level course, I want this to be to some extent a “journal club” to help increase your critical thinking and ability to interpret, evaluate, incorporate, and question existing knowledge. The geographic focus of many of the lectures and readings is on western North America, although concepts and facts will be relevant to other areas of North America and the rest of the world. Also at the end of the semester each student will give a presentation to the rest of the class on an ecosystem of her or his choice, which will be an opportunity for us to learn something about fire ecology and fire management in other areas of the world. Each week will start with one or two lectures to provide some background on the topic of the week, followed by discussion of the papers chosen. Students will be expected to read each paper in detail; not only will we be looking for what a paper has to offer for bettering our understanding of fire ecology but also what additional questions it raises concerning science needs or management implications.

Course evaluation will first consist of participation in group discussions on the readings. My goal with these discussions is for everyone to think about and respond to facts, ideas, methods, and concepts brought up by the readings. Second, I have assigned five exercises or short papers to write during the semester to complement what we discuss from the papers as well as to bring in some outside resources (additional peer-review papers, your background or experience, photographs or videos you find online, etc.). And finally there is the end-of-the-semester project to describe the fire regime, some specific plant and animal ecology, and management concerns of an ecosystem of your choice. The final project will consist of a 10-15 minute PowerPoint presentation to be given to rest of the class. Rubrics for assignments, journal paper discussions, and the final report will be available for each assignment or project. The rubric for discussion participation is included in the separate list of weekly papers to read.

Library & Research Help

The CSU Libraries Help Desk provides research and technical assistance either in person at Morgan Library or by phone at 970-491-1841. Jocelyn Boice is the librarian supporting this course. Contact her by email at jocelyn.boice@colostate.edu or by phone at 970-491-3882 to ask questions or set up an appointment for in-depth research help.

Important Dates to Remember

Last Day to Add/Drop Classes	
Without an Instructor Override:	Jan 22 nd 2017
Registration Closes:	Feb 1 st 2017
Drop Deadline (100% refund):	Feb 1 st , 2017
Withdrawal Deadline (50% refund):	Mar 19 th 2017
Spring Recess:	Mar 13 th – 17 th 2017

Course Schedule

Module	Topic	Schedule & Assignments	Learning Objectives
1	Introduction	<ul style="list-style-type: none"> - <u>Lecture 1</u>: Course intro: Ecology, fire ecology, and ecosystems - <u>Assignment 1</u>: Record a video on your background and interests and upload to the rest of the class - <u>View and discuss</u>: Several short videos of Colorado forest ecosystems 	<ul style="list-style-type: none"> - Define fire ecology and how it fits in with general ecology - Explore some basic ideas about fuels, vegetation structure, variations in fire behavior, and plant adaptations to fire with some examples from Colorado forests
2	Fire Behavior	<ul style="list-style-type: none"> - <u>Lecture 2a</u>: Fire basics - <u>Lecture 2b</u>: Fire behavior - <u>Assignment 2</u>: Select an end-of-the-semester project - <u>Read and discuss</u>: <ol style="list-style-type: none"> 1. Bond et al. (2005) 2. Bond and Keeley (2005) 3. Mutch (1970) 	<ul style="list-style-type: none"> - Identify components of: 1) Fire Triangle, and 2) Fire Behavior Triangle - Incorporate some broad ideas about fire effects on plants both globally and from an evolutionary standpoint
3	Energy and climate	<ul style="list-style-type: none"> - <u>Lecture 3a</u>: Climate across global scales - <u>Lecture 3b</u>: Climate across local scales - <u>Assignment 3</u>: Solar energy - <u>Read and discuss</u>: <ol style="list-style-type: none"> 4. Jackson (2006) 	<ul style="list-style-type: none"> - Describe how and why climate and ecosystems vary both globally and locally - Incorporate time and ecosystem change into ecological thinking
4	Fire regimes	<ul style="list-style-type: none"> - <u>Lecture 4a</u>: Fire regimes - <u>Lecture 4b</u>: Fire climatology - <u>Read and discuss</u>: <ol style="list-style-type: none"> 5. Brown (2000) 6. Krawchuk & Moritz (2011) 	<ul style="list-style-type: none"> - Identify components of the Fire Regime Triangle - Define and describe climate teleconnections such as ENSO and PDO
5	Reconstructing fire regimes	<ul style="list-style-type: none"> - <u>Lecture 5a</u>: Dendrochronology - <u>Lecture 5b</u>: Fire history - <u>Read and discuss</u>: <ol style="list-style-type: none"> 7. Swetnam (1993) 8. Brown & Wu (2005) 9. Whitlock et al. (2003) 	<ul style="list-style-type: none"> - Identify general methods of fire history reconstructions, especially using tree-ring data - Evaluate strengths and limitations of various lines of evidence used to characterize fire regimes
6	Evolution and the role of history	<ul style="list-style-type: none"> - <u>Lecture 6a</u>: Plant life histories - <u>Lecture 6b</u>: Evolution and historical context - <u>Read and discuss</u>: <ol style="list-style-type: none"> 10. Norris et al. (2015) 11. Weng & Jackson (1999) 	<ul style="list-style-type: none"> - Define water and light effects on plant life histories - Define basic evolutionary concepts - Explore paleoecological patterns using historical data

7	Fire as an evolutionary force I	<ul style="list-style-type: none"> - <u>Lecture 7a</u>: Plant adaptations - <u>Lecture 7b</u>: Animal adaptations - <u>Assignment 4</u>: Mini-grant proposal - <u>Read and discuss</u>: 12. Keeley et al. (2011) 13. Bond & Midgley (1995) 	<ul style="list-style-type: none"> - Describe basic plant and animal adaptations for either persisting through or recover after fire - Apply knowledge of fire regime characteristics to assess fire effects on specific plant or animal species
8	Fire as an evolutionary force II	<ul style="list-style-type: none"> - <u>Lecture 8a</u>: Communities - <u>Lecture 8b</u>: Concepts of succession - <u>Read and Discuss</u>: 14. Schwilk & Ackerly (2001) 15. Noble & Slatyer (1980) 	<ul style="list-style-type: none"> - Describe general concepts of ecological niches and succession - Define use of “vital attributes” for describing fire responses in plant species
9	Historical Range of Variability and ecological restoration	<ul style="list-style-type: none"> - <u>Lecture 9a</u>: Historical range of variation (HRV) - <u>Lecture 9b</u>: Ecological restoration - <u>Read and discuss</u>: 16. Swetnam et al (1999) 17. Falk (2006) 	<ul style="list-style-type: none"> - Apply use of HRV concept to ecosystem management - Identify instances of ecosystem impacts and changes in fire regime characteristics
10	Fire and management I: Case study of the Hayman Fire	<ul style="list-style-type: none"> - <u>Lecture 10</u>: Hayman fire effects - <u>Assignment 5</u>: Case study of a recent wildfire - <u>Read and discuss</u>: 18. Brown et al. (1999) 19. Abella & Fornwalt (2015) 20. Chambers et al. (2016) 21. Rhoades et al (2011) 	<ul style="list-style-type: none"> - Analyze a case study of a recent wildfire in the context of what we have discussed in the class up until this point
11	Fire and management II: Some current issues	<ul style="list-style-type: none"> - <u>Lecture 11</u>: Anthropogenic climate change - <u>Read and discuss</u>: 22. Balch et al. (2013) 23. Westerling et al. (2006) 24. Abatzoglou & Williams (2016) 	<ul style="list-style-type: none"> - Describe anthropogenic climate change and potential impacts on current and future fire regimes - Identify instances of changed fuel structures due to invasive plant species
12	Fire policy	<ul style="list-style-type: none"> - <u>Lecture 12</u>: Fire management in the US - <u>Read and discuss</u>: 25. Fulé (2008) 26. North et al. (2015) 27. Stephens et al. (2016) 	<ul style="list-style-type: none"> - Describe components of historic and current fire management in US in context of fire ecology - Discuss potential future role of fire in land and natural resource management
13 & 14	Class presentations	<ul style="list-style-type: none"> - Student PowerPoint presentations over two weeks 	<ul style="list-style-type: none"> - Present what you have learned about a particular ecosystem and its fire ecology to the rest of the class - Discuss additional ecosystems and fire ecology through fellow students’ presentations

15	Reintroducing fire: The Role of Collaboration	<ul style="list-style-type: none"> - <u>Lecture 13</u>: Collaborative Forest Landscape Restoration in Colorado - <u>Read and discuss</u>: 28. Clements & Brown (2011) 39. Brown et al. (2015) 30. Aplet et al. (2014) 	- Discuss current concepts of collaboration and ecosystem management through a case study on the Front Range in Colorado
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Basis for Final Grade

Assignment	Grade Points	Grade Percentage
Weekly discussion participation (15 weeks * 10 points)	150	37.5%
Intro video (Assignment 1) – 20 points	20	5%
Semester assignments: - Solar energy & forests (Assignment 3) – 30 points - Mini-grant proposal (Assignment 4) – 30 points - Fire case study (Assignment 5) – 30 points	90	22.5%
Final presentation: - Select ecosystem (Assignment 2) – 20 points - Submit presentation – 120 points	140	35%
Total:	400	100%

Final grades will be assigned based on a straight curve (90-100% = A; 80-89.9% = B; 70-79.9% = C; 60-69.9% = D; <60% = F). There will be very limited ability to make up missed assignments; these will be considered on a case-by-case basis.

Course Policies

Late Work Policy

Late work will be accepted with half-off points up to one week late.

Grades of "Incomplete"

Per university policy, an instructor may assign temporary grade of Incomplete to a student who demonstrates that he or she could not complete the requirements of the course due to circumstances beyond the student's control and not reasonably foreseeable. A student must be passing a course at the time that an Incomplete is requested unless the instructor determines that there are extenuating circumstances to assign an Incomplete to a student who is not passing the course. When an instructor assigns an Incomplete, he or she shall specify in writing using the Department Incomplete Grade Form the requirements the student shall fulfill to complete the course as well as the reasons for granting an Incomplete when the student is not passing the course. The instructor shall retain a copy of this statement in his or her grade records and provide copies to the student and the department head or his or her designee. (Section I.6 of the *Academic Faculty and Administrative Professional Manual*)

Disability Access

Colorado State University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations must first contact Resources for Disabled Students before requesting accommodations from the professor. Resources for Disabled Students (RDS);

<http://rds.colostate.edu/home>) is located in room 100 of the General Services Building. Their phone is (970) 491-6385 (V/TDD). Students who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations.

Academic Integrity

The Department of Forest and Rangeland Stewardship takes academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. The CSU writing center defines plagiarism this way:

Plagiarism is the unauthorized or unacknowledged use of another person's academic or scholarly work. Done on purpose, it is cheating. Done accidentally, it is no less serious. Regardless of how it occurs, plagiarism is a theft of intellectual property and a violation of an ironclad rule demanding "credit be given where credit is due."

Source: (Writing Guides: Understanding Plagiarism.

<http://writing.colostate.edu/guides/guide.cfm?guideid=17>)

If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the course. Each instance of plagiarism, classroom cheating, and other types of academic dishonesty will be addressed according to the principles published in the CSU General Catalog (under "Academic Integrity/Misconduct: <http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/> .)

Of course, academic integrity means more than just avoiding plagiarism. It also involves doing your own reading and studying. It includes regular class attendance, careful consideration of all class materials, and engagement with the class and your fellow students. Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, we will ask to you sign the CSU Honor Pledge as part of completing all of our major assignments. While you will not be required to sign the honor pledge, we will ask each of you to write and sign the following statement on your papers and exams:

"I have not given, received, or used any unauthorized assistance."

Title IX Information

CSU's Student Sexual Harassment and Violence policy, following national guidance from the Office of Civil Rights, requires that faculty follow CSU policy as a "mandatory reporter" of any personal disclosure of sexual harassment, abuse, and/or violence related experiences or incidents shared with the faculty member in person, via email, and/or in classroom papers or homework exercises. These disclosures include but are not limited to reports of personal relational abuse, relational/domestic violence, and stalking. While faculty are often able to help students locate appropriate channels of assistance on campus (e.g., see the CSU Health Network link below), disclosure by the student to the faculty member requires that the faculty member inform appropriate CSU channels to help ensure that the student's safety and welfare is being addressed, even if the student requests that the disclosure not be shared.

For counseling support and assistance, please see the CSU Health Network, which includes a variety of counseling services that can be accessed at: <http://www.health.colostate.edu/>. And, the Sexual Assault Victim Assistance Team is a confidential resource for students that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. The web address is

<http://www.wgac.colostate.edu/need-help-support>.

Source: <http://oeo.colostate.edu/title-ix-sexual-assault>

Non-Discrimination Statement

Colorado State University does not discriminate on the basis of race, age, creed, color, religion, national origin or ancestry, sex, gender, disability, veteran status, genetic information, sexual orientation, gender identity or expression, or pregnancy. The University complies with the Civil Rights Act of 1964, as amended, related Executive Orders 11246 and 11375, Title IX of the Education Amendments Act of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, the Age Discrimination in Employment Act of 1967, as amended, The Pregnancy Discrimination Act of 1978, Americans with Disabilities Act of 1990, the Civil Rights Act of 1991, the ADA Amendments Act of 2008, the Genetic Information Nondiscrimination Act of 2008, and all civil rights laws of the State of Colorado. Accordingly, equal opportunity of employment and admission shall be extended to all persons. The University shall promote equal opportunity and treatment in employment through a positive and continuing affirmative action program for ethnic minorities, women, persons with disabilities, and veterans. The Office of Equal Opportunity is located in 101 Student Services. Source: <http://oeo.colostate.edu/non-discrimination-statement>