FORS 333: Fire Ecology

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

LOGISTICS

Time: Tuesday, Thursday, 9:30 – 10:50 am
Physical Meeting Location: University Center, Room 302
Virtual Meeting Location: Zoom https://umontana.zoom.us/j/98491410748
Web Site: https://moodle.umt.edu/course/view.php?id=32863

INSTRUCTOR

Philip Higuera (he/him/his), Associate Professor
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Office Hours: Tue. and Wed., 2:00-3:30; book at
https://phiguera.youcanbook.me/ if you can.
E-mail: philip.higuera[at]umontana.edu
(Include "FORS 333" in subject)

TEACHING ASSISTANT

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(Include "FORS 333" in subject)

HYBRID-FLEXIBLE COURSE FORMAT FOR FALL 2020

Hybrid: This course is using the "hybrid" format: it includes both face-to-face and online instruction, with a substantial amount on-line activities. The classroom is a large ballroom in the University Center, set up with tables that keep students 6'+ apart (1 student/table), and masks are required by all students. Nonetheless, in-person meetings are not necessary to be successful in the class (see below). Any field trips will be optional (depending on logistics and resources), and some field time will be replaced with "self-guided" field activities that can be done individually, close to campus. I chose this format to increase the resilience of the course (students, and instructors) to the presence and spread of COVID-19 on campus and in our communities.

Flexibility: Students may choose whether or not to attend face-to-face class sessions, with no questions asked. The class, including teaching materials, assignments, and assessments, is designed to be accessible remotely, through the Moodle shell, with no penalty in learning (e.g., grading or content delivery). Further, students participating remotely may do so synchronously (e.g., by joining live via Zoom during face-to-face sessions), or asynchronously (e.g., watching lecture afterwards and participating in on-line forums in place of in-person discussions). Finally, due dates for assignments will have great flexibility than in non-pandemic times.

Safety: I expect students to follow UM safety protocols, including using masks properly for inside and outside class activities, disinfecting your desk and equipment, and using hand sanitizers. Any student unable to follow safety protocols will need to participate remotely. The UM Coronavirus website and UM's email newsletter, UMToday, should be your main sources for updates and information related to UM's response to coronavirus throughout fall semester.

COVID-19-SPECIFIC DETAILS

- ***Stay home and contact the Curry Health Center at (406) 243-4330 if you feel the least bit sick and/or are exhibiting any COVID-19 symptoms.***

- **Mask use is required within the classroom. [View UM's face covering policy](#).** Drinking liquids and eating food (which requires mask removal) is strongly discouraged within the classroom.

- ***Please enter our classroom from the main UC (west) and exit through the doors on the east side of the classroom (towards Mt. Sentinel).***

- Each student is provided with a Healthy Griz kit. We expect students to clean their personal work space when they arrive for class, and before they leave the classroom. Refill stations for cleaning supplies/hand sanitizer will be set up around campus - please learn where they are and use them.

- Please do not congregating outside the classroom before or after class.

- For in-person attendance, we will use an on-line software to ask questions, and record your seating location, to support contact tracing efforts.

- No additional seating can be added to the classroom.

- There is high demand for spaces on campus to accommodate students with inadequate WiFi in their homes or quick turnarounds between face-to-face and remote classes. A list of remote learning spaces with the days and times available for student use is posted on [the Keep on Learning website](#). There will be signs posted outside of these buildings and rooms to indicate their availability.

- If you are diagnosed with COVID-19, follow instructions for quarantine and contact your advisor so they can help you stay on track academically.

- Please remain vigilant outside the classroom and help mitigate the spread of COVID-19.

- If you want to keep up-to-date on how Missoula and Missoula County are responding to the pandemic, [Cindy Farr, the Incident Commander for Missoula City County Health Department, has a YouTube channel](#), where she posts nearly daily briefings and other relevant updates.

COURSE OVERVIEW

Fire is a dominant ecological process affecting individual organisms, populations, communities, and ecosystems worldwide. To understand the ecology of most terrestrial ecosystems, you have to understand the role that fire plays in that system. Fire is also a useful tool and tightly linked to natural resources, and the stability and predictability of numerous things humans value (e.g., health, property, live). 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 a key part of developing and implementing sound management approaches and learning to live with wildfire. Throughout this course we will study fire ecology 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 patterns 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 contemporary fire activity and expectations for the future?

Fire as a social-ecological process: 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, you should be able to:

1. *Describe* the *scientific* principles at the foundation of fire ecology, and their relevance for management applications and practice.

2. *Describe* and *explain* (i) the biological and physical controls of wildfire, from the scale of a flame to fire regime, and (ii) how wildfire impacts individual organisms, populations, and ecosystems, across time scales of years to millennia, drawing on relevant examples.

3. *Describe* and *compare* historical fire regimes, current management challenges, and ecological role of fire in montane, mixed-conifer, subalpine, and grassland ecosystems of the West, and other select ecosystems globally.

4. *Analyze* and *interpret* fire ecology datasets to *test* hypotheses about fire effects, and *communicate* your findings in written text.

5. *Evaluate* information on fire ecology and management from diverse sources, including the scientific literature, media outlets, and social media, and *formulate* an informed opinion.

Course Organization

We will cover the following topics, roughly in this order, through presentations, on-line exercises, guest lectures from experts in the field, and optional field activities to study fire effects and post-fire revegetation. See Moodle for the current course calendar.

Theme	Topics
Fire as a biophysical process	Biological and physical controls of fire The fire regime concept Fire danger and links to fire ecology and management *Current topics:* Fire and climate change
Fire as an ecological process	Fire history: characterizing and reconstructing fire regimes Fire effects on plants, animals, and ecosystems *Current topics*: Fire, Climate, and Changing Forest Fire ecology of mixed-conifer forests Fire ecology of subalpine forests Fire ecology of pinion-juniper and montane aspen ecosystems *Current topics*: Fire and Ecological Feedbacks *Global fire ecology*: grasslands, rain forest, boreal forest, tundra, and/or more
Fire as a social-ecological process	Fire as a social-ecological process The National Cohesive Strategy: resilience to wildfires *Current Topics*: Fire, Resilience, and Ecosystem Change

*Guest presentation by topical expert

Prerequisites

FORS 230, "Fire Management & Environmental Change" OR an introductory course in ecology, botany, biology, dendrology, or biogeography.

Course Materials

For the past decade the course required the text book "Fire Ecology in Rocky Mountain Landscapes" by W. L. Baker, published in 2009 by Island Press. For 2020, in part due to the need to support remote learning, this book is no longer required; rather it is optional. I recommend it if you think you will go on to study or work in a fire-related field. You may find this book from a number of on-line book sellers.

Weekly course materials will come from (1) primary literature from scientific journals and research reports from the USFS or other relevant agencies; (2) other media formats, including videos, podcasts, and pieces from reputable media outlets; (3) and presentations that are accessible on a range of digital devices (and which include text, videos, and podcasts). All materials will be linked to from the Moodle shell.

Computer Access for Moodle and Synchronous Class Activities

For 2020, you absolutely need reliable internet access to keep up to date with course materials, successfully access and hand in assignments, and receive important update and/or participate in discussions via Moodle. For in-person meetings, we will also use laptop computers, tablets, or cell phones (any way to access the internet), as available, for in-class activities. If you do not have access to any of these devices, please contact your instructor asap.

Socrative: We will use the on-line app Socrative, to ask questions and solicit feedback from students participating in class synchronously (weather in-person or remote). When prompted by your instructor or TA to "log in to Socrative" you should navigate in a web browser to www.socrative.com. You DO NOT need to sign up for anything, so resist clicking on the "Sign up for free" tab. Instead, click the "Login" tab that is usually in the upper right of the screen. From there, choose "Student Login" and when prompted for the "Room Name" enter "FORS333". When prompted to enter your name, enter your name as "Last Name, First Name." When Socrative exercises are complete, we download them and use them in part to quantify attendance and student participation. Entering your last name first helps your TA more easily sort names in a way that matched our course roster.

Assignments and Exams

Weekly Learning Content Questions
Reading, watching, or listening to the assigned material by the noted due date is an important part of the course. If no due date is listed, the due date is by the end of the relevant Moodle section (which has an associated date). It is important that you complete this content by the noted deadline, to be able to support in-class activities (remote or in-person).

During most weeks, questions for the following week's readings will be posted on Moodle by Tuesday. Your answers to these questions are typically due by 9 am on the following Thursday via Moodle and take the majority of students around 45-60 minutes to complete. For any short-answer or essay questions, 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. Save these questions…as they are a good preview of what you can expect to see on the exams.

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 material was completed); pass = 6 points (i.e., some of the materials likely completed), or fail = 0 points (i.e., no evidence that the material was completed). 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 we know of the source); if you are citing material that is external to class (which is not typically required for weekly questions), then you need to provide the full source at the end. 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 in the News forum and student contributions

New for 2020, students will be required to post at least two new features in the "Fire in the News" forum, and provide their reaction and informed assessment. Details will be on Moodle.

Fire Effects Field Trip and Project

The course traditionally includes a one-day field trip to the Lolo Peak Fire, where students observe fire effect and collect data on post-fire tree regeneration and re-vegetation at different sites within the 2017 Lolo Peak Fire. For Fall 2020, students will have the option of attending this field trip and/or a field trip to the 2020 Mount Sentinel Fire. Students who are participating entirely remotely should contact the instructor for an appropriate substitution.

Regardless of the field trip you attend, students will develop and write an individual research project based on class data. This assignment accounts for 25% of the course grade. 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 the grading rubric located on Moodle will be discussed in class.

Exams

Two exams will cover materials from class periods, readings, and any field trips preceding the exam. *Material not covered in class but assigned in course content may be included in the exams.* The final exam is cumulative but will focus on the second half of the course. Exams will consist of true/false, multiple choice, and short answers and/or essay questions. As of the start of class, all examples will be distributed via Moodle.

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Exam 1: Tuesday October 6th (e-format, in class)
Final Exam: Thursday November 19th (e-format, in class)

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Course Grade

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
"Fire in the News" contributions	50
Weekly class participation (in-class or on-line)	100
Weekly content questions (lowest one dropped)	100
Fire effects exercises	250
Mid-term Exam	250
Final Exam	250
TOTAL	**1000**

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

A = ≥ 93%	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/viewing, 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 and other assignments 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.

6. *This is an unusual semester: please communicate with your instructor if you have any questions about how things are going or how to have a successful semester.*

COURSE POLICIES

Class Expectations

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 leave the classroom.

Class participation*
The "Class participation" portion of your course grade is usually based in part on class attendance; with the hybrid-flexible course model for fall 2020, evaluating participation will look different and may change over the semester. For students participating synchronously (whether in-person on remote), during-class exercises and attendance will contribute to participation; for students participating asynchronously, participation will be based on completing small assignments on Moodle, comparable to the during-class activities.

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 48 hours prior to the due date. This includes missing an exam: *there are no make-up exams* without prior arrangement.

*This semester is unlike other: if you are unable to keep up with class assignments or course materials, please contact your instructor and/or advisor: we are here to help you succeed. You are encouraged to do this sooner than you think necessary, as it provides more options. If you have extenuating circumstances (e.g., health, educational conflicts, family, etc.) and you contact me (Phil) least 48 hours in advance of a due date, I generally am happy to grant extensions.

Communication

I encourage you to see me and/or the TA 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, unless requested to do so. If you do e-mail the instructor or TA, please do the following so that the e-mail is read and understood: *(a) include "FORS 333" in the subject line* (this bumps it up to the top of my e-mail)*, (b) write in complete sentences, with proper grammar, and (c) sign the e-mail with your full name. Reply times will vary and may be up to 60 hours.*

Classroom environment

Students at University of Montana are diverse in many ways, including race, gender, age, religion, preparedness, and mobility. Please help create a respectful learning environment by honoring all student contributions and expressing your views in ways that do not diminish other students' perspectives.

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, 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](#).

Disability Modifications

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 2020 Official Dates and Deadlines calendar](#) and summarized below:

September 9 (5 pm): Last day to drop classes on Cyberbear with refund.

September 10 – October 21 (5 pm): Drop requires instructor and advisor approval, in CyberBear, $10 fee from registrar's office, and student will receive a "W" on transcript.

October 22 - December 6: Students are only allowed to drop a class under very limited and unusual circumstances, requiring instructor, advisor, and Dean's approval; $10 fee applies. A "WP" of "WF" will appear on the transcript for dropped classes. No refunds.