



Course Number: F425/524

Department of Forest and Rangeland Stewardship
Warner College of Natural Resources

COURSE SYLLABUS

Instructor

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Office Hours:	Monday and Wednesday 11:30-12:30 or by appointment

Term:	Spring 2019
Class Meeting Days:	Monday and Wednesday
Class Meeting Hours:	10:00-11:25
Class Location:	Forestry 127
Course Credits:	3

Course Overview

Wildland fire is an important, pervasive, and a sometimes-destructive ecological process in many ecosystems across the globe. In some cases, wildland fire act to maintain forest structure and function humans depend upon and in other cases they result in damage to human infrastructure, cause human suffering and have negative impacts on the landscapes that societies have depended on. Fire modeling has long been a key part of fire and fuel management, fire ecology, smoke management and air quality, fuel hazard assessment, and planning. However, Wildland fire is inherently complex, involving aspects of chemistry, physics, fluid dynamics, heat transfer, biology, and ecology. The overall goal of this class is to explore how these various disciplines interact to help us model and predict wildland fire behavior for forest and fire management. While there are many models of fire behavior available, the Rothermel surface and crown fire spread models and the Van Wagner crown fire initiation and spread models, are the most commonly used models in U.S., and around the globe. Given that these models are currently, and will be in the futur as well, the most used models in the U.S. we will focus our time on learning the theoretical aspects and practical limitations of these models.

Course Goals and Objectives

At the conclusion of this course, students will be able to:

1. Understand and explain the physical and chemical processes that influence fire behavior
2. Demonstrate the ability to utilize mathematical models to estimate various fire behavior descriptors
3. Identify and explain the assumptions and limitations of common fire behavior modeling systems
4. Apply and interpret predictions from common fire behavior models to natural resources management issues
5. Develop and utilize a mental vocabulary of common wildland fire terms and concepts

Course Prerequisites

Prerequisites: Students are expected to have a general knowledge of the strategies, tactics and tools used in wildfire management, and a basic knowledge of fire behavior and fire ecology. These skills can be gained through the completion of F 424 or an equivalent class.

Required Texts and Materials

There are no required textbooks for this course. Your readings in this class will consist of scientific literature and government documents. The readings will expand upon concepts covered in class and provide additional background material. In addition to readings I have provided several class handouts for you to utilize. Class handouts consist of equations utilized in class and/or important information needed to complete the exercises in class and on homework assignments. I expect you to have read the assigned readings before the start of class. A tentative reading list is provided below.

Course Policies

Late Work Policy:

There are no make-ups for homework assignments, in-class assignments, labs, the midterm, or the final exam. Any assignment turned in late will be assessed a penalty: a half-letter grade if it is one day late, or a full-letter grade for 2-5 days late. Assignments will not be accepted if overdue by more than 5 days. All assignments will be due to the start of the class period on the due date.

Extra Credit Policy:

There will be no extra credit assignment in this class.

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.

Attendance Policy:

Attendance is not monitored during class. However there are no make-ups allowed in this class, including in-class questions/quizzes. It is your responsibility to attend class and ensure your success.

If you will be missing a class for any reason (participation in official University activities, e.g., an out-of-town athletic event, or special religious observances) it is your responsibility to discuss this with me before the class date.

Final Exam Policy:

Final examination week is part of the regular semester. Student attendance shall be consistent with University policy.

If a student has three or more final examinations (not classes) scheduled for the same day or if conflicts of examination times occur, the student may negotiate a time change with the instructors involved. If the parties involved cannot find a mutually agreeable time, the Registrar's Office indicates which courses must be changed. **Note:** The Registrar's Office must be notified at least one week prior to Final Examination Week to allow instructors time to make appropriate accommodations. It is the student's responsibility to initiate negotiations.

Any student who has a conflict with the examination schedule must inform the instructor as soon as possible before the examination. If an agreement cannot be reached between the instructor and student as to the appropriateness of a make-up examination the student should appeal to the department head.

<http://www.registrar.colostate.edu/final-exams>

Professionalism Policy:

Per university policy and classroom etiquette; mobile phones, iPods, *etc.* **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, *etc.*, and have been warned may suffer a reduction in their final class grade.

When emailing the instructor please include your full name, CSU ID, and the course number in your email.

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/researchsources/understandingplagiarism/plagiarismoverview.cfm>.

Accessed, May 25, 2012)

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 (see page seven, column two: <http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf>).

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 you to 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."

Course Schedule (Tentative)

All dates and assignments listed below are tentative and can be changed.

Class Schedule

Week #	Day	Topic	Day	Topic
Week 1	Monday (1/21/19)	No Class	Wednesday (1/23/19)	Class Introduction and Overview of Fuel Particle Combustion
Week 2	Monday (1/28/19)	Pyrolysis and Requirements for Ignition	Wednesday (1/30/19)	Heat Release, Emissions and Flame Temperature.
Week 3	Monday (2/04/19)	Heat Release, Emissions and Flame Temperature.	Wednesday (2/06/19)	Fons's Theory of Fire Spread and Heat Transfer
Week 4	Monday (2/11/19)	Fons's Theory of Fire Spread and Heat Transfer	Wednesday (2/13/19)	Predicting Surface Fire Spread: The Rothermel 1972 model
Week 5	Monday (2/18/19)	Predicting Surface Fire Spread: The Rothermel 1972 model	Wednesday (2/20/19)	Predicting Surface Fire Spread: The Rothermel 1972 model
				Lab 1: Introduction to BEHAVE
Week 6	Monday (2/25/19)	Application of Rothermel 1972 in Heterogeneous Fuelbeds and Fuel models	Wednesday (2/27/19)	Environmental Inputs for Rothermel 1972
				Lab 2: Behave basics
Week 7	Monday (3/04/19)	Other Related Surface Fire Behavior Models: Residence Time, Heat Release Rate, FLI, Flame Length	Wednesday (3/06/19)	Surface Fire Spread in 2 Dimensions:
				Lab 3: Adv Behave
Week 8	Monday (3/11/19)	Surface Fire Spread in 2 Dimensions:	Wednesday (3/13/19)	TBD
Week 9	Monday (3/18/19)	No Class Spring Break	Wednesday (3/21/19)	No Class Spring Break
Week 10	Monday (3/25/19)	Crown fire Spread and Initiation	Wednesday (3/27/19)	Crown Fire Spread and Initiation

Week 11	Monday (4/1/19)	Crown Fire Spread and Initiation	Wednesday (4/3/19)	Lab 4: Crown Fire Modeling in BEHAVE
Week 12	Monday (4/8/19)	Estimating Crown Fire Model Inputs	Wednesday (4/10/19)	Estimating Crown Fire Model Inputs
Week 13	Monday (4/15/19)	Fire Hazard and Forest Management	Wednesday (4/17/19)	Fire Hazard and Forest Management
				Lab 5: Fire Family Plus
Week 14	Monday (4/22/19)	Fire Hazard and Forest Management	Wednesday (4/24/19)	Lab 6: Fuel Treatment Design
Week 15	Monday (4/29/19)	Limitations and Future of Fire Models	Wednesday (5/01/19)	Exam review
Week 16	Monday (5/06/19)	Exam part 1	Wednesday (5/08/19)	Exam part 2
Final Exam	No Class!!!!			

Basis for Final Grade

In this class you will be assessed using a combination of homework/lab assignments, in class quizzes, a mid-term exam, and a final exam. You will be graded using a standard A+ through F scale.

Assessment	Total number of points
Homework/lab assignments	500
Class assignments/quizzes	150
Final Exam	350
	1000 pts

Assignments

Homework/lab assignments

Homework/lab assignments will be assigned to help you grasp the material we cover in class. Homework assignments will consist of a mixture of calculations, data analysis, simulation modeling, and interpretation of data and written assignments. All homework/lab assignments will be completed and handed in individually unless otherwise noted. It is expected that all assignments turned in are at a professional level. This includes putting your name on the paper, writing in complete sentences, labeling tables and figures and citing sources to name a few. All assignments will be due at the start of the class on the due date listed, unless prior arrangements have been made.

Class assignments/quizzes

Throughout the class we will have assignments and quizzes during the normal class time. Assignments/quizzes will be unannounced and designed to test conceptual concepts presented in class or in the readings and provide you with opportunities to engage with the material in small groups. There are no makeup opportunities for in class questions/quizzes, unless prior arrangements have been made.

Final Exam:

The final exam will consist of three parts. Part one will be a combination of short answer, true and false and multiple choice questions that test your understanding of concepts and terminology. Part two will consist of calculations that will test your knowledge of the mathematical and chemical aspects related to fire science. The third portion of the final exam will consist of using computer models to apply the knowledge you gained in this class to real world problems and to test your ability to use common computer models in fire science. Failure to hand in the take home portion of the final exam will result in a zero for the exam. During the second portion of the final exam you will be allowed to bring your own "cheat sheet" of equations and a calculator. All mathematical problems will be graded in terms of both the answer and the way in which you set up the problem. For mathematical questions I will provide 75% of the points for correctly setting up the problem and 25% for the correct answer. All material we covered in the class (both readings and lectures) may be included on the final exam.