

Introduction to Fire Management

Carl Seielstad, Associate Professor, Fire Science

Fire Management 30270 – FOR230–01
9:10-10:00am MW Chemistry 123
Spring Semester 2016

UM College of Forestry and Conservation
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Office Hours: Mon 12-2; Tues 10-11 or by appt.

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Course Overview

Fire management is an immense topical area with aboriginal roots- native peoples from across the globe have been using fire to manipulate landscapes for thousands of years. From these roots, complex fire management organizations and practices have evolved. In North America, fire has replaced timber as the dominant land management activity, and federal agencies regularly spend nearly half their annual budgets trying to put fires out during busy fire seasons. A warming global climate and growing human inhabitation of the wildlands implies that fire will remain a dominant societal issue in the foreseeable future. FOR230 Introduction to Fire Management will trace the evolution of fire management practices in the United States and provide an overview of fire fundamentals, fire ecology, and fire management practices. The class is targeted at students new to fire management and is intended to provide a basic understanding of first principles to students in natural resource management and related fields, while serving as a stepping off point for those interested in further study of fire.

Learning Outcomes

Upon completion of this class, students should be able to:

- Describe the processes of combustion and heat transfer.
- Discuss how weather, fuels, and topography interact to control fire behavior.
- Understand fire regimes and first and second order fire effects.
- Recognize and articulate the basic role of fire in affecting insects and disease, stand structure, and species composition in the West.
- Comprehend fire policy evolution in the United States.
- Describe the American fire management organization and command structure.
- Present multiple approaches, strategies and tactics for managing prescribed fire and wildland fire.

Readings

There is no required textbook. The assigned readings include parts of book chapters, reports, and peer-reviewed literature. They will be made available through Moodle. Although you are required to read only parts of some of these readings, I have selected them partially because they are good references for

the future. In each assigned reading, you should check the required page numbers in the table at the end of this document. Where TBA appears in the table, a reading has not yet been assigned. Citations for the assigned readings are as follows:

- Anderson, H. 1982. Aids to determining fuel models for estimating fire behavior. GTR-INT-122, 22 pp.
- Baker, W. 2009. Fire ecology in Rocky Mountain landscapes, Island Press, 605 pp.
- Brown, J. and Smith, J.K. 2000. Wildland fire in ecosystems: effects of fire on flora, USDA Forest Service RMRS-GTR-42-vol. 2. Ogden, UT, 257p. (pp. 3-7).
- Jenkins, M., Hebertson, E., Page, W. and Jorgensen, C. 2008. Bark beetles, fuels, fires and implications for forest management in the Intermountain West, Forest Ecology and Management, 254(1): 16-34.
- Keeley, J., Aplet, G., Christensen, N., Conard, S., Johnson, E., Omi, P., Peterson, D., Swetnam, T. 2009. Ecological foundations for fire management in North American forest and shrubland systems, PNW-GTR-779, 92 pp.
- Neary, D., Ryan, K., and DeBano, L. 2005. Wildland fire in ecosystems: effects of fire on soils and water, USDA Forest Service RMRS-GTR-42-vol. 4. Ogden, UT, 250p. (pp. 95-106).
- Pyne, S., Andrews, P. and Laven, R. 1996. Introduction to wildland fire, 2nd Edition, John Wiley & Sons, Inc., 769p.
- Sandberg, D., Ottmar, R., Peterson, J., and Core, J. 2002. Wildland fire in ecosystems: effects of fire on air, USDA Forest Service RMRS-GTR-42-vol. 5. Ogden, UT, 79p. (pp. 19-32)
- Schoennagel, T., Veblen, T., and Romme, W. 2004. The interaction of fire, fuels, and climate across Rocky Mountain forests. Bioscience, 54(7): 661-676.
- Scott, J., Burgan, R. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model, RMRS-GTR-153, 72 p.
- Schroeder, M. and Buck, C. 1970. Fire weather: a guide for application of meteorological information to forest fire control. U.S. Department of Agriculture Forest Service Agricultural Handbook 360, 229p. (pp. 8-10; 11-18; 19-67; 69-84; 181-195).
- Smith, J.K. 2000. Wildland fire in ecosystems: effects of fire on fauna, USDA Forest Service RMRS-GTR-42-vol. 1. Ogden, UT, 83p. (pp. 25-42).
- van Wagtendonk, J. 2007. The history and evolution of wildland fire use. Fire Ecology Special Issue, 3(2): 3-17.
- van Wagtendonk, J. 2006. Fire as a physical process. Pages 38-57 in: Sugihara, N. G., J. W. van Wagtendonk, J. Fites-Kaufman, K. E. Shaffer, and A. E. Thode (eds.). Fire in California's ecosystems. University of California Press, Berkeley. 578 p.
- Waldrop, T, Goodrick, S., 2012. Introduction to prescribed fire in southern ecosystems. USDA Forest Service Southern Research Station Science Update, SRS-054. 80 pp.

Course Policies

Attendance: Attendance is required. Additionally, I will not always post comprehensive class notes or PowerPoints, nor will I spend office hours giving lectures again. Take good notes, and if you miss a class,

get notes from a classmate. I am happy to answer questions, clarify issues, and elaborate on lecture and reading topics during office hours or by appointment.

Communication: Moodle and email will be the primary forms of communication. All course materials will be made available through Moodle, along with announcements, updates, and changes. Please check Moodle often and refer to it first if you have questions about what to read or do.

Academic Honesty: Students must practice academic honesty. Academic misconduct is subject to an academic penalty and/or a disciplinary sanction by the University. This is a zero tolerance policy that will result in failure and possible expulsion if not followed. All students need to be familiar with the Student Conduct Code. The Code is available for review online at: [Student Conduct Code \(http://life.umt.edu/vpsa/policies/student_conduct.php\)](http://life.umt.edu/vpsa/policies/student_conduct.php)

Cell Phone Use: Please disengage from cell phones during lecture. This means no texting, browsing, or checking email until class is over. If you need to engage in these activities, please remove yourself from the classroom before doing so.

Make-up/Extra Credit: There will be no make-up assignments and no opportunities for extra credit. I will not administer exams early or late except under the most extenuating of circumstances and with at least 60 hours of advanced notice. Assignments will lose 10% for each day past the due date.

Students with disabilities may request reasonable modifications by contacting me in the first two weeks of the class. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). "Reasonable" means the University permits no fundamental alterations of academic standards or retroactive modifications. 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 Lommasson 154 or 406 243 2243. I will work with you and DSS to provide an appropriate modification.

Assignments

Quizzes: Four quizzes will be given during the semester (see table below for dates), collectively comprising 40% of your final grade. They will cover material from the lectures and readings from the unit immediately preceding them. I will not cover all of the material in the readings directly in my lectures, but the readings are important and will be tested on.

Exam: The final exam will be cumulative, covering material from the entire semester. The exam will consist of combinations of short answer, multiple choices, matching, true/false, and essay.

Exercises: There will be five exercises assigned during the semester on the topic of fuels, fire behavior, fire effects, fire regime metrics, and fire management. Each exercise is expected to require 2-4 hours of time and will be due approximately 2-4 weeks after assigned. See table below for assignment and due dates

Grading

Exercises (5)	30
Quizzes (4)	40
Final (1)	<u>30</u>
	100%

Tips for success

- READ! The quizzes and exams will cover material from the readings and lecture. I will not cover everything in the readings during lecture. In fact, much of the reading will not be addressed directly in lecture but will be important in gaining comprehensive understanding of fire.
- It is imperative that your university email works and that you can use Moodle. These will be the primary means of communication between me and you. I will update Moodle frequently with notes, class material, assignments, and readings.
- Stay on top of this class! Review your lecture notes within a couple of days of each lecture and make notes of things you missed or don't understand. Then ask questions of me and/or you classmates. Review the readings in the same manner.
- Ask questions and take advantage of office hours. Don't wait until the last minute to do the readings or the writing assignment.
- Be enthusiastic, curious, and open-minded.

Tentative Course Schedule:

Week	Date	Topic	Readings	Assignments Distributed	Assignments Due
1	Jan 25	Course Introduction; UNIT 1. FIRE AS A PHYSICAL PROCESS 1.1. Fire in the Earth System	Syllabus		
1	Jan 27	1.2 The Combustion Process	Pyne et al. 1996: 3-11		
2	Feb 01	1.3 Fire, Ecosystem Energy, and Carbon Cycle	Fire Science Brief 2010: 5 p.		
2	Feb 03	1.4 Heat Transfer	Pyne et al. 1996: 14-18, 20-23		
3	Feb 08	1.5 Ignition: Lightning and the Role of Humans	Baker 2009: 15-16	Exercise 1	
3	Feb 10	Unit 1 Wrap Up; Quiz – Unit 1			
4	Feb 15	<i>President's Holiday</i>			QUIZ
4	Feb 17	UNIT 2. FIRE BEHAVIOR 2.1 The Fire Behavior Triangle, Terminology, Fire Spread	TBA		

Week	Date	Topic	Readings	Assignments Distributed	Assignments Due
1	Jan 25	Course Introduction; UNIT 1. FIRE AS A PHYSICAL PROCESS 1.1. Fire in the Earth System	Syllabus		
5	Feb 22	2.2 Fuels I	Pyne et al. 1996: 90-106		
5	Feb 24	2.3 Fuels II	Anderson 1982; Scott and Burgan 2005	Exercise 2	Exercise 1
6	Feb 29	2.4 Fire Weather I	Schroeder & Buck 1970: 3-84		
6	Mar 02	2.5 Fire Weather II	Schroeder & Buck 1970: 85-143, 181-195		
7	Mar 07	2.6 Fire and Topography	Baker 2007: 33-37 VanWagtendonk 2006: 46-53		
7	Mar 09	Unit 2 Wrap Up; Quiz – Unit 2			
8	Mar 14	UNIT 3. FIRE AS AN ECOLOGICAL PROCESS First/Second Order Effects; Measures of Severity	VanWagtendonk 2006: 53-56		QUIZ
8	Mar 16	Fire Effects on Watersheds, Hydro Processes, Soils, and Air	Neary et al. 2005: 21-27, 29-37, 107-119 Sandberg et al. 2002: 19-32	Exercise 3	Exercise 2
9	Mar 21	Fire Effects on Flora and Fauna	Brown and Smith 2000: 9-34 Smith 2000: 25-42		
9	Mar 23	Fire and Insects (Interacting Disturbances)	Jenkins et al. 2008: 16-34		
10	Mar 28	Unit 3 Wrap Up; Quiz Unit 3			
10	Mar 30	UNIT 4. FIRE REGIMES 4.1. Fire Regimes/Fire History	Keeley et al. 2009: 1-35		QUIZ
11	Apr 04	<i>Spring Recess</i>		Exercise 4	Exercise 3
11	Apr 06	<i>Spring Recess</i>			

Week	Date	Topic	Readings	Assignments Distributed	Assignments Due
1	Jan 25	Course Introduction; UNIT 1. FIRE AS A PHYSICAL PROCESS 1.1. Fire in the Earth System	Syllabus		
12	Apr 11	4.2. Fire in Pine Savannas	Schoennagel et al. 2004: 667-674.		
12	Apr 13	4.3. Fire in Subalpine Forests	Schoennagel et al. 2004: 661-667.		
13	Apr 18	4.4. Climate Change and Fire	TBA		
13	Apr 20	Unit 4 Wrap Up; Quiz Unit 4			
14	Apr 25	UNIT 5. FIRE MANAGEMENT 5.1. Introduction to Fire Management	TBA Radiolab- Mack Lake Fire	Exercise 5	QUIZ
14	Apr 27	5.2. Fire Policy	VanWagtendonk_2007: 3-17		Exercise 4
15	May 02	5.3. Fire Suppression Strategies and Tactics	TBA		
15	May 04	5.4. Prescribed Fire; Fuel Reduction Treatments; Natural Fire	Keeley et al. 2009: 35-56. Waldrop and Goodrick 2012: 5-42.		
16	May 10	Final Exam: (TUES) 10:10am -12:10am			Exercise 5

Important Dates Restricting Opportunities to Drop a Course

February 12. Last day to drop classes on cyberbear.

February 13 – March 28. Drop requires form with instructor and advisor signature, \$10 fee from registers office; student will receive a 'W'.

March 29. Students are only allowed to drop a class under very limited and unusual circumstances. Not doing well in the class, deciding you are concerned about how the class grade might affect your GPA, deciding you did not want to take the class after all, and similar reasons are not among those limited and unusual circumstances. If you want to drop the class for these sorts of reasons, make sure you do so by the end of the 45th instructional day of the semester (March 28).