

Forest Ecosystems and Society Graduate Degree Program
Plan for Achieving FES Learning Outcomes

Student Name _____

Circle appropriate degree: M. F M.S. Ph.D

Consult the attached description of each learning outcome. For each outcome, on separate pages, describe how you have achieved, or will achieve, the learning outcome in each area, and how you will be able to demonstrate that you are competent in that area to the committee.

After all signatures have been obtained, a copy of the plan and signatures should be sent to all members of the student's graduate committee and copy should be filed in the student's personnel file in the department office.

1. Disciplinary skills and knowledge
2. Interdisciplinary Collaborative Problem Solving (biophysical and social sciences)
3. Communication skills (oral, written, professional)
 - a. (optionally as desired by student and committee) Teaching
4. Critical thinking and critical awareness skills
5. Research skills (quantitative, qualitative)
6. Research ethics and responsibilities
7. Policy analysis / interpretation

Required Signatures

I agree to the plan described above for achieving the FES degree program learning outcomes.

Student Signature _____ Date 3/3/2017

I agree to the plan described above for achieving the FES degree program learning outcomes and I will assess my student on these learning outcomes during their defense and preliminary examination (if Ph.D).

Major Professor Signature _____ Date 3/3/2017

The plan described above meets the requirements of the FES Graduate Degree program.

FES Department Signature [Signature] Date 3/8/17
(Program Director or Dept. Head)

FES Graduate Learning Outcomes Effective Fall 2015

Explanation of Learning Outcomes

The explanations below are meant as general guidelines. Students and committees will interpret these and make specific recommendations for how students should prepare to meet them and demonstrate them to the committee in a manner suitable to their area of study and level of advancement.

1. **Disciplinary skills and knowledge**

Knowledge of a student's chosen field of study, and closely related fields, including history and trends in major findings, concepts, theories, approaches, and context.

2. **Interdisciplinary Collaborative Problem Solving**

- a. Situate environmental issues into appropriate biophysical and social contexts and identify disciplines necessary to address the problem.
- b. Collaborate in interdisciplinary teams, e.g., listen to, give and receive constructive feedback, define divisions of labor, set goals and milestones, actively work to see problems from multiple perspectives, understand group dynamics including issues around providing and accepting leadership, member responsibilities and peer-to-peer communications.
- c. Provide disciplinary expertise to an interdisciplinary team.
- d. Articulate ideas that transcend contributing disciplines; identify commonalities and conflict among disciplines; to devise approaches that support commonalities and reduce conflicts.

3. **Communication skills (oral, written, professional)**

Effectively interact (write, speak and listen) to diverse audiences in an organized and clear fashion about areas of expertise in oral, written or electronic formats. Explain information from one discipline to researchers in other relevant disciplines and communicate research to scientific and non-scientific audiences.

For students wishing to pursue careers in academia, the following learning outcomes for teaching may be applicable:

Understand contemporary pedagogy, relevant STEM teaching methods and experience in their application in classroom, online, and technical/professional learning environments. Develop¹ a classroom and/or online course, including development of a syllabus which includes learning outcomes, classroom activities, assignments and assessment and evaluation methods.

4. **Critical thinking and critical awareness skills**

Discern between, and infer consequences of multiple perspectives. Evaluate the quality, context, scale, and biases in information, and synthesize diverse types of information, in written and oral forms. Effectively participate in real-time discussions of biophysical and social systems and their interactions. Understand the application of methods and knowledge from one discipline to another.

5. **Research skills**

Demonstrate facility with the research methods appropriate for the area of study. Understand the use of quantitative and qualitative summaries of data as evidence for conclusions and scientific inference. This can include skills and knowledge needed to plan, implement, analyze and interpret research.

6. **Research ethics and responsibilities**

Knowledge of processes and guidelines for assuring that research is conducted in socially and professionally acceptable and legal ways, while minimizing and managing conflicts of interest. Topics of relevance may include responsible conduct of research, general ethics, peer review, bias during data analysis and presentation, plagiarism, animal welfare, treatment of human subjects, collaboration, and authorship.

7. **Policy analysis/interpretation**

Understand the role of laws, regulations, social institutions, and governance processes relevant to application of a student's disciplinary and/or inter/trans-disciplinary areas of study.

¹ Development may include course delivery but that is not necessary.

I. Disciplinary Skills Knowledge

Knowledge of a student's chosen field of study. Knowledge of closely related fields, including history and trends in major findings, concepts, theories, approaches, and context.

A. Learning Outcomes:

1. The ability to describe key concepts in landscape ecology, pyro-geography, and disturbance ecology
2. The ability to describe key concepts in the field of remote sensing related to pyro-geography and disturbance ecology
3. The ability to characterize current understanding of wildfire as a landscape scale disturbance in the United States and Canada

B. Learning Outcomes will be achieved by:

1. Spending time in landscapes making observations and thinking about the mechanisms that influence large scale wildfire disturbances and identifying similarities and differences within and across geographic regions
2. Discussing observations seen across various landscapes and described in the literature
3. Participating in lab groups through discussion, presentation, and observation
 - a) LCSRG: Landscape Fire Conservation Science and Research Group led by Dr. Meg Krawchuk's at Simon Fraser University (SFU) and OSU
 - b) Fiery Lab: Led by Dr. Meg Krawchuk and Dr. John Bailey at OSU
 - c) FEAM: Forest Ecology and Management led by Dr. Ken Lertzman at SFU
4. Course work:
 - a) FES 524 Natural Resource and Data Analysis: further development of statistical knowledge and understanding pertinent to questions related to natural resources
 - b) FES 599 Forest Biodiversity Seminar: enhance understanding of issues and research around forest ecology, evolution, conservation, and biodiversity across geographies
 - c) FES 599 Conservation Ethics Workshop: small group work focused argument analysis related to wildfire topics
5. Reading, writing, and discussing literature pertinent to the concepts
6. Integrating knowledge gained from coursework, reading, fieldwork, and previous work experience in research and writing
7. Working as a teaching assistant for FES 440: Wildland Fire Ecology
 - a) Attending lectures and participating in student discussion groups

C. Achievement of learning outcomes will be demonstrated by:

1. Articulating the broad concepts listed above in both written and verbal forms that include the following deliverables:
 - a) Written and oral qualifying exams (completed ██████████ June 2015)
 - b) Research proposal (completed ██████████ June 2016)
 - c) 2015 Conference post presentation at the Association of Fire Ecology
 - d) Presentations and discussion in lab groups
 - e) PhD Thesis development and defense
 - f) Meet course work objectives and outcomes

II. Transdisciplinary/Interdisciplinary Collaborative Problem Solving

Situate environmental issues into appropriate biophysical and social contexts and identify disciplines necessary to address the problem. Collaborate in interdisciplinary teams, e.g. listen to, give and receive constructive feedback, define divisions of labor, set goals and milestones, actively work to see problems

from multiple perspectives, understand group dynamics including issues around providing and accepting leadership, member responsibilities and peer-to-peer communications. Provide disciplinary expertise to an interdisciplinary team. Articulate ideas that transcend contributing disciplines; identify commonalities and conflict among disciplines; devise approaches that support commonalities and reduce conflicts.

A. Learning Outcomes:

1. Integrate knowledge from the fields of pyro-geography, landscape ecology, biogeography, remote sensing, geographic information science, and statistics to illustrate disturbance interactions in forest ecosystems
2. Understand the implications of my research findings along the biophysical human science continuum
3. Understanding wildfire as a landscape process along the biophysical human science continuum and the dichotomy that exist between fire management (i.e. suppression) and fire as a biophysical process
4. Collaborate and problem solve when necessary for fieldwork, coursework, and lab groups

B. Learning Outcomes will be achieved by:

1. Compiling and analyzing data, discussing, writing papers for my research
2. Course work:
 - a) FES 524 Natural Resource and Data Analysis: working in groups to think about research questions, analysis, and write up statistical findings
 - b) FES 599 Forest Biodiversity Seminar: work in small groups to organize speakers series
 - c) FES 580 Manuscript writing: work in small groups to provide feedback on writing content and organization
 - d) GEOG 566: Advanced spatial statistics: enhance knowledge and understanding regarding spatial analysis to apply to my research and grow my tool box
3. LCSRG lab group
 - a) Facilitate and organize meetings that are useful and productive for all group members
4. Supervising, managing, and mentoring field technician
5. Communicating with field technician and other necessary stakeholders
6. I also have extensive experience working on teams and working with teams, which is transferable to any work environment. This experience includes group development, leadership styles and approaches, conflict resolution, feedback, goal setting and expectations.
7. Additionally, my master's thesis and work has provided me with a solid foundation regarding human environment interactions and the role humans have had in shaping contemporary North American landscapes that would allow me to work across disciplines with people on topics such as the wildland urban interface or the effects of smoke from wildfire on urban areas
 - a) Course work completed:
 - (1) University of Denver course work: Geog 3425 Urban Sustainability, Geog 4000 Geographic perspectives

C. Achievement of learning outcomes will be demonstrated by integrating and synthesizing knowledge to generate the following deliverables:

1. Development and defense of PhD Thesis
2. Integrate management implications and/or human environment implications for research findings when relevant

3. Share findings with relevant stakeholders - British Columbia (BC) Parks
4. Meet course work objectives and outcomes

III. Communication Skills

Effectively interact (write, speak and listen) with diverse audiences in an organized and clear fashion about areas of expertise in oral, written or electronic formats. Explain information from one discipline to researchers in other relevant disciplines and communicate research to scientific and non-scientific audiences.

A. Learning Outcomes:

1. The ability to write scientific, technical, and summary reports that effectively communicate the main ideas
2. The ability to present technical results to diverse audiences
3. The ability to engage and be curious with diverse audiences

B. Learning Outcomes will be achieved by:

1. Interacting and communicating with diverse audiences
2. Writing papers and giving presentations
3. Course work:
 - a) FES 524 Natural Resource and Data Analysis: work in groups to think about research questions, analysis, and write up statistical findings; being able to explain my research to a broad audience
 - b) FES 599 Forest Biodiversity Seminar: work in small groups to organize speakers series
 - c) FES 580 Manuscript writing: work in small groups to provide feedback on writing content and organization; being able to explain my research to a broad audience; develop clarity and efficiency in writing
4. LCSRG and Fiery lab group
 - a) Presenting my research to develop clarity and efficiency in both written and oral forms
5. Building on previous work and academic experience
6. Training:
 - a) Accredited ADL Trainer/Facilitator for A Campus of Difference™ anti-bias and diversity training programs focused on creating respectful and inclusive campus environments. A World of Difference® Institute—Anti-Defamation League Train-the-Trainer Program, December 2012
 - b) Participant, Interact—Skills for Adaptive Leadership (Communication Workshop). Leadership Institute of Seattle (LIOS) Graduate College of Saybrook University, November 2012

C. Achievement of learning outcomes will be demonstrated by:

1. Produce papers, reports, and oral presentations for scientific as well as broader audiences
 - a) 2015 conference poster presentation at the Association for Fire Ecology
 - b) Present at the Western Forest Graduate Research Symposium at OSU
 - c) Lab group presentations
 - d) Mini Lectures in classes as a teaching assistant
 - e) Discussions both as participant and facilitator
2. Develop research papers that will contribute to the PhD Thesis
3. Generate written reports including fieldwork summary and research findings for BC Parks
4. Meet coursework objectives and outcomes

IV. Critical Thinking/Awareness Skills

Discern between, and infer consequences of multiple perspectives. Evaluate the quality, context, scale, and biases in information, and synthesize diverse types of information, in written and oral forms. Effectively participate in real-time discussions of biophysical and social systems and their interactions. Understand the application of methods and knowledge from one discipline to another.

A. Learning Outcomes:

1. The ability to recognize conceptual connections across disciplines
2. The ability to recognize links between my research and others research
3. The ability to critique the work of my peers in a productive way
4. The ability to recognize the outcomes of multiple perspectives
5. The ability to evaluate the appropriateness of research methods
6. The ability to apply logical principles of argument construction and analysis to my work

B. Learning Outcomes will be achieved by:

1. Synthesizing, connecting, and critiquing current research trends in my field
2. Course work:
 - a) FES 524 Natural Resource and Data Analysis: work in groups to think about research questions, analysis, and write up of statistical findings; thinking about statistical analysis with an awareness of appropriate use of statistical tests
 - b) FES 599 Forest Biodiversity Seminar: work in small groups to facilitate discussion of paper related to lecture by guest speak; think critically about research papers
 - c) FES 580 Manuscript writing: work in small groups to provide feedback on writing content and organization; think critically about my writing and others writing
3. LCSRG and Fiery lab group meetings
 - a) Presenting my research
 - b) Facilitating discussions and lab meetings in a productive manner that allows for multiple perspectives and voices from the group
 - c) Engaging in discussions regarding other people's research
 - d) Engaging in meaningful conversations about discussion topics, writing workshops, and brain storming within the group
4. Discussing with peers their research ideas and my research ideas
5. Integrating knowledge gained in coursework, reading, fieldwork, and previous work experience into research and writing

C. Achievement of learning outcomes will be demonstrated by:

1. Synthesizing previous research, identifying research gaps, posing research questions, conducting research, and the summation of research which will be demonstrated by the following deliverables:
 - a) Development and successful defense of research proposal (Demonstrated [REDACTED] June 2016)
 - b) Participate in lab groups - share my research and engage with others regarding their research
 - c) Meet coursework objectives and outcomes
 - d) Utilizing appropriate statistical methods for my research questions and data
 - e) Development of research papers and pass PhD thesis defense

V. Research Skills

Demonstrate facility with the research methods appropriate for the area of study. Understand the use of quantitative and qualitative summaries of data as evidence for conclusions and scientific inference. This can include skills and knowledge needed to plan, implement, analyze and interpret research.

A. Learning Outcomes:

1. The ability to conduct literature searches, identify research gaps, and pose research questions
2. The ability to choose appropriate statistical methods to answer research questions
3. The ability to interpret and summarize research findings
4. The ability to plan, implement, and manage fieldwork in remote backcountry settings

B. Learning Outcomes will be achieved by:

1. Course work completed:
 - a) University of ██████ course work: Geographic Research Methodology GEOG 4020; Advanced Geographic Statistics GEOG 3000
 - b) ██████ courses: Research Approaches for PhD Students REM 802; Statistics for resource managers and field biologists STAT 650; Geographic Research Methodology GEOG 4020 (University of ██████);
2. Course work:
 - a) OSU courses: FES 524 Natural Resource and Data Analysis: work in groups to think about research questions, analysis, and write up of statistical findings; thinking about statistical analysis with an awareness of appropriate use of statistical tests; GEOG 566: Advanced spatial statistics: enhance knowledge and understanding regarding spatial analysis to apply to my research and grow my tool box
3. Development of the research proposal (completed ██████ June 2016)
4. Management of research questions, data collection, and data analysis
5. Timely progress to meet research goals each term
6. Develop manuscripts for thesis and publication

C. Achievement of learning outcomes will be demonstrated by:

1. Completion of PhD research which includes the following deliverables to demonstrate these skills:
 - a) Written and oral qualifying exam (completed ██████ June 2015)
 - b) Research proposal (completed ██████ June 2016)
 - c) Fieldwork and data collection (completed summer 2016)
 - d) Meet course work objectives and outcomes
 - e) Research papers that contribute to the PhD Thesis

VI. Research Ethics and Responsibilities

Knowledge of processes and guidelines for assuring that research is conducted in socially and professionally acceptable and legal ways, while minimizing and managing conflicts of interest. Topics of relevance may include: Responsible conduct of research; General ethics; Peer review; Bias during data analysis and presentation; Animal welfare; Treatment of human subjects; Collaboration, authorship, and plagiarism

A. Learning Outcomes:

1. The ability to conduct responsible data collection and management

2. The ability to apply ethical guidelines and practices throughout the research process
3. The ability to recognize forms of plagiarism
4. The ability to recognize and avoid professional conflicts of interest

B. Learning Outcomes will be achieved by:

1. Read: On being a scientist: Responsible conduct in research
2. Discussion of ethical issues related to scientific research
3. Coursework: Conservation Ethics Workshop FES 599 (OSU); Research Approaches for PhD Students REM 802 (University of); Geographic Research Methodology GEOG 4020 (University of); Natural Resource Data Analysis FES 524 (OSU)
4. Training: Leave No Trace Center for Outdoor Ethics Master Educator (completed 2007 through the National Outdoor Leadership School)

C. Achievement of learning outcomes will be demonstrated by:

1. Meet coursework and training objectives and outcomes
2. Generate and follow guidelines to conduct fieldwork as well as follow permit criteria for remote wilderness settings
3. Manage field team safety and set clear expectations regarding minimal impact practices (LNT) in remote backcountry areas
4. Maintaining ethical guidelines throughout research
5. Defense of research

VII. Policy Analysis/Interpretation

Understand the role of laws, regulations, social institutions, and governance processes relevant to application of a student's areas of study.

A. Learning Outcomes:

1. The ability to describe key policies pieces related to wildfire management in the United States and Canada
2. The ability to describe how my research may inform management
3. The ability to recognize the role my research may have in management decisions

B. Learning Outcomes will be achieved by:

1. Integrating knowledge from coursework, reading, fieldwork, lab groups, and previous work experience into research, writing, and discussion

C. Achievement of learning outcomes will be demonstrated by:

1. Identifying aspects of my research that may inform or contribute to management decisions and policy while simultaneously integrating this into the discussion section of papers contributing to the PhD Thesis

VIII. Teaching

Understand contemporary pedagogy, relevant STEM teaching methods and experience in their application in classroom, online, and technical/professional learning environments. Develop a classroom and/or online course, including development of a syllabus, which includes learning outcomes, classroom activities, assignments and assessment and evaluation methods.

A. Learning Outcomes:

1. Develop a course including syllabus, learning outcomes, classroom activities, assignments, and evaluation methods
2. Uphold university policies in a classroom setting
3. Create classes that facilitate learning processes and accommodate a variety of learning styles
4. Mentoring students

B. Learning Outcomes will be achieved by:

1. Work as a Teaching Assistant (grading and participation/facilitation in discussion groups)
 - a) [REDACTED] Ecology; Oregon State University; Winter 2017
 - b) Observing teaching style and methods
2. Facilitate laboratory exercises as a teaching assistant
 - a) Introduction to Biogeography (Geog 215; [REDACTED] University; Fall 2015)
 - b) Earth Systems Science (Geog 111; [REDACTED] University; Fall 2014)
 - c) Environmental Systems (Geog 1201, 1202, 1203; University of [REDACTED]; 2009-2011 Fall, Winter, Spring)
3. Develop and facilitate an environmental GIS course
 - a) Adjunct instructor - Introduction to GIS and GPS (Geol 304; [REDACTED] College; Spring 2013)
4. Design and facilitate place based environmental science curriculum
 - a) Senior Field Instructor, National Outdoor Leadership School (NOLS; courses offered in affiliation with University of Utah, Dept. of Parks, Recreation, and Tourism (PRT), Natural Resource Learning Program)
5. Coach students to assist them in achieving their goals
 - a) Mentoring students on NOLS courses
 - b) Mentoring field assistant during 2016 summer field season for data collection

C. Achievement of learning outcomes will be demonstrated by:

1. Producing an introductory environmental GIS and GPS course
2. Creating learning environments that are positive and uphold university policies
3. Structuring class time to meet learning objectives to accommodate various learning styles
4. Building rapport with students/field assistants to provide mentoring to help the student(s) meet their goals