

Proposal for a Core Curriculum for the Forest Ecosystems and Society Grad Program

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1. Rationale

FES Department Mission: *FES strives to develop and integrate scientific knowledge from the social and biophysical sciences to inform new approaches to sustain interdependent ecological and social systems of the world. FES also evaluates the scientific and philosophical foundations of natural resource management and policy and helps develop conceptual frameworks for natural resource policy reflective of our understanding of the world and the people within it.*

Most FES MS students do not go into careers as research scientists and academic positions are becoming increasingly difficult to secure for new PhD graduates. A goal of the core curriculum is to provide skills and knowledge that are applicable to the wide range of careers sought by our graduations. In addition to supporting the departmental mission (above) the objectives of the core are to:

- a) Provide FES-centric knowledge in scientific reasoning, drawing appropriate conclusions from scientific studies, effective communication and collaboration in diverse groups (employer- and student-identified important knowledge).
- b) Provide additional training in critical thinking, written and oral communication and collaboration (employer- and student-identified important skills)
- c) Promote and develop a collegial and collaborative culture and provide a cohort-building experience among graduate students from diverse scientific disciplines within FES.
- d) Provide education and practice in interdisciplinary problem solving – a learning objective of our graduate program

2. Estimated impact of proposed Core Curriculum on Student Credit Hours.

Although the proposed core is 9 credits, we estimate the change will require the addition of one 3-credit course on a students Program of Study because

- a) Almost all graduate students take FES 520 (3 credits) in their first term anyway
- b) The required 3-units of seminar class would replace existing thesis credits on a student's Program of Study.

3. Two Proposals for a Core FES Graduate Curriculum

The proposal for the core curriculum has been separated into 2 proposals for ease of voting and discussion. They are *not* alternatives to each other. Together they form a 9 credit proposed required curriculum for FES graduate students that meets all for objectives of the core.

Proposal 1: Graduate students would be required to take FES 520 (3 credits, Posing Researchable Questions) usually in their first year and FES 5XX (3 credits, Interdisciplinary Collaborative Problem Solving) usually in their second year.

Proposal 2: In addition to Proposal 1, in lieu of 3 credits of thesis, graduate students would be required to take 3 terms of a 1-credit seminar. In the 2nd of the 3 terms, the student would publically present their proposed research to students and faculty (from within and outside of their discipline) followed by a discussion of the proposed research. In the first and third term, the student would participate in critiquing and discussing presented proposals. FES faculty members may be required to attend a small number of proposal presentations each year.

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- a) Almost all graduate students take FES 520 (3 credits) in their first term
- b) The required 3-units of seminar class could replace existing thesis credits on a student's Program of Study.

4. History and Background:

The FES Graduate program has been discussing core requirements for several years. The following are summaries of key events or outcomes:

- The department affirmed a mission and vision in **2013** that centers on interdisciplinarity and relevance to resource management and policy:
FES strives to develop and integrate scientific knowledge from the social and biophysical sciences to inform new approaches to sustain interdependent ecological and social systems of the world. FES also evaluates the scientific and philosophical foundations of natural resource management and policy and helps develop conceptual frameworks for natural resource policy reflective of our understanding of the world and the people within it.
- We held a retreat in **October 2014** where faculty added a learning outcome to our program for interdisciplinary collaborative problem solving and were faculty approved developing a new interdisciplinary course.

Our current learning outcomes are:

- Disciplinary skills and knowledge
- Interdisciplinary collaborative problem solving
- Communication skills (oral, written, professional)
- Critical thinking and critical awareness skills
- Research skills
- Research ethics and responsibilities
- Policy analysis/interpretation
- Teaching (for PhD/academia)
- We conducted surveys of 50 FES/FS/FR MS or PhD students in 2014. On a scale of 1=not very important, 2 = slightly important, 3 = moderately important, and 4 = extremely important,
 - the top 3 “knowledge areas” for the workplace were:
 - Drawing appropriate conclusions from scientific studies (mean = 3.7)

- How to effectively communicate and collaborate in diverse groups (mean = 3.7)
 - Scientific reasoning (e.g., induction, deduction) (mean = 3.6)
 - the top 3 “skills areas” for the workplace were:
 - Critical thinking (mean = 3.9)
 - Writing (mean = 3.9)
 - Collaboration with coworkers (mean = 3.7)
 - Students’ primary career aspirations were to help solve environmental problems (see attached graph)
- We obtained surveys from 88 employers of FES graduates (MS and PhD) in **2014**. On a scale of 1=not very important, 2 = slightly important, 3 = moderately important, and 4 = extremely important,
 - the top 3 “knowledge areas” were:
 - Scientific reasoning (e.g., induction, deduction) (mean = 3.7)
 - Drawing appropriate conclusions from scientific studies (mean = 3.7)
 - How to effectively communicate and collaborate in diverse groups (mean = 3.5)
 - the top 3 “skills areas” were:
 - Critical thinking (mean = 3.9)
 - Writing (mean = 3.8)
 - Using data management software and spreadsheets (e.g., Excel, Access) (mean = 3.5)
- In **2015**, a group of faculty (Strauss, Ganio, Hall, Nelson, Warren, Harmon, Johnson, Still), a graduate student (Engebretson), and a postdoc (Burton) developed a proposed interdisciplinary collaborative problem solving core course for FES students to support the related learning outcome. This proposed course was shared at the department meeting on June 10, 2015.
- At the **June 2016** department meeting, there was an open discussion about the question: “As a department, do we think it is important to have a requirement for FES graduate students to do an open presentation of their proposals?” The meeting minutes record that overall, the discussion was favorable toward this requirement.
- A survey was distributed to FES faculty and graduate students in **November 2016** (led by Chris Still). Responses were received from 9 T/TT faculty (i.e., <50%). Responses were received from 12 PhD and 6 Masters students. (See attached data.) Results were discussed at the February 2017 department meeting.
- In **2018**, a primary finding of the 5-year review of the FES Graduate Program was that graduate students felt that some core courses would help bring graduate students together
- Most FES masters students do not go into careers as research scientists. Academic positions are becoming increasingly difficult to secure for new PhD graduates.

5. Points to support proposed 2-course Core (3-credit existing FES 520; new 3-credit ID course)

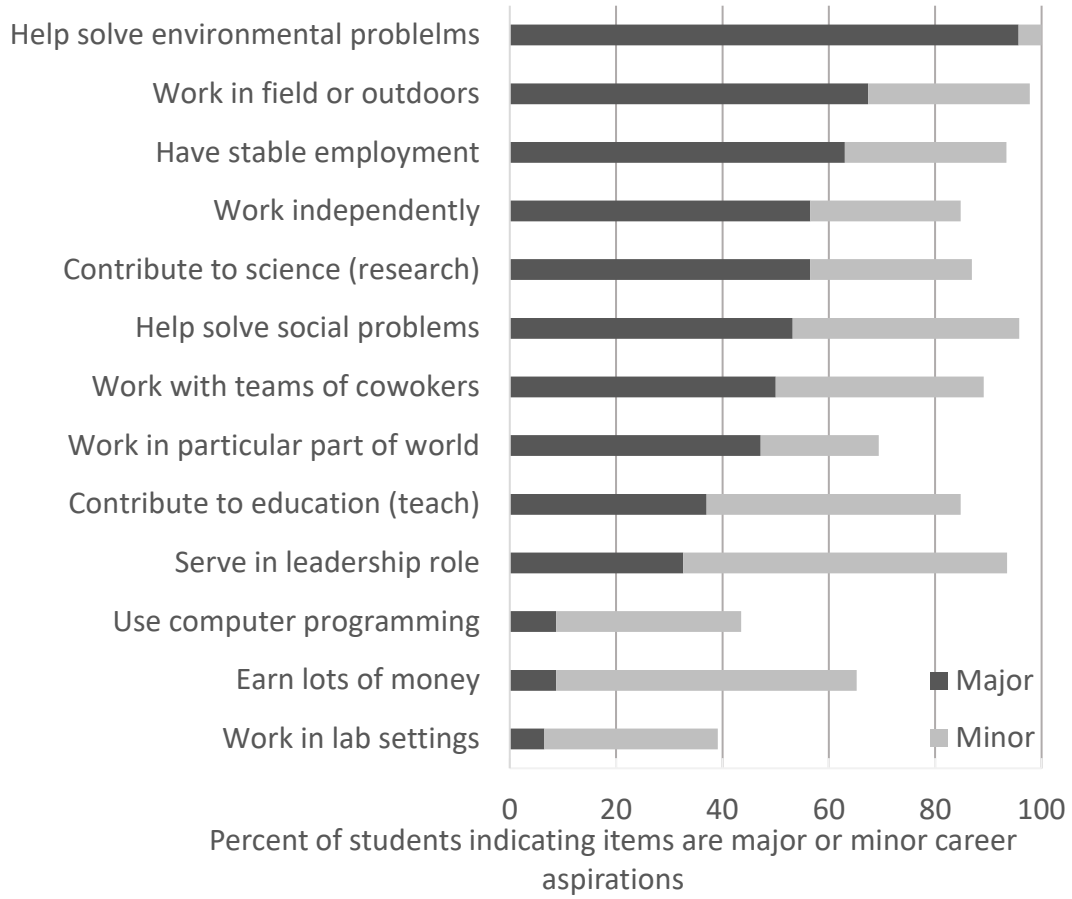
- Both courses address important core content areas
 - Content was identified by both students and employers as critical to the workplace, namely critical thinking, scientific thinking, and working in diverse groups.

- FES 520 is designed to help new students launch their research and has a heavy emphasis on scientific reasoning.
- Specific content of the interdisciplinary course would be determined by a formal new course proposal if the core proposal is approved.
- The interdisciplinary course is designed to help students understand how to apply concepts and tools to interdisciplinary problems and generate solutions.
- The interdisciplinary course is especially focused on the “interdisciplinary collaborative problem solving” learning outcome in FES, which is not well addressed in existing courses. With its focus on actual problems, it also addresses the outcomes of policy analysis/interpretation.
- Exit interviews with >35 students since 2014 indicate that the majority find FES 520 to be quite valuable, particularly for MS students.
- Departmental culture and cohort building
 - Having a course in the fall of the first year and a course in the fall of the second year will promote a collaborative culture among graduate students. The disciplinary diversity in FES tends to enable silo-ing; common courses will help overcome this issue.

6. Points to support a requirement that students enroll multiple times in a seminar, that will be offered in more than one quarter each year, in which students are required to present their proposed research to a general audience. Note that many details are not determined yet and would be clarified in the course proposal if the core proposal is approved

- About the proposed requirement
 - Seminar would be facilitated by a T/TT faculty member
 - Need to determine if students would be required to present their proposed research in seminar prior to collecting data. For MS students this is typically before the end of their 3rd term of enrollment; for PhD students this may be later.
 - Students could enroll in whatever quarters make sense for them.
 - Students would be required to provide written (or oral?) feedback on at least three other students’ proposals during the year (what’s the right number here?)
 - (Idea to launch discussion about course proposal) Each year, FES T/TT faculty would be required to attend at least three proposals by students for whom they are not major professor, committee member, or GCR (could allow GCR to fulfill this?)
- Reasons to support this proposed requirement
 - Students need to practice the application of their critical thinking skills to presentations of proposed work or research to assess feasibility.
 - Students need practice presenting their work to general audiences, receiving critique, and giving constructive critique
 - Students benefit from insights from people outside their graduate committee, and there is presently no way to ensure they get such insight
 - It supports the goal of enhancing a more cohesive departmental identity and culture
 - Requiring presentations and having faculty participation will help level the disparities that may exist across student committees with respect to workloads and required rigor

Career Aspirations, FES MS & PhD students (2014)



Results of survey of 9 T/TT faculty and 2 Research faculty in FES, November 2016

	<u>Ranking 1=most preferred, 5 = least preferred</u>		
<u>Core Curriculum Options</u>	<u>Sum</u>	<u>Mean</u>	<u>Median</u>
All MS and PhD students would be required to take 1-3 core courses (not necessarily including FES 520 and 521). Courses still to be determined.	20	2	1
Each committee and student agrees about courses, but specifically <i>encourages</i> all students to take 1-3 core courses (i.e., similar to what we have now with FES 520 and 521).	29	3	2
Each committee and student agrees about courses (i.e., no core courses that all students would take [most flexible option]).	38	3	3
All MS and PhD students would be required to take 1-3 core courses within separate biophysical or social science tracks. Courses still to be determined.	40	4	5
All MS and PhD students would be required to take 5-6 core courses (not necessarily including FES 520 and 521). Courses still to be determined (least flexible option).	45	4	5

Graduate student responses (12 PhD, 6 Masters)

	<u>Ranking 1=most preferred, 5 = least preferred</u>		
<u>Core Curriculum Options</u>	<u>Sum</u>	<u>Mean</u>	<u>Median</u>
Each committee and student agrees about courses, but specifically <i>encourages</i> all students to take 1-3 core courses (i.e., similar to what we have now with FES 520 and 521).	40	2.4	2.0
Each committee and student agrees about courses (i.e., no core courses that all students would take [most flexible option]).	40	2.2	1.5
All MS and PhD students would be required to take 1-3 core courses (not necessarily including FES 520 and 521). Courses still to be determined.	45	2.5	2.5
All MS and PhD students would be required to take 1-3 core courses within separate biophysical or social science tracks. Courses still to be determined.	54	3.0	3.0
All MS and PhD students would be required to take 5-6 core courses (not necessarily including FES 520 and 521). Courses still to be determined (least flexible option).	80	4.4	5.0