Justification for Course in Landscape Ecology

Landscape ecology is a relatively recent field of study that has interdisciplinary roots in geography, geology, ecology, and natural resources. While the historical underpinnings of landscape ecology can be traced back to the early 1900s, it did not become a full fledged field of interest and research until the 1980s. At its most basic description, landscape ecology is the study of ‘pattern on process.’ In other words, how does the spatial patterning and structure of a landscape influence the biotic and abiotic processes that are occurring (It should be noted, however, that the concept of landscape within landscape ecology is scale independent, meaning that the focus is not simply at a spatial scale of what humans might consider a landscape). Because humans are distinctly part of the landscape, landscape ecology is inherently interdisciplinary and integrates broadly across the physical and social sciences. Across nearly all Land Grant institutions that have natural resource programs and universities that have a science based graduate curricula, one universal course is Landscape Ecology. Because the University of Hawai‘i at Mānoa (UHM) currently has no other courses devoted strictly to landscape ecology, such a course is critically needed. Furthermore, the proposed course fills a core area in the study of natural resources, which is the purview of the Department of Natural Resources and Environmental Management (NREM). Based upon this core need I am proposing a new graduate level course be added to the curriculum that will meet biannually during Fall semesters. The justification for this new course is described below in relation to the twelve guidelines for new courses as outlined by the College of Tropical Agriculture and Human Resources.

1. What is the course modification?

The proposed course will be new to the University of Hawai‘i at Mānoa.

2. Why is this course being requested or modified?

The field of landscape ecology is a very interdisciplinary one that encompasses natural resources, ecology, land management, and geography. Across most Land Grant institutions that have natural resources programs and universities that have natural science based graduate degrees, one common course is Landscape Ecology (see example list of schools and the similar class to the one proposed herein following this paragraph). Because UHM currently has no other courses devoted strictly to landscape ecology and management, such a course is critically needed. Furthermore, this course was specifically listed as one of the primary courses that be developed under the job announcement for the faculty position I hold.

Considering the number of graduate students that are being trained in NREM it is critical that they have a well rounded background in the natural resources, including a landscape perspective, when they graduate. In fact, landscape ecology is the backbone for most forms of land management at present, as well as part of most current management models, such as adaptive management, conservation planning, and ecosystem management. Because land management and natural resource management issues are of key concern both within Hawai‘i as well as the mainland, the knowledge gained by the students will be relevant to any location that they would move onto in the future. Furthermore, considering that the landscapes of Hawai‘i face burgeoning problems (e.g., introduced species, stakeholder conflicts, land tenure, land ownership), coupled with its foundational relevance to natural resources, the proposed course is both timely and necessary. Graduate students in both NREM and other departments will greatly benefit by having the opportunity to take this course.

The course is being requested at this point in time for five main reasons. First, the university does not have a course strictly focused on landscapes. Second, landscape ecology is a core class in nearly all natural resource programs across the Land Grant institutions of the U.S. and major research universities. Third, my professional training is in large part devoted to landscape related issues, and hence both my graduate students’ and my research focus are grounded in a landscape ecology perspective. Fourth, students attending a natural resource program need to be well rounded, and thus it is critical that they are exposed to landscape ecology as one of the core areas. Fifth, most agencies and non-profit organizations in Hawai‘i are using a landscape ecology perspective in their management and conservation decisions. However, students trained here at UHM have not been exposed to this perspective. Hence, there is great interest among agency personnel to have a formal course in landscape ecology for training students here in Hawai‘i. This interest has been communicated to me by agency professionals (e.g., Steve Hess; Wildlife Biologist, USGS- Pacific Island Ecosystems Research Center), non-profit organizations (e.g., The Nature Conservancy), and faculty here at the UHM, including Drs. Robert Cowie, David Duffy, and Durrell Kapan.

If this course is approved it would greatly benefit graduate students in a number of departments at UHM, including Biology, Botany, Geography, Microbiology, Natural Resources and Environmental Management, Sociology, Urban and Regional Planning, and
Zoology as well as programs such as Ecology, Evolution, and Conservation Biology, and Environmental Science. On the other hand, if a course in landscape ecology were not approved, there would be no classes that deal with landscapes specifically and there would be no opportunities to learn about and be exposed to a core area of natural resources and basic science.

**Sampling of Introductory Wildlife Ecology and Management Courses at Land Grant Institutions (please note that most institutions have several courses, which is indicated below)**

a) Iowa State University, College of Agriculture and Life Sciences, Department of Natural Resource Ecology and Management. NREM 472. Landscape Ecology and Natural Resource Management. (Dual-listed with 572). (2-2) Cr. 3. F. Prereq: NREM 301 or A Ecl 312 or equivalent and NREM 345 or CRP 451 or equivalent. Analysis and management of spatial patterns and processes in populations, communities, and ecosystems with emphasis on broad spatial scales. Human influences on natural systems are strongly considered.

Animal Ecology 570. Landscape Ecology. (Cross-listed with EEOB). (2-3) Cr. 3. Alt. F., offered 2008. Prereq: permission of instructor; EEOB 588; a course in calculus. The study of ecological and evolutionary processes within a spatial context with emphasis on behavior, population, and community dynamics.

b) University of Colorado at Boulder, Cooperative Institute for Research in Environmental Sciences, Dept. of Ecology and Evolutionary Biology. EBIO 5060 (3). Landscape Ecology. Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change.


d) University of Maryland Center Environmental Science. MEES 614/Biology 623. 4 Credits. Graduate and advanced undergraduate course.

e) University of Massachusetts Amherst, College of Food and Natural Resources, Department of Natural Resources Conservation. NRC 621 Landscape Ecology, 4 credits. Graduate level course.

f) University of Wisconsin-Madison, College of Agricultural and Life Sciences, Department of Forest and Wildlife Ecology. Principles of Landscape Ecology (Forest Ecology & Management/ Zoology 565). Principles of Landscape Ecology (Forest Ecology & Management/Zoology 565) is a 2-credit course designed to introduce advanced undergraduate students as well as graduate students to the field of landscape ecology. Familiarity with the material covered in FEM/Zoo 565 is considered a prerequisite for Zoo/Bot/FEM 879.

University of Wisconsin-Madison, College of Agricultural and Life Sciences, Department of Forest and Wildlife Ecology. Advanced Landscape Ecology (Zoology/Botany/Forest & Wildlife Ecology 879). Advanced Landscape Ecology is taught during alternate spring semesters of even numbered years. Advanced Landscape Ecology is an advanced graduate course that assumes general familiarity with the basics of landscape ecology.

g) University of Wyoming, Department of Zoology and Physiology. ZOO 4300. Principles of Wildlife Ecology and Management. 5 credits. Integrates concepts of vertebrate ecology with the art of wildlife management, stressing approaches to deal with the inherent uncertainty of managing populations. Strategies to increase or decrease populations of target species, tools used to determine population status (e.g., viability analysis, monitoring, habitat assessment), and ecosystem management approaches. Laboratory included. Dual listed with ZOO 5300.
3. **How will the content be organized?**
   Please find attached a syllabus for the course as it was offered in Fall 2008 as NREM 691-001 Landscape Ecology.

4. **What other courses at UHM closely parallel the proposed course and in what way will the latter make a distinct contribution?**
   There are no other classes at UHM in landscape ecology. While the Departments of Geography, and Urban and Regional Planning are concerned generally with landscapes, they do not have any courses in landscape ecology, landscape change, land management, etc.

5. **Where or how does the proposed course fit into the current and future curriculum?**
   The proposed course fits into the current NREM curricula as an elective course for NREM graduate students. It may also be considered an elective course in Biology, Botany, Geography, Urban and Regional Planning, and Zoology, depending upon approval of the respective departments. In addition, it is expected to be approved as one of the Ecology classes for the Ecology, Evolution, and Conservation Biology program.
   With regards to the course, students will receive content that dovetails the other natural resource classes being offered in NREM (e.g., forestry, watersheds, GIS, etc.). Students learn foundational concepts and theories about the landscapes, how they are part of the ecological hierarchy, and principles on to study and manage them. The material covered provides both historical context to the development of the field as well as examples from around the world, including Hawai‘i.

6. **Why is the number of credits and level justified? Explain the prerequisites and the absence thereof.**
   The class is listed as three credits because it is a standard lecture and discussion based course and is the minimum number of credits needed to cover the material in a sufficient manner. Typically classes in Landscape Ecology are three credits if they do not contain a laboratory, which this course does not contain. The reason for making the course a 600 level is threefold. First, Landscape Ecology courses require a level of knowledge about science, nature, and society that typically would not be obtained until graduate school, or at a very advanced undergraduate level. Second, 50% of the course time is devoted to in-depth discussions of the primary literature, which requires a graduate level of ability to read, synthesize, and interpret. Third, Landscape Ecology courses at other institutions is often considered a graduate level course, or advanced undergraduate/graduate combined course.
   The course does not have prerequisites other than graduate student standing. Although courses could be added to limit enrollment, the topic is of broad interest here at UHM. Furthermore, this course is one that appeals to students from many departments as well as outside the university and making it less restrictive is important. As an example, the current class has students from Botany, Geography, Microbiology, NREM, and RCUH affiliates.

7. **How will the course assist students to achieve the critical skills and competencies expected of CTAHR graduates?**
   For each critical skill, either state that your course proposal (or modification) will not address that skill, or describe briefly (in a sentence or two) how the students will be assisted in gaining mastery of that critical skill.
   Students enrolled in Landscape Ecology are expected to use and/or develop a number of critical skills expected of CTAHR graduates. The following critical skills are utilized in the course:
   1. Written Communications. Students are required to write in a grammatically and scientifically correct manner that assumes a logical flow for both their exams and semester project.
   2. Oral Communications. A major portion of the course is devoted to building oral communication skills. Each student must lead a weekly discussion section once, participate each week in discussion, and give a final scientific presentation of their semester project at the end of course.
   3. Analytical Problem Solving Skills. Students are required to effectively read and interpret data and results from figures and tables, and evaluate causes and effects of different ecological processes and relationships.
4. Personal Characteristics. The class is structured such that students should be inherently curious, which I regularly foster. Furthermore, students need to effectively manage their time to accomplish the assigned readings and carry out their independent research project. I expect that for every contact hour in a graduate course that a student spends three to four hours of time outside of the classroom studying. I also expect students to be punctual, responsible, and self-directed. Finally, I work with students in all of my courses on accepting constructive criticism in order to improve their skills and persevere.

5. Human Relations Skills. In any class I teach I expect students to conduct themselves in a professional manner that is sensitive to other students and other viewpoints.

6. Business Management Skills. There is no aspect of the course related to this skill set.

7. "Read World Experience". A regular part of this particular course is discussing the need and utility of landscape ecology in both basic and applied scientific arenas. In particular, we discuss the value of landscape ecology in managing natural resources, studying humans, and finding the appropriate scales and tools for analysis. Most non-profit organizations and governmental agencies are using a landscape ecology perspective in their management framework, making this course of key value in real world terms.

8. Leadership Skills. Each student is expected to lead a weekly discussion section as well as conduct their own research.

9. Computer Skills. Students are expected to type all assignments in a word processor. In addition, the independent research project requires that students use spreadsheets for analysis and produce graphical output.

10. Global Perspective. The class is taught to convey aspects of landscape ecology from around the world and how to apply it in different contexts. For instance, landscape ecology is discussed in the context of North America, Europe, Australia, and Asia.

8. How will students be evaluated?

Students will be evaluated through a combination of examinations, participation in discussions, and an independent research project. Please see the attached syllabus for further details.

9. What are the minimum qualifications for teaching this course? Is a qualified instructor now available?

Currently there is an instructor available for the course. If a new instructor were needed, he or she should have a graduate degree or training in one of the following programs of study: botany, ecology, forestry, geography, geomorphology, landscape architecture, natural resources, wildlife ecology, or zoology. Furthermore the individual would need to have an intimate knowledge of both ecology and landscapes.

10. How will the course be financed, assuming no further cutbacks?

Currently there are no additional costs aside from the basics of providing lectures.

11. Has the course been offered before? Is there a demand for it?

Yes, the course is currently being offered this semester (Fall 2008) as NREM 691-D01 Landscape Ecology. Currently there are fifteen students enrolled in the course. Numerous students aside from those registered were interested in the class, but were unsure if it would count towards their degrees or were simply unaware of the course initially as it was listed as a special topics class. There has been an acknowledged demand for the course among students in such departments as Biology, Botany, Geography, Natural Resources and Environmental Management, Urban and Regional Planning, and Zoology. In addition, a number of faculty members from across the campus have indicated a need for this course.

12. Is the course cross-listed with another department?

The course is not being cross-listed with any other department.