

AGROFORESTRY: A PROFITABLE LAND USE

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AN INTERDISCIPLINARY ONLINE CERTIFICATE AND MASTERS PROGRAM IN AGROFORESTRY

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Abstract: Within a context of rapid technological change and shifting market conditions, the American education system is challenged with providing increased educational opportunities for students and non-traditional clients often at lower cost than in campus-based degree programs. Many educational institutions are answering this challenge by developing distance education graduate programs. These programs can provide working professionals with a chance at a graduate education, reach those disadvantaged by limited time or distance, and update the knowledge base of workers at their places of employment.

Agroforestry, as a farming system that integrates crops and/or livestock with trees and shrubs, is gaining recognition as an integral component of a multifunctional working landscape. While agroforestry has been gradually gaining attention, the need for a cadre of well trained professionals in agroforestry is essential to support its continued growth. Short courses and workshops are helpful, but professionals and landowners alike across the U.S., Canada and overseas are seeking more comprehensive graduate degree or certificate programs. A web-based, asynchronous M.S. degree and/or a graduate Certificate will help to fill this void. Presently, there are no comparable comprehensive graduate programs in agroforestry elsewhere in the U.S. To meet the current and future needs of the agroforestry profession, The Center for Agroforestry at the University of Missouri is creating an online graduate certificate and masters degree program in agroforestry. The Center for Agroforestry will begin admitting students and offering online courses beginning Spring semester 2011. The certificate and masters will be fully implemented by the summer of 2013.

Keywords: distance learning, web-based asynchronous courses, agroforestry education

BACKGROUND

Within a context of rapid technological change and shifting market conditions, the American education system is challenged with providing increased educational opportunities for students and non-traditional clients often at lower cost than in campus-based degree programs. Many educational institutions are answering this challenge by developing distance education graduate programs. Curran (2008) defines online education as a process by which students and teachers communicate with one another and interact with course content via Internet-based learning technologies. These types of programs can provide working professionals with a chance at a graduate education, reach those disadvantaged by limited time or distance, and update the knowledge base of workers at their places of employment. Also, these programs serve as a means to increase enrollment and make more efficient use of internal resources and existing facilities.

Online education offers the ability to decentralize education and offer courses throughout the state, region, nation or internationally without sacrificing quality. The quality of distance learning has greatly improved in the past few years, as both students and educators have become more comfortable with the technology and as stories of best practices have been shared and duplicated.

Although demand for graduate education is at an all-time high, many colleges and universities are faced with limited budgets or capacity to expand facilities or faculty. Barriers to the adoption of online courses include the lack of faculty acceptance and high costs associated with online development and delivery (Allen and Seaman 2007).

With funding support from the University of Missouri (UM) System, the MU College of Agriculture, Food and Natural Resources and the MU School of Natural Resources, The Center for Agroforestry is developing eight online courses to create an Interdisciplinary Online Graduate Program in Agroforestry. As part of the UM System funding, all faculty attended a two-day eLearning workshop which consisted of presentations, illustrations and demonstrations of the fundamental principles of online course design and development. Instructional designers from all four UM campuses attended to assist in online course design. Ten eMentors, representing the four UM campuses shared ideas and demonstrated the tools they use in their courses to enhance student learning. The eLearning workshop helped faculty develop relationships with the instructional designers and eMentors so that continued assistance would be available as the courses are developed. All eLearning workshop participants were given a copy of "The Faculty Guide to Teaching and Learning with Technology" to help guide course development (<http://etatmo.missouri.edu/toolbox/index.php>). The online M.S. degree is being implemented under the umbrella of an existing non-thesis M.S. in Forestry within the MU School of Natural Resources. In addition, a graduate certificate in agroforestry is also being established.

WHY AN ONLINE GRADUATE PROGRAM IN AGROFORESTRY?

Agroforestry, as a farming system that integrates crops and/or livestock with trees and shrubs, is gaining recognition as an integral component of a multifunctional working landscape (Garrett 2009). Economic returns from the farming enterprise have been decreasing steadily over the years (Dimitri et al. 2005) while environmental problems due to intensive agriculture have been well documented (Udawatta et al. 2011). Reduced biodiversity, increased erosion, lower soil fertility, greenhouse gas emission, and non-point source pollution of ground water and streams have all been identified as problems associated with intensive monoculture systems. Small- and medium-sized farms are fast disappearing from the agricultural landscape leaving a legacy of failing rural communities. Agroforestry offers promise as an alternative land-use practice with potential for alleviating some of these environmental and economic problems. Agroforestry is gaining attention in the U.S. through the efforts of University of Missouri Center for Agroforestry, CINRAM at the University of Minnesota, Agroecology Issue Team at Iowa State University, MidAmerica Agroforestry Working Group, USDA National Agroforestry Center, USDA ARS, USDA NRCS, USDA Forest Service, Association for Temperate Agroforestry, three new online courses at various land-grant universities, and non-profit organizations (e.g., Trees for the Future). Federal incentive programs are being implemented through the Farm Bill to help landowners establish trees on their farmlands for carbon sequestration, biomass and biofuel along with other conservation benefits.

While agroforestry has been gaining attention, the need for trained professionals in agroforestry has also been expanding (Gold 2007, Lassoie et al. 2009). Short-term courses and workshops have been helpful (Gold et al. 2006), but professionals across the U.S., Canada and overseas have been looking for graduate degree or certificate programs in agroforestry. Traditional graduate programs offer limited options for working professionals. A web-based M.S. degree and a graduate Certificate will address this void to a certain extent as proven in natural resources (<http://www.iddl.vt.edu/domains/cnr/index.php>) and other disciplines such as business, pharmacy and allied health sciences. Lacking any similar online program in agroforestry elsewhere in either the U.S. or globally, notwithstanding an undergraduate online regional agroforestry course at the University of Florida, The Center for Agroforestry at MU has decided to fill the void and is developing an online M.S. curriculum and graduate certificate in agroforestry that will be delivered via the Internet.

CURRICULUM

The M.S. curriculum will be a 30 credit non-thesis degree (using an existing M.S. in Forestry) with a 15 credit required core, a professional paper (up to 6 credits) and elective course work. The Graduate Certificate will be a 12 credit curriculum requiring four core courses (Table 1). A 3 credit field internship will be required to complete the non-thesis master's degree. The details of the internship will be developed in discussions with the major advisor and masters committee; however, a final report approved by the major advisor or internship supervisor will be required. Electives can be chosen from relevant online course offerings from other units across campus (Table 1).

Table 1. Required Core and Elective Courses for Online Masters in Agroforestry

<u>Core Courses</u>	
1. FOREST 4385/7385	Agroforestry Theory, Practice and Adoption
2. FOREST 8385	Ecological Principles of Agroforestry
3. FOREST 4000/7000	Agroforestry Economics and Policy
4. SOIL 8000	Agroforestry for Watershed Restoration
<u>Other required core course</u>	
5. FOREST 8050	Research in Forestry/Professional Paper (3 - 6 credits)
<u>Electives</u>	
6. NATR 7325	Introduction to Geographic Information Systems
7. SOIL 4000/7000	Resources and Their Management
8. FOREST 4390/7390	Watershed Management and Water Quality
9. SOIL 4000/7000	Soil Fertility and Nutrition

TECHNOLOGICAL REQUIREMENTS

Distance education courses can be delivered synchronously (e.g., video conferencing) or asynchronously (e.g., web-based course material). Students can perform all course functions at a distance, or they can be required to do some activities in the field or on campus. The proposed program will be a hybrid of all these because of the overriding necessity of providing students with the best scientific training possible. All courses will have a web home page using the MU Blackboard course management system, which provides email, asynchronous discussion groups, chat sessions, and a place to view all course material posted by the instructor. From this Blackboard base, the instructors will develop lectures, field trips, labs, exercises, and examinations that best fit the demands of the course (explained in course descriptions). Some of these may be completely asynchronous, for example lectures recorded as narrated PowerPoint presentations viewed directly from the course web site (i.e., Tegrity). Others may be synchronous (the students login and listen to a live lecture with Adobe Connect or use a webcam to communicate with the instructor). Instructor lectures and presentations by outside experts may also be captured and video streamed for later viewing, by posting a link on the course web site. If students require CD/DVDs due to slow Internet connection, they will be mailed to them. Most of the courses will incorporate videotaped case studies, virtual labs using various interactive and animated techniques with lab packets sent to students, and field exercises followed by videoconference sessions or Chat rooms where students share their findings. The best mix of techniques will be chosen by the respective faculty instructors in consultation with the instructional designers and the Director of Academic Technology at the College of Agriculture, Food and Natural Resources.

ENROLLMENT PROJECTIONS

Admission to the new graduate certificate and degree program will begin in fall 2011. Enrollment of 15 new graduate students in the master's degree and 10 students in the graduate certificate is anticipated in the first year. Once the masters and certificate programs are marketed worldwide, enrollment is expected to increase to ~50 students over the next five years. In addition to the students admitted to the specific agroforestry certificate or degree, we expect students from a number of colleges/universities to enroll in the individual online courses.

EVALUATION PLAN

Products

Once the online masters and graduate certificate are fully up and running products will include: 1) eight integrated online courses, 2) a program website with supplemental course materials for all the core courses, 3) virtual CD-ROM field tours for one of the courses, 4) course packets with necessary reading materials for all courses, 5) an online masters degree in agroforestry, 6) an online graduate certificate in agroforestry and 7) "society ready graduates", who are capable of making a positive changes in the agriculture, natural resources, and environmental sectors in the U.S. and elsewhere in the world.

Outcome/Impacts

The expected results of the online masters and graduate certificate programs will include: 1) an increase in enrollment of graduate students in courses related to agroforestry, 2) increased number of optional graduate level courses available for graduate students across many disciplines, 3) opportunity for place bound students and professionals (including school teachers) to obtain a Masters degree or graduate certificate in agroforestry, and 4) a competent workforce ready to take on the challenging task of balancing the "production vs. conservation" paradigm. Related by-products include the opportunity for students to pursue a traditional on-campus Masters degree (thesis option) with specialization in agroforestry. Further, students enrolled in other specializations or other Masters programs can also obtain a Graduate Certificate in agroforestry if they desire to do so. The ultimate outcome will be "society ready graduates". This program will have a direct impact on the professional workforce in agriculture, forestry and natural resources and environmental management. In addition, the University of Missouri will reach a large number of non-traditional as well as traditional students in the U.S. and overseas.

Evaluation Plans

A formal evaluation strategy is a central component of the online masters program. According to Spector (2009), distance education courses are currently held to different and significantly higher standards than face-to-face courses. He goes on to state "While this may seem unfair to distance educators, in the long run this is probably a good thing –especially if it results in raising quality expectations and outcomes with regard to all learning and instruction". A project advisory committee consisting of the Director and Associate Director of the School of Natural Resources, Director

of Educational Technology at the College of Agriculture, Food and Natural Resources, Director of The Center for Agroforestry, and online instructor faculty are responsible for the overall “quality control” of the project.

Overall evaluation of the online masters and certification programs activities will be undertaken in two phases: formative and summative. The formative evaluation will include pilot testing and technical and peer review of all lectures, lecture notes, CD-ROM virtual field tour and the website that are developed. The review process will enhance the clarity, appropriateness and accuracy of each product. For the teaching part, a “teaching peer evaluation committee” consisting of a multi-disciplinary team of five professors will assess technology, teaching style, methodology, adequacy of exams, student participation and student evaluation for each course using Quality Matters Rubric Standards. Quality Matters is a nationally recognized, faculty-centered, peer review process designed to certify the quality of online courses and online components. Colleges and Universities across the country use the tools in developing, maintaining and reviewing their online courses and in training their faculty (<http://www.qmprogram.org>). In addition to the final course evaluations, students will use an online “mid-course correction” feedback sheet that will allow improvements in the current as well as future course offerings.

The summative evaluation will tell us the effectiveness and impact of the graduate program on students. The ultimate success of this project lies in: 1) increasing the quality of graduate students in terms of their skill set and molding them into competent professionals and leaders in the field and 2) increasing the number of graduates with technical skills in agroforestry. The methods employed will include standard exams administered during the course of the program, observations and analysis of student writings and informal and in-depth interviews (over the phone) with the students at the conclusion of the program. Follow-up surveys to assess job performance (employer ratings of employee performance) will be conducted using online surveys. A comparative study will be conducted to compare students who will be graduating from the online program in 2013 with those students graduating from the on-campus program. As pointed out by Rossi and Freeman (1993), determining impact requires comparing, with as much vigor as possible, the conditions of targets who have experienced an intervention with those of equivalent targets who have experienced something else. The treatment group (online graduates) will be compared to the control group (on-campus graduates) for their level of understanding of agroforestry, skill set, attitude towards agriculture and natural resources, confidence in applying for an agroforestry related job, job offers, and admission to further graduate programs among other criteria. Evaluation findings will be used in the preparation of manuscripts for submission to appropriate academic journals.

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