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School of Natural Resources and Environment

Bioenergy School Turns Undergraduate Concern into Knowledge

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During summer 2006, while many students completed course work, traveled abroad or enjoyed an extensive vacation, some students used the opportunity to learn about the emerging field of bioenergy. Interest and research in sustainability and energy issues abound on campus, however



Interns constructing a biodiesel reactor (Scott Edmundson and Wei-Ting Liu pictured). *Photo/A. Wilkie*

substantive programs for undergraduates are surprisingly absent. Student interest in this growing field prompted Dr. Ann C. Wilkie to form the UF/IFAS Bioenergy Summer School, a research internship program aimed at developing undergraduate student curiosity into a deeper understanding of sustainability through hands-on experience in an array of bioenergy projects. Funding for the Wilkie Summer School was provided by the Office of the IFAS Dean for Research.

This program was structured to bridge conceptual gaps in our current understanding of energy cycles. Discussions, led by Dr. Wilkie and a number of guest experts, gave a seasoned perspective of the issues in sustainability that we as a society face and outlined some potential solutions. Group projects reinforced our teamwork and communication skills, and provided a "down and dirty" intimacy of green projects ranging from assessing the amount of organic waste produced by the University to building a student biodiesel reactor. We also got the opportunity to embrace a subject of particular interest through work on individual research projects. The program was comprehensive and, under the guidance of Dr. Wilkie, students tackled many issues in sustainability: waste management, energy resources, energy conservation, global warming, ecological issues, agricultural dilemmas, and social awareness.



Interns working in Dr. Wilkie's Lab. (James Duncan, Wei-Ting Liu and Scott Edmundson pictured). Photo/A. Wilkie

Field trips enhanced our real world perspective and covered a wide range of companies and programs. The Bioenergy Interns visited Celunol Corporation, the cellulosic ethanol company associated with the University of Florida, currently researching ways to turn biomass into bioethanol. We followed the trail of the water hyacinth (Eichhornia crassipes), an aquatic weed harvested from Lake Alice. It led us to Wood Resource Recovery, the largest tree recycling/mulching center in

northern Florida. By turning fallen trees into mulch and topsoil, valuable soil amendments, rather than burning them and releasing carbon dioxide into the atmosphere, we can see our habits as a society are gradually improving with our understanding.

Of course, we visited and toured the innovative waste to energy treatment system developed by Dr. Wilkie at the Dairy Research Unit (DRU). The DRU uses anaerobic digestion, a microbial fermentation, to convert organic matter (dairy manure) into a burnable biogas, a sustainable source of natural gas. We also visited the batch anaerobic digestion system of Sigarca, Inc., that converts municipal organic waste at the local waste transfer station. Field trips to explore the inner workings of campus waste management and energy use included a visit to UF's wastewater treatment plant and to the UF motorpool where biodiesel was being tested in university vehicles.

We combined our diverse backgrounds to tackle a number of group projects. Bioenergy is a diverse discipline and group projects spanned the spectrum: a campus organic waste audit, an energy conservation and solar water heating project, and building a biodiesel reactor. While the projects were met with various levels of success, we learned and enhanced basic skills of science, math, chemistry, plumbing, microbial ecology, and laboratory protocols, as well as understanding current issues surrounding each topic.

Individual projects helped to develop each student's personal interest, consistent with their educational background. Projects included bio-prospecting algae for biodiesel production, a test run to turn glycerol (a biodiesel by-product) into biogas, a survey of the student body to assess knowledge and awareness of energy issues, the conversion of sewage and sewage sludge into biogas,

designing a small anaerobic digester suitable for developing countries, and analyzing the policy issues of using South Florida sugarcane for bioethanol production. We also created a website where we posted the results of our projects and details of our Bioenergy School experience.

The hands-on and engaging program educated and developed us as students to become more proficient in issues important to our future (this 'our' is expansive to the whole human race and even the entire planet Earth). Every student walked away with new information and experiences to incorporate into everyday decisions. Two of us are forming research interests that we plan to pursue in graduate school. Projects were met with successes, incompletes, and inevitably failures. These however are the pioneering first steps that we have made at the Bioenergy School. We are now well versed, inspired and informed, educated and enlightened in diverse aspects of sustainability and bioenergy, and we challenge you to use your bioenergy to its fullest potential!

For information regarding the 2007 UF/IFAS Bioenergy Research Summer Internship Program, please contact Dr. Wilkie in the Soil and Water Science Department.

For more information regarding the 2006 experience, visit the 2006 Bioenergy Internship website or contact James G. Duncan and Scott J. Edmundson: http://biogas.ifas.ufl.edu/Internship

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