

UC Davis D-Lab & Horticulture Innovation Lab Centers: Providing Support & Capacity Building to Bring Appropriate Technologies to Market

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Summary of the Project

Among the most promising disruptive technologies for application to horticulture are those that address the uses of energy in the production, marketing, and processing of horticultural crops. This project tests a range of sustainable energy solutions in two U.C. Davis graduate student classes, D-Lab I and II, as well as implementing two pilot D-Lab classes at the Horticulture Innovation Lab's Regional Centers at Kasetsart University in Thailand and Zamorano University in Honduras.

D-Lab I and II at U.C. Davis

In April 2013, **D-Lab II: Energy and Development: Designing for the Market** was offered. The class offered a studio-style design course that focused on low-cost energy solutions for the developing world. Student teams work with local partners and mentors, to design, prototype, and test scalable solutions for real world energy problems for their client's communities. Curriculum included lab modules, business development skills, case studies, independent research, and guest speakers.

Projects:

- Rubber Tapping Knife in Thailand
- Mobile Irrigation System in Uganda
- Off-Grid Zeolite Bead Regeneration in Thailand

In winter quarter 2013 **D-Lab I: Energy and Development: An Overview**, was offered. The class gave an overview of energy issues in developing economies that emphasized critical thinking. Curriculum included four hands-on energy labs, a business development clinic, case studies, and guest speakers. Multi-disciplinary teams worked with local partners to perform feasibility studies for proposed energy solutions.

Projects:

- Electricity Feasibility Study in Ghana
- Solar Irrigation in Uganda
- Seed Saving Feasibility Study in Thailand
- Solar Fruit Drying in Ecuador

Capacity Building

- 42 U.C. Davis students trained in feasibility studies and design process.
- 75 Thai and Honduran university students trained in feasibility studies and design process.
- 6 graduate assistants and researchers trained on the design-process.
- Zamorano D-Lab instructor completed a design process and D-Lab training through a Fellowship at U.C. Davis.
- 3 Kasetsart University professors completed a Design Process and D-Lab Training through a workshop at Kasetsart University.



First design-process lecture at Kasetsart University



Honduras D-Lab at Zamorano University

The inaugural D-Lab class was offered at Zamorano University in the summer of 2013. The class is segmented into three work modules, each lasting 3 weeks with 15 students each. The students are exclusively in the Environmental Engineering Department and are undergraduates in their final (4th) year. Their projects included:

- Vermicomposter
- Charcoal Briquettes
- Biodiesel Stove
- Microgasifier
- Bicycle Blender
- Innovative Humidity System



Zamorano Students Presenting Projects

Each group presented in front of their project mentors and class peers. Many of the presentations were held at the Horticulture Innovation Lab Center.

Evaluation of Zamorano D-Lab

UC Davis D-Lab conducted an evaluation of the class in July 2013. Working with Zamorano partners a logical framework for class success was created. Then using a modified version of Zamorano University's post-class student survey indicator data was collected.

Preliminary results seem to point to a very successful class. The Zamorano D-Lab has been very successful in implementing a D-Lab class that encapsulates the essence of design and development, as well as being a very positive experience for students. The evaluation report is available upon request.

Project Timeline:



Thailand D-Lab at Kasetsart University

In February 2012, UC Davis D-Lab traveled to Thailand to establish a foundation for collaborative work between UC Davis D-Lab and partners at Kasetsart University. Less than a year later, Kasetsart University is offering a D-Lab curriculum that began in November 2013 and will end in March 2014. The students are all in their final year in various engineering programs at Kasetsart University.

The Horticulture Innovation Lab Center has been a valued partner and hopes to test student designs on campus.

Design Process Workshop and Evaluation at Kasetsart University

Principal Investigator Kurt Kornbluth and two graduate students traveled to Kasetsart University in November to help set-up the D-Lab class and run a two-day workshop on the design process for the three professors who co-taught the class. At the end of the visit a 20-week curriculum was developed and the 3 inaugural lectures of the class were delivered.

An evaluation strategy was designed with input from the professors, which include a logical framework and post-class student survey. U.C. Davis D-Lab is awaiting results for when the class ends in March.



Kasetsart University Students after "Wallet Exercise"

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