

# **Building advanced experiential learning activities into a capstone course**

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# Benefits of experiential learning

- Improves retention and assimilation of course material
- Increases achievement of student learning outcomes
- Enhances workforce development and career-related skill sets
  - (Waterman 2014, Warren 2012, Committee on a Leadership Summit to Effect Change in Teaching and Learning 2009)



# Benefits of experiential learning

- Shortens time to degree and increases graduation rate
- Students from underrepresented groups see enhanced benefits
  - (Waterman 2014, Warren 2012, Committee on a Leadership Summit to Effect Change in Teaching and Learning 2009)



# Incorporating community-based research



- Reinforces social interactions as part of the learning process
- Students who engage in research demonstrate higher levels of interest in subject disciplines and higher rates of success and retention
  - (Freeman et al. 2014, Lopatto 2010)

# Incorporating community-based research

- Effective at reducing the achievement gap between underrepresented students and others and to enhance learning
  - (Freeman et al. 2014, Lopatto 2010)



# Why a capstone?

- Development of interdisciplinary Sustainability Minor
- Proposed by Scott Hewitt, Professor of Chemistry, and John Bock
- University Mission and Goals Initiative funding
- Difficult to obtain traction
  - Where to house?
- Renewed effort with CSU system-wide process
- ENST/CHEM 492 Sustainability Projects developed with Chancellor's Office CALL grant

# ENST/CHEM 492 Sustainability Projects

## Student Learning Outcomes (SLOs)

- Analyze sustainability through scientific, engineering, social, and economic lenses and recognize that these are different perspectives of one interconnected system
- Demonstrate successful communication, both written and oral, with community partners, faculty and other interested groups
- Apply systems-thinking to sustainability issues
- Develop and apply team leadership in a community with a diverse background of educational experiences and cultures
- Identify and evaluate challenges and problems related to sustainable development
- Propose and assess effective solutions to such problems

# ENST/CHEM 492 Sustainability Projects

- First taught Spring 2015
  - 18 students enrolled
  - Six majors across three colleges
- Three projects
  - LEED Lab with CSUF Facilities Management
  - Irrigation system mapping with Fullerton Arboretum
  - Sustainability audit of The Ecology Center

# LEED Lab

- Working towards USBGC LEED Green Associates certification
- Audit of McCarthy Hall water use



# Fullerton Arboretum

- Irrigation system included several components added since 1970s
- No detailed map
- Conversion to 2-wire system using grant from Toro Corporation
- Students mapped current system



# The Ecology Center sustainability audit

- The Ecology Center is a non-profit educational organization in San Juan Capistrano
- Students conducted audit of waste, power consumption, and water use
- Developed detailed plan to become more sustainable



# ENST/CHEM 492 Spring 2016

- 11 students enrolled
- Five majors across three colleges
- Two projects
  - LEED Lab with CSUF Facilities Management
  - Soil analysis and modification recommendations with Fullerton Arboretum
    - Integration with existing GIS project

# Assessing student learning

- Four 1000 word reflections each focused on up to three SLOs
- Four team presentations
  - Provide progress reports
  - Analysis of problem
  - Development of proposed solutions
  - Demonstrating communication with community partner
  - Teamwork and individual effort

# Campus sustainability-focused experiential learning programs

- U-ACRE (Urban Agriculture Community-based Research Experience)
  - USDA NIFA HSI funded fellowships with intensive research experience
  - ANTH 458 Sustainable Urban Food Systems
    - Service-learning at area farms and Fullerton Arboretum
- ENST/CHEM 492 Sustainability Projects
  - Upper division and graduate level service-learning
- EPA Sustainable Communities
  - ANTH 490T People and Environment in Southern California
    - Upper division and graduate level service-learning
- ANTH 315 Culture and Nutrition
  - Service-learning at Fullerton Arboretum
- GE Pathway in Sustainability (on hiatus)
  - Lower division, some incorporating service learning
- Campus as a Living Lab
  - Partnerships with Facilities Management
- CHEM 100 Survey of Chemistry
  - Service-learning at Fullerton Arboretum
- iSustain
  - 100-level Freshman Programs with service-learning at Fullerton Arboretum

# Challenges and opportunities at CSUF

- Integrating multiple levels of sustainability-focused experiential learning programs
- Common set of SLOs?
- Program mapping of introduction, proficiency, and mastery of skills by course level and intensity of experiential component
- Tiered peer mentoring
  - More advanced students mentor others in projects

# References cited

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## **CSU Campus as a Living Lab Final Report**

We met the main goal of our Campus as a Living Lab grant. We developed a Sustainability Projects course. It will be offered in spring 2015. It currently has 12 students enrolled, but we expect that the enrollment will increase by the first day of class.

Sustainability and the idea of a campus as a living lab is very interdisciplinary. Our Director of Facilities Operations and our Provost are very supportive of interdisciplinary collaboration. However, some faculty, department chairs, and deans are more concerned about protecting their disciplinary turf, not losing FTES, and not having to pay for anything extra. There was also concern in one college about having too much FTES. We have had considerable administrator turnover at our institution and have many "interim" administrators. In large part because of these problems, we were not able to get our course approved (as a special) and online for enrollment until most students had already enrolled for spring 2015. In addition, because of this we scaled back our plans of having two courses. We put aside the classroom-based case studies sustainability course that was supposed to precede our Sustainability Projects course. We also put aside the sustainability minor for the time being.

On a positive note, there are two different innovative programs being started on campus that bode well for our Sustainability Projects course and the sustainability minor we would like to develop. This fall CSUF began a freshman GE sustainability pathway that would be a perfect pipeline for our Sustainability Projects course and our future sustainability minor. Second, there is a strong push on our campus to support high impact practices that lead to retention, increase graduation rate, and lower the achievement gap. Our Sustainability Projects course clearly fits as a high impact practice, and could lead to improved retention and graduation rate if taken by students in their freshman, sophomore, and junior years. So, there are reasons to be optimistic for the future.

Our Sustainability Projects course is cross-listed between Environmental Studies and Chemistry & Biochemistry (ENST/CHEM 492). The course is available to juniors, seniors, and graduate students. We are offering the course for the first time this coming spring in a room that holds 24 students. Although we didn't get the course online for enrollment until most students had enrolled, we already have 12 students enrolled our Sustainability Projects course. We needed at least 10 students to have the course run. We take this as a positive indication that many students want this type of course. We expect that more students will enroll as we approach the beginning of the spring semester.

This project has been a collaboration mainly between Dr. Hewitt (CHEM), Dr. Bock (ANTH/ENST), and our project partners including Willem Van der Pol who is our Direct of Facilities Operations. As of August, Dr. Hewitt became the Interim

University Librarian. To be honest, we may not have gotten approval without Dr. Hewitt being at the level of the other deans. Given that Dr. Hewitt is now the Interim UL, Dr. Bock will teach our Sustainability Projects course this spring. Dr. Hewitt will provide help as needed. We have the following projects in place for our spring 2015 course:

- CSUF LEED project
- Fullerton Arboretum water project (on our campus)
- Future Foods Farm (aquaponics farm a few miles from campus) and the Ocean & Earth restaurant, enhancing their sustainability
- Ecology Center in San Juan Capistrano, audit of their energy, water, waste, and consumption

The main focus of this course is for students to work in interdisciplinary teams on sustainability projects, either on campus or in the community. Students will apply their disciplinary knowledge to help solve real world, sustainability problems. This approach is most effective when done in interdisciplinary teams (as it is often done in companies, communities, and consulting firms). There is no required textbook and no exams.

The class will meet as a whole in weeks 1, 4, 7, 11, 15, 16. The first week provides an introduction to the course material and the projects. Weeks 4, 7, and 11 are for team presentations and class brainstorming to help each team. Formal team presentations will be given in week 15 and 16.

Individual written assignments will focus on the team projects and on personal reflections. Those involving the team projects will help each team member better understand their projects and obtain external information to help their projects. Those involving personal reflections focus on the more on the larger picture and what the students will take away from the course.

Graduate students will do an additional assignment, a more extensive review of the literature, the next steps in the project, and more of a focus on systems-thinking and all of the different facets of the project that need to be considered to make the project successful.

Here are our student learning outcomes for our Sustainability Projects course:

- 1) view sustainability through scientific, engineering, social, and economic lenses and recognize that these are different perspectives of one interconnected system
- 2) learn to brainstorm/network, with the rest of the class, community partners, sustainability faculty and alumni, and beyond
- 3) identify and evaluate challenges and problems related to sustainable development
- 4) apply systems-thinking to sustainability issues
- 5) be an effective team member in a community with a diverse background of educational experiences and cultures
- 6) propose and assess effective solutions to such problems

Once we see how successful our Sustainability Capstone Course is, we will have to decide how to pursue a more sustainable approach. Ideally, we will get enough support from our deans to get this course approved as a regular course and then seek GE approval. We would then split the course into three courses at the 200 (freshman & sophomores), 300 (juniors and seniors), and 500 (graduate students) level. Then, we would pursue the sustainability minor. If this doesn't happen, then our alternative approach will be to use our Center for Sustainability to offer internships with the CSUF Facilities Operations, Fullerton Arboretum, and our other community partners. The idea here is that each department has an internship course, so that we wouldn't be taking away FTES or funds from any department or college.

The funds were expended as originally budgeted for faculty release time and benefits (\$7499.00) and for graduate assistant support and benefits (\$3967). We did incur some expenses for advertising supplies, but we forgot to transfer the \$534 allocated for this. We request that we be allowed to reimburse the Center for Sustainability for advertising expenses, and use any small residual funds for supplies for our Sustainability Projects course this spring. If that is not allowed, we will return the remaining funds. The \$5,000 match from CSUF was used to fund graduate assistant and faculty support.