Course Syllabus
CE4915 – International Senior Design Field Experience
College of Engineering
Summer 2012

Instructor Information

Instructors: David Watkins, PhD Mike Drewyor, PE, PS
Office: Dow 806 Dow 861
Telephone: (906) 487-1640 (906) 487-3045
E-mail: dwatkins@mtu.edu mdrewyor@mtu.edu

Course Identification

Course Number: CE4915
Course Name: International Senior Design Field Experience
Course Location: Panama (August 2012)
Prerequisites: Approved for Senior Design

Course Overview/Learning Objectives

Taken together, CE4915/4916 provide a unique capstone senior design experience that involves service learning in an international, multicultural context. As a capstone senior design experience, the intent is to complement a rigorous academic program with intensive, innovative, and real-world design projects. Students work on engineering design teams, under the guidance of faculty and industry advisors, to serve the needs of industry, government, or community clients. In experiencing a design project from the initial stages of needs assessment and project conception through the stages of design and documentation, students are immersed in a business-like environment geared to foster innovation in engineering design and undergraduate research. Students are provided formal instruction in project management, design principles, teamwork, documentation, intellectual property, budgeting, ethics, and other relevant topics. By the end of the second semester, each team has delivered contract documents, a final report, a formal end-of-project presentation, and other “deliverables” to their industry, government, or community partner.

In addition to the benefits of a traditional senior design experience, these courses are models in service learning and prepare students for ethical, reflective, and quality service to diverse communities. They aim to broaden student vision and heighten their sensitivity to significant societal needs. It is hoped that students will continue to strengthen their interest and involvement in sustainable engineering and service to their communities. These courses fulfill the terminal requirement for the International Sustainable Development Engineering Certificate.
These courses will provide opportunities to:

- Work with clients to identify and prioritize needs.
- Develop problem statements.
- Identify and assess alternative solutions.
- Perform feasibility analyses.
- Develop design drawings, specifications, and engineering reports.
- Enhance leadership, communication, and interpersonal skills.
- Appreciate diversity in solving problems.
- Gain satisfaction from and appreciation for humanitarian and public service.
- Encourage lifelong and cross-cultural learning.

**Typical Design Projects**

Design projects are selected through consultation with community, government, and industry clients, and so cannot be fully specified in advance of the international field experience. Projects in the past have primarily included civil and environmental engineering projects, such as small structures, water supply systems, sanitation systems, and storm water drainage systems. Although it is expected that most projects will have a similar focus, interdisciplinary engineering projects are also common. Examples include charcoal production kilns, control systems for regulating water flow, and small-scale hydroelectric power generation. Projects with a focus in an engineering discipline other than civil or environmental engineering are also welcome. One project has been completed by a biomedical engineering team (design of an inexpensive prosthesis), and other possible projects include renewable energy technologies, improved cook stoves for reducing indoor air pollution, and mechanical devices for food processing or transforming raw/reused materials into building materials or commercial products.

For any project outside the technical expertise of the course instructors, an attempt will be made to identify external advisors/mentors appropriate to the project.
**ABET Criteria**

International Senior Design is intended to achieve ABET Outcomes related to the major design experience requirement. The “Criteria for Accrediting Engineering Programs, 2007-2008 Cycle” includes the following language:

“The Criterion 4. Professional Component

.... Students must be prepared for engineering practice through the curriculum culminating in a major design experience (emphasis added) based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.”

In addition, these courses will help to satisfy the ABET Program Outcomes by providing graduates with the following:

“The Criterion 3. Program Outcomes and Assessment

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multi-disciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global economic, environmental, and societal context

(i) a recognition of the need for, and the ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.”
Course Resources

Course Website(s)
- Canvas <https://mtu.instructure.com>

Required Course Text
- Notes and handouts provided by the Instructors.

Supplemental Course Text(s)
- Others as appropriate for selected projects (e.g., *Appropriate Technology Library*). Materials provided in the Dropbox.

Grading Scheme

Class participation, effort, attitude and teamwork are critical to success in these courses. These will be assessed through self evaluation, peer evaluation, and advisor/mentor evaluation, to be weighted equally in the student's final course grade.

For CE4915, a final assessment report and presentation will be included in the grading scheme. Students will also be required to keep a daily “learning log” (journal), in which they reflect on personal, educational, and professional experiences, including program conformance with ABET criteria. Summaries of these reflections will be submitted at the end of the trip.

The table below shows the contribution of each component to the overall grades awarded in the course. Active participation and completion of all course components is required to earn a passing grade in the course.

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<thead>
<tr>
<th>Component</th>
<th>%</th>
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<tbody>
<tr>
<td>Participation/Effort/Attitude</td>
<td>10</td>
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<tr>
<td>Peer Evaluations</td>
<td>15</td>
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<tr>
<td>“Learning Log” (ABET)</td>
<td>15</td>
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<tr>
<td>Assessment Presentation</td>
<td>25</td>
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<tr>
<td>Assessment Report</td>
<td>35</td>
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Course Policies

Students must abide all University policies as well as the Expected Behavior Policy While Traveling Abroad.
University Policies

Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance the University's policies.

If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see the instructor as soon as possible so that appropriate arrangements can be made. The Affirmative Action Office has asked that you be made aware of the following:

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at 487-2212. For other concerns about discrimination, you may contact your advisor, department head or the Affirmative Action Office, at 487-3310


Affirmative Action:  http://www.admin.mtu.edu/aaoo/

Disability Services:  http://www.mtu.edu/dean/disability/policies/

CE4915 Course Schedule – Subject to change

August 12 – Travel to City of Knowledge, Panama City

August 12-14 – Introduction and overview. Team building. Plan project assessment activities (data gathering, topographic surveys, community interviews, etc.). Check/set up equipment. Visit Panama Canal construction project.

August 15 – Travel to project sites.

August 16-22 – Carry out project assessment activities.

August 23 – Return to City of Knowledge


August 25 – Team presentations (AM). Tour city (PM).

August 26 – Return to USA.

August 30 – Final submittal deadline (Assessment Report, Learning Log Summary, Peer Evaluations). Hard copy or electronic submittal accepted.