Multi-Disciplinary Design Implementation Status

Motivation

Why?
- ABET: graduate must show ability to function on multidisciplinary teams
- Engineer of 2020: future engineers (computer scientists?) must embrace cross-disciplinary fertilization
- Duke Outsourcing Study: engineers (computer scientists?) with strong interpersonal skills, technical knowledge and ability to communicate across borders will always be in demand
- COE Goals: to graduate students well-prepared for professional practice

Problem Statement: How can the COE best prepare students for a multidisciplinary world?

Background

AY02-03: “No Walls” program initiated. Students take ENGR 401/402 in place of senior design. Team composition tailored to project needs

AY03-04: Program Coordinator leaves, but “No Walls” program continues with larger participation. Receives strong commendation from ABET review team.

AY04-05: “No Walls” program continues, but use of ENGR 401/402 falls to wayside. Increasing faculty discontent. Scalability creates concerns. Students rate program among the worst of College experience.


Sp 06: IDEA GENERATION & EVALUATION: 8 → 4 → 2, while increasing faculty and stakeholder input.

F 06: FINAL CONVERGENCE: Marley & Sobek present two alternatives to entire faculty for feedback. Feedback compiled and given to COE Curriculum Committee. Cmte recommends junior-level, multidisciplinary design course. Multi-D teamwork skills rubric developed (C. Plumb).

Sp 07: Sobek teaches pilot course (ENGR 480) with 14 students. College applies for permanent course number.

F 07: Sobek and Kuntz co-teach first offering of ENGR 310 with 11 students. Seven COE degree programs adopt ENGR 310 as required course for 2009-2010 catalog; one adopts it as a professional elective.

Sp 08: Sobek and Kuntz co-teach ENGR 310 with 85 students. Six team advisors instruct recitation sections. Course website being developed. Committee being formed to advise on long-term sustainability of course.

Lessons Learned

Spring 2007 Course
- Projects out-of-phase with lecture → Start projects earlier; more concrete assignments with higher expectations
- Teams not using project management tools → Introduce later in semester; require use of specific tools in assignments
- Non-performance on some teams → Closer advisement; more individual accountability through exam, peer evaluations
- Textbook not useful → Teach out of different textbook, but not require it of students
- Project topics inappropriate, not inspiring → Better guidance in project selection
- This is a skills course, not a content course → More in-class exercises, more applications and examples, less theory.

Fall 2007 Course
- Slow start to projects → Overlap assignments slightly to push teams along; align effort expectations early, explicitly
- Team advisor from industry worked well → But requires good coordination
- Need better way to disseminate course information → Course website
- Give students more help with problem definition → Outline project goals earlier; do more research on their design problems; require stakeholder interactions
- Ambiguity on expected deliverables on assignments → Concrete idea of what to expect from projects → A solid proof-of-concept design

Current Course

Enrollment: 85 Students: 3 CE, 34 ChBE, 29 ECE, 10 IE, 4 ME, 4 MET, 1 Math.
Website: www.coe.montana.edu/engr310

Structure: Lecture 2x/week, recitation 1x/week. Team assignments parallel lecture content.

Instructors: Sobek, lead instructor – sets course content, delivers lectures, determines assignments. Kuntz, lead TA – advises team advisors, advises own teams. TA’s – advise teams in recitation (two teams per 50-min. recitation). 8

Topics: Design process, problem definition, creativity/idea generation, system architecture, controlled convergence, teamwork, project planning/ tracking, IP, lifecycle engineering, design communication.


What’s Next?

How to set up course for long-term viability?
- Best instructor model?
- Oversight?
- Recruiting instructors?

Continuing course improvements
- Student feedback
- Faculty feedback

Cross-College Committee to make recommendations in Spring 2008.