As part of an NSF Department Level Reform (DLR) grant, we have instituted curricular reform in our undergraduate civil and environmental engineering programs. We want our graduates to take a systems approach to engineering problem solving and incorporate both short and long-term environmental, social, political, regulatory and economic issues into the problem definition and the problem solution. We have developed integrated systems classes, revised curricular content and pedagogy and created a sense of community within our programs. Our key strategy for practicing systems thinking and developing community is through the "Catamount Community" service-learning (S-L) projects instituted into required courses within each year of the program. (The catamount (mountain lion) is the University mascot.) Not only does S-L provide students with hands-on engineering experience, but it also demonstrates civic responsibility. This is an important component of our grant. In a world where money is often the bottom line, we want our students to realize the importance of giving back to the communities in which we live. Examples of some of the senior S-L design projects from the capstone course for the past two years, and associated reflection and assessment strategies are presented.

The senior capstone design experience is an ABET requirement for both the BS in civil and BS in environmental engineering. For the past two years, we have modified our semester-long spring course to meet a variety of our curricular reform goals. The capstone course is centered around team S-L projects with local communities. The final report represents seventy percent of the course grade with oral presentations, attendance and participation making up the remainder. A variety of team and individual assignments are used throughout the semester for both student and instructor assessment of learning goals. The course learning objectives include: 1) To experience and learn about civil and environmental engineering “project work” while actually doing it. The different facets of “project work” range from technical problem solving and design to interpersonal and personal skills; 2) Learn, practice and enhance teamwork, communication, and decision-making skills; 3) Develop a scope of work, project objectives and a work schedule with input from community partners for a real-world project; 4) Apply civil and environmental engineering design principles in a comprehensive service-learning project; 5) Understand the environmental, social, economic and other consequences of engineering projects; 6) Give an oral presentation of a final design to a review panel of faculty, community partners, peers, and private practitioners; and 7) Present a final written report that documents the team’s analysis and final design. The following presents a flow chart showing the S-L capstone process with lots of pictures from the various projects.

A variety of assessment and reflection methods are used. Students develop and reflect on personal goals for the course. They participate in course and S-L surveys.

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