Industry-Sponsored Interdisciplinary Capstone Design Course

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Abstract

Often universities seek to incorporate industry into their research and educational programs in different ways. At Bucknell University, a group of faculty members from multiple engineering disciplines developed a course that directly connects with industry’s authentic engineering endeavors. The course is at the core of the undergraduate curriculum as capstone experiential learning. In a year-long interdisciplinary senior design (IDSD) course, students from varying majors work in teams of four, and each team works on one client project. Corporations bring design problems, and serve as the sponsors, as well as the mentors, for student teams on the project.

The course is team-taught and co-coordinated by two full-time faculty members; not only are they in charge of course organization, lectures, and assessment of the learning outcomes for various University Departments and Programs, but they also serve as primary project advisors, directly providing assistance to student teams as appropriate. Additional faculty members from five departments, as well as laboratory and machine shop technicians, are designated to support the student teams via organized mechanisms such as quarterly design review panels.

The academic goal of the IDSD course is to introduce students to the realization of engineered products in real-world interdisciplinary teams. Students bring disciplinary knowledge, skills and capabilities to solve an authentic problem. Emphasis is placed on addressing, validating and articulating the customer-appropriate value proposition. Focus is placed on team skills and communication through writing, graphics and oral presentations. Critical thinking, reflection and self-evaluation are also strong themes.

In its third year of implementation, Bucknell IDSD has worked on a wide range of technical problems sponsored by major national and global corporations, and expanded into a course that takes students outside of engineering. Successful execution of the IDSD course via a fruitful collaboration between Bucknell University constituencies and the industry sponsors leads to student learning outcomes that regular disciplinary courses cannot achieve on their own, as well as added benefits for the sponsoring corporations in marketing and recruiting.