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Prototype Program for a Joint Academic/Industry-Sponsored Design Course

ABET-EC 2000 criteria put a greater emphasis on demonstrating the ability of our graduates to: a) apply their knowledge, b) design and conduct experiments, c) design systems to meet desired needs, d) function effectively in multi-disciplinary teams, e) identify, formulate and solve engineering problems, f) communicate effectively with others, etc. In order to achieve these, we plan at the Chemical Engineering Department at Washington University to revamp the cap-stone senior design course to provide a unique design experience to our graduates. The new structure for the design course should achieve effectively the following goals: i) accomplish ABET-EC 2000 criteria, ii) provide interaction between practicing engineers from local industry and our undergraduate students to make the design course a truly industrially oriented experience, iii) use challenging real-world problems selected from industry for training students, iv) provide multidisciplinary team work, v) establish close collaboration between faculty and local industry, etc.
Accordingly, we have established with Solutia Inc. a prototype program for a joint academia/industry-sponsored design course in which practicing engineers from local industry will define a process or product "design" problems for the students and then guide them through their solutions.
In this prototype program, practicing engineers from the corporate sponsor (Solutia), faculty from Washington University, and the students jointly designed a three-month program that exposed the students to the technical needs of the industry and provided a link between scholastic education and modern industry practices. The program was designed to provide a forum for the students to learn applied engineering practices, economic evaluation of capital projects, and interaction with other engineering disciplines and corporate management. The program was designed to specifically teach the students industry-leading techniques of delivering high value capital projects that are environmentally sustainable and economically beneficial. The academic/corporate "community" objective is to strengthen the talent pipeline from the engineering classroom to the process industry arena.

Two groups of two students each were selected by Solutia in a professional interview setting to ascertain their interest in an industry career and determine if their skills would provide a benefit to two corporate key process expansion projects in lieu of the required academic design project for the design course. The Solutia mentoring engineers then outlined a schedule to involve the students in chemical process design, evaluation of alternatives, development of economic/financial scenarios, specification of process equipment, and preparation of technical documentation. The students completed their project by a formal presentation to Solutia senior engineering staff and management.

The program successfully provided a vehicle for the students' scholastic experience to transcend to applied value-oriented engineering practices. They were able to evaluate design alternatives and review their conclusions with the mentoring engineers. The students met with engineering and operations staff at the manufacturing sites and participated in information gathering and the presentation of ideas. They were also introduced to other engineering disciplines and received training in capital project management and project cost estimation. Most importantly, they were able to culminate their work by identifying waste and energy reductions, and performing a detailed financial analysis of the capital project.
Currently, we are expanding this program to include more companies from local industry.
In this presentation, the developed prototype program for a joint academic/industry-sponsored design course will be presented and its benefits and impacts on both the students and on the sponsored corporate will be discussed.