

UNDERGRADUATE ENGINEERING DIVERSITY COURSE: WOMEN AND MEN IN THE ENGINEERING WORKPLACE

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Abstract

An undergraduate engineering diversity course, entitled: "Women and Men in the Engineering Workplace", was offered as an experimental course in the Spring semester of 2003 in the College of Engineering at Iowa State University. The course was cross-listed with the ISU Women's Studies Program, and is believed to be the first such engineering diversity course in the nation, and perhaps the first women's studies course to be offered by an engineering college. The students were "recruited" by the instructors representing the college's eight engineering departments, and were predominantly upperclasspersons. In order to ensure a gender balance in the class itself, the enrollment was 'engineered' so that half of the class were men, and half women. Although the course was centered on increasing gender diversity in the historically male dominated profession of engineering, race and class aspects of diversity were also dealt with in the class.

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The class relied heavily on guest lecturers from the college of liberal arts and sciences at ISU, and from the ISU Women's Studies Program. The course had to be approved through a lengthy curriculum approval process to meet ISU's U.S. diversity requirement. In this paper, the course content, course preparation, and classroom experiences are described.

Course Development Process

The idea for the development of an engineering college course to meet the university U.S. diversity requirement at ISU emerged after the authors were invited to speak on a panel of women engineers in a related course that has been offered for many years at ISU within the college of liberal arts and sciences (LAS). This course is entitled: "Women in Science and Engineering", and is also a 300 level undergraduate course aimed primarily at women students in the sciences and engineering. Taught by zoology professor, Dr. Eugenia Farrar, who is also an affiliated faculty member of the ISU Women's Studies program, this course was also cross listed as a women's studies course as well as an upper level undergraduate zoology course. When the authors were invited by Dr. Farrar to participate in a panel on women in engineering, it became clear that the large majority of students enrolled in the class were scientists, and only two students that semester were engineers. As the authors related our experiences to the class of being women in the engineering profession, it was also clear that a large gap existed between the woman scientist and the woman engineer, particularly if the woman scientist was in the life sciences (biology, etc.). Thus, based on early conversations the authors shared as a result of participating on the panel in Dr. Farrar's course, it was concluded that perhaps the engineering college should develop and conduct our own diversity course that would be not only targeted at women engineering students, but at men engineering students as well.

A second influence in our decision to pursue a separate diversity course for engineering students dealing with a focus on gender issues developed when one of the authors (Dr. Heising) participated as an invited lecturer in a new sociology course, also cross listed with women's studies, entitled: "Masculinities and the Sociology of Manhood" taught by ISU sociology professor, Dr Sharon R. Bird (Dr Heising was asked to speak on her

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experiences as a woman in a traditionally man's profession in that class). Later, Dr Heising also asked to sit in on Dr Bird's new course, which has led to a close collaboration; Dr Bird later was invited to give guest lectures on the topics of gender and also, masculinities studies in sociology in the new engineering diversity course that were very well received, especially by the men engineering students in the class.

A third influence in our decision to pursue a separate diversity course for engineering students was the scholarly work and course of ISU history professor, and women's studies affiliate, Dr. Amy Bix, who has been writing a book on the history of women's engineering education in the United States. Dr. Bix also teaches a diversity course on the history of women in science and engineering, which Dr Heising also participated in prior to the offering of the engineering diversity course. Dr. Bix also later provided guest lectures in the engineering diversity course related to the history of women's engineering education, which complemented the visiting Society of Women Engineers (SWE) exhibit during women's history month in spring, 2003, on the history of SWE and women in engineering in the U.S.

Finally, the last influence on our decision to pursue a separate diversity course for the engineering college was an NSF sponsored conference hosted by the ISU Women's Studies program in October, 2002, which was in development for the last several years at ISU. Dr. Heising, as well as Drs. Farrar, Bird and Bix, was heavily involved as a co-convenor of the conference, which involved the participation of twelve engineering colleges in the Midwest. This conference provided a wealth of information on the status of women in engineering, and the barriers and challenges facing women in pursuing careers in science, math, engineering and technology (SMET) fields. Scholarly work based on conference participation was also substantially utilized in the engineering college diversity class, including the works of several internationally known experts on women in SMET fields.

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Course Delivery Experiences

Once the course content was agreed upon by consultation with several of the aforementioned instructors and research professors, the course went through an extensive approval process that is required of any diversity course. Approval was received in Fall 2002, and the course was slated for first delivery in Spring 2003. It was decided that the course would be capped at 30 students, and that the course be populated by an equal number of men and women engineering students. As an official industrial engineering course, also cross listed as a women's studies course, the experience for the students of an equal gender distribution in an official engineering course would also be part of the experience. As we found out later, several of the men students who attended in fields of engineering where the percentage of women undergraduates remains relatively low (ie: less than 10%) remarked that this was their first classroom experience with so many women engineering students. Thus, the course itself was structured so that the even gender balance in the classroom itself affected the delivery and receptivity of the students to the materials presented.

The course consisted of several topics that were given by recognized faculty experts in the field, and who were mostly affiliated faculty members of the ISU Women's Studies program. The topics and instructors included: gender in communications (Dr. Jane Vallier, ISU English department), gender and women's studies (Dr. Jill Bystydzienski, Director, ISU Women's Studies program), history of women in engineering (Dr. Amy Bix, ISU History department), masculinities studies (Dr. Sharon Bird, ISU Sociology department), work and family balance (Dr. Connie Post, ISU English department). Also, several engineering faculty and staff, including the Dean of Engineering, Dr. James Melsa, and the Assistant Dean of Engineering for Undergraduate Studies, Dr. Loren Zachary, participated in the class as instructors in the following areas: professional engineering society diversity efforts/work-family balance/personal experiences as a woman professor of engineering (Dr. Carolyn Heising, industrial engineering professor), gender schemas (Ms. Mary Goodwin, CoE staff), racial diversity in engineering and the ISU LEAD program (Ms. Rosa Bell, CoE staff), status of college women in engineering

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and girls education in the U.S. (Ms. Monica Bruning, CoE staff), affirmative action in engineering (Dr. Derrick Rollins, chemical engineering professor), and women professors of engineering experiences (Dr. Jackie Shanks, chemical engineering professor/Dr Judy Vance, mechanical engineering professor). Also, Dr Vance gave a week of lectures related to women in engineering leadership based on her recent NSF Women in Engineering Leadership Institute (WELI) grant. Also, several student engineering leaders in the ISU student section of the Society of Women Engineers (SWE) and the National Society of Black Engineers (NSBE) gave talks on their organizations national, local and student section efforts in furthering diversity goals in the engineering profession. Also, Dr. Heising's son, Michael, an ISU political science junior, attended the class as the only non-engineer present, and gave a lecture entitled "bachelor living" in the work-family balance section. His presence and participation also gave added meaning when the work- family balance issue was addressed.

Conclusions

To summarize, the development, approval and first delivery of an experimental undergraduate diversity course for engineering students directed and taught by engineering faculty, staff and selected student leaders, as well as by experts in diversity topic areas, largely from the ISU liberal arts and sciences college and the ISU Women's Studies program, was achieved in the Spring semester of 2003. This course was very well received by the engineering students who participated, and many rewarding experiences were had by those attending. It is recommended that other engineering colleges consider offering similar courses to undergraduate engineering students not only to enhance the knowledge and preparation of future engineers and corporate managers in the ever important area of diversity training, but also to enhance the efforts of the engineering profession in promoting the goals of diversity.