Online Ethics Center
FOR ENGINEERING AND SCIENCE

Ethics in Engineering Curricula

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Description

An essay outlining a program that integrates ethics education into the engineering curriculum.

Abstract

In the early 1980s, the board of Engineering and Technology (ABET) initiated a requirement of all engineering programs to address ethical issues. This requirement has been in place for over a decade, but many engineering programs failed to address ethics in a substantive manner. Ethics instruction can take place through one of two general approaches. In one method, ethics instruction is accomplished through a course, or courses, offered by philosophy faculty. But this approach might tend to suggest that ethics is peripheral rather than central to engineering. In addition, such courses typically do not speak directly to ethical issues faced by engineers. The second approach involves integration of ethics content into the engineering curriculum itself. Integration allows students to see ethics as a core component of engineering; moreover, the teaching of ethics by an engineering professor might lend the subject greater credibility in the eyes of the student.

We think ethics should not only be integrated within existing courses, but should be sequentially developed throughout the engineering curriculum. While our approach to integration is by no means discipline-specific, our discussion will be illustrated with reference to our new biological engineering undergraduate program. This program was approved by the Oregon State Board of Higher Education in 1996, with the first freshman cohort just having entered last fall. The overall objective of our program is to provide an ABET-activity curriculum that trains engineers for careers in modern bioprocess and biomedical technology. Recent advances in molecular biology especially recombinant DNA technology, have created new opportunities for increasing the number, quality and utility of biologically-based products. Our curriculum was developed with input from several regional biotechnology companies, and provides training in molecular and cellular-level biology, and design experience relevant to fermentation engineering and downstream processing. We believe the need for ethics instruction in this program is particularly evident, as our graduates will be dealing with the most recent advances in molecular and cellular biology.

Approach

Our approach to integration of ethics instruction in engineering curriculum is consistent with the following sequential development.

Freshman year

Engineering students are required to complete only one or two courses in their major during their first year of study, these being focused on orientation to the discipline. In these courses, it is appropriate to introduce the concepts of professionalism and professional ethics. Issues such as professional restrictions and codes of ethics, specially as they relate to public health and safety and whistle blowing, constitute fairly straightforward subject matter for discussion. In addition, students can be introduced to ethical problem case presenting different courses of action that can be taken based on different moral judgments.

Last term in BE 111, Biological Engineering Orientation, the class watched a film describing the events leading up to the Challenger disaster. In particular, we heard the testimonial of one of the key engineers, Roger Boisjoly, involved in the design of

the faulty O-ring. The students were directed to Online Ethics Center for Engineering and Science site that details this case (http://onlineethics.org/cms/9609.aspx). The site presents a chronological treatment in seven sections of the events from Boisjoly's perspective. At the end of each section is a question or two on what action should be taken "at that point in time." The module also presents some alternative responses to these questions. We ask the students to read and think through the module, and answer the questions, while being sure to assume Boisjoly's personal responsibilities and circumstances as well as his public responsibilities. An essential feature of this assignment is discussion of why students choose their particular actions, including the associated costs, benefits and limitations of those actions.

by Michelle Bothwell and Joseph McGuire

Rights

Use of Materials on the OEC

Resource Type

Essay

Parent Collection

Essays on Ethics Instruction

Topics

Ethics and Society
Public Well-being
Research and Practice
Safety
Social Responsibility
Whistleblowing
Workplace Ethics

Discipline(s)

Engineering