

2007

The Fessenden Honors in Engineering Program

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Giazzoni, Michael, "The Fessenden Honors in Engineering Program" (2007). *Honors in Practice -- Online Archive*. 47.
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Developing honors opportunities for students in engineering programs can be difficult, and the experience at the University of Pittsburgh is no exception. Often these students' degree requirements are so demanding that their opportunities for participating in honors experiences are severely limited. In each of the two semesters of their freshman year, freshman engineers at the University of Pittsburgh take the same courses: physics, chemistry, calculus, engineering computing, one elective, and a zero-credit, required engineering seminar that introduces them to their major choices. They enter their engineering majors in their sophomore year.

Our University Honors College (UHC) is organized on a participant model, not a membership one, so we have students who participate to varying degrees in the experiences that we offer such as honors coursework, special advising, intellectual community, and a special research-based Bachelor of Philosophy degree. For those engineering students interested in the opportunities of breadth and depth offered by the UHC, one option that provides a minimum of exposure is the choice of replacing some of their standard courses with honors versions. Honors courses are smaller and focused on in-depth treatment of course content. Math and science courses focus on deriving laws and formulas from first principles before moving on to advanced problem-solving. Honors humanities and social science courses also feature in-depth treatment of material, often using primary texts instead of textbooks. Faculty who wish to teach in the Honors College submit course proposals that are reviewed and selected by our department. In general, students in honors courses expect to read, write, think, and discuss more than they would in a non-honors section. The primary benefit, then, is the knowledge and experience gained from working harder than one technically is required to work, in a vibrant classroom environment. Honors courses are not weighted differently than non-honors courses at our institution, so students not interested in the intrinsic benefits of these courses usually do not choose to take them.

On the other extreme, engineering students who wish to have a more well-rounded college experience have the option of adding the specific and elective requirements of a major in our liberal arts division, the School of Arts and Sciences. Usually this route results in so many extra credits that it requires a fifth year of study, so only the most intrepid students make this choice.

THE FESSENDEN HONORS IN ENGINEERING PROGRAM

Finally, some engineering students seek a middle course. In order to achieve the goals of intellectual breadth and the experience of honors-level coursework, along with an intellectual community to support it, some students choose to participate in the Fessenden Honors in Engineering Program (FHEP).

Created in 1980, the program was originally named the Sophomore Honors in Engineering Program, reflecting the program's focus on activities through the second year of study. Since that time, the program has developed to focus more on the first and formative year of study. The program is named after Reginald Fessenden, an electrical engineer at the University of Pittsburgh (1893–1900) who carried out important early research that led to the development of the modern radio.

FHEP provides an opportunity for like-minded students to share challenging coursework and meet in a weekly seminar to discuss issues of philosophical and ethical import for engineers. Those who wish to receive a special certificate fulfill the following requirements:

- a 3.0 grade point average in related coursework;
- two out of three of their math, chemistry, and physics courses in honors versions each semester of their first year;
- the honors version of their engineering computing class both semesters;
- two honors social sciences/humanities electives, completed before the end of their second year; and
- FHEP Seminar (the honors version of Freshman Engineering Seminar) each semester of their freshman year.

In keeping with the UHC's participant model, not every student attempts (or is required to attempt) to fulfill the certificate requirements; roughly ten students do each year. Many other students pick and choose from several of the options listed above. Of these, almost all choose to participate in FHEP Seminar, which enrolls 25–40 students out of the roughly 420 engineering students that enter Pitt as traditional freshmen each year.

FHEP Seminar is the cornerstone of the program. Both the honors and the non-honors versions of Freshman Engineering Seminar have the goals of easing the transition to college and educating students, through small discussion groups, about the engineering majors available to them. Students in the honors version of the seminar cover this goal and go further by reading and discussing books with import for engineering and human culture. For example, they cover topics like the cultural division between the humanities and sciences described in C.P. Snow's *The Two Cultures*. They also argue about issues like technophobia and antitechnology, with readings by such mainstream authors as Neil Postman and fringe writers like the Unabomber (a full curriculum appears at the end of the article). The UHC provides the books free of charge to students in the seminar, thus covering the primary fixed cost of the program. Free-wheeling discussions are supplemented when possible by hikes, guest speakers, and field trips to locations such as Wright-Patterson Air Force Base and Frank Lloyd

Wright's Fallingwater. All of these readings, discussions, and experiences are designed to give School of Engineering students a broader and deeper education, helping to create engineers who can think and write across the disciplines.

A seminar with such a wide-ranging topic list could easily degenerate into trying to be a Seminar in Everything. What holds it together is the preceptors—the sophomore- through senior-level students who run the program. Preceptors have all gone through FHEP Seminar as freshmen, and they use their experiences in the program (and in the School of Engineering) to facilitate discussions and dispense advice to freshmen. They meet regularly with a coordinator from the UHC to discuss organizational issues and facilitation techniques as well as constantly develop and revise the curriculum. Since there are non-honors versions of Freshman Engineering Seminar, the preceptors and coordinator work with the School of Engineering to make sure the seminar sections run in parallel to each other. Even so, the preceptors are given a great deal of leeway in how they administer the course. New preceptors are recruited out of each year's class by an interviewing committee consisting of preceptors, the coordinator, and a representative from the School of Engineering when possible.

At the end of each semester, anonymous course evaluations are conducted in FHEP Seminar. The compilation of these evaluations provides information on many student issues, such as satisfaction with the course, appraisal of readings, appreciation of humanistic issues satisfaction with their preparation for spring major selection, and evaluation of the preceptors' work.

The preceptors are volunteers; in fact, ours have repeatedly turned down offers to be paid for their work. They seem to feel that being volunteers gives them extra degrees of responsibility and autonomy. However, they still report to the UHC coordinator, who works with them closely. The more significant explanation for this volunteer attitude seems to be the way that they have adopted and hope to embody the UHC philosophy, which they advance in their seminar: one should do extra intellectual work for the intrinsic benefit of knowledge as well as for the exciting intellectual community that forms in a group of people who share that value.

By now, hundreds of currently working engineers have experienced FHEP as undergraduates. FHEP has met its goal of giving undergraduate engineering students the chance to participate in the UHC, the chance to get together with a group of like-minded future engineers to discuss philosophy, engineering ethics, and cultural issues, all while still progressing toward a professional degree. Some students do more, such as those who go on to earn double degrees. However, for those students interested in the middle course, FHEP is meeting the needs of motivated, curious, able, and intelligent students—students interested in bridging the Two Cultures.

FHEP READING LIST

Semester 1: Engineering and You

1. Isaac Asimov, *Robot Dreams*
2. Samuel Florman, *The Civilized Engineer*
3. C. P. Snow, *The Two Cultures*
4. Eugene Ferguson, *Engineering and the Mind's Eye*
5. Robert Pirsig, *Zen and the Art of Motorcycle Maintenance*

Semester 2: Engineering and the World

1. Richard Feynman, *What Do You Care What Other People Think?*
2. Henry Petroski, *To Engineer is Human*
3. William McDonough & Michael Braungart, *Cradle to Cradle*
4. William A. Henry, *In Defense of Elitism*
5. Neil Postman, *Technopoly*
6. Ted Kaczynski, *The Unabomber Manifesto*

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