

Syllabus - Special Topics in Curriculum, Instruction and Evaluation: Principles of Engineering STI 2009

Instructor:

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Course Objectives: Unit 7 of the PLTW POE curriculum has a brief introduction to engineering ethics. In this course we wish to expand the current ethics material and extend its presentation over all seven units of the POE curriculum. This will require the POE instructor to engage in an overview of contemporary ethics in engineering issues followed by research and development in curriculum for ethics awareness in science and engineering education. Supplemental curriculum covering engineering ethics following the APPB learning model and meeting ABET 2000 requirements is to be developed. Strategies for assessment of the supplemental material are to be developed.

Texts: Schinzinger and Martin, *Ethics in Engineering, 4th Ed.*, McGraw Hill, 2005

Internet Resources: See the following web sites for more materials on engineering ethics, case studies, and professionalism:

1. American Society of Mechanical Engineers:
http://www.asme.org/Education/PreCollege/TeacherResources/Code_Ethics_Engineers.cfm
2. Center for the Study of Ethics in the Professions at IIT: <http://ethics.iit.edu/>
3. National Institute for Engineering Ethics: <http://www.niee.org/>
4. National Society of Professional Engineers:
<http://www.nspe.org/Ethics/CodeofEthics/index.html>
5. The Online Ethics Center for Engineering and Science: <http://onlineethics.org/>
6. Vanderbilt University Center for Ethics: <http://www.vanderbilt.edu/CenterforEthics/cases.html>

There are many more!

Required Reading: Text and Papers

- Text: Chapter 1 – Ethics and Professionalism, pages 1-29
Chapter 2 – Moral Reasoning and Codes of Ethics, pages 32-52
Chapter 3 – Moral Frameworks, Sections 3.1 and 3.2, pages 55-66
Chapter 4 – Engineering as Social Experimentation, Sections 4.1 and 4.2, pages 88-106
Chapter 5 – Commitment to Safety, Sections 5.1 and 5.2, pages 117-134
Chapter 6 – Workplace Responsibilities and Rights, pages 146-180
Chapter 7 – Honesty, pages 190-216
Chapter 8 – Environmental Ethics, pages 220-239
Chapter 9 – Global Issues, Section 9.2, pages 254-266
Chapter 10 – Engineers and Technological Progress, Section 10.2, pages 285-293

Papers: Nagwa Bekir, Vaughn Cable, Ichiro Hashimoto, Sharlene Katz, “Teaching Engineering Ethics: A New Approach”, 31st ASEE/IEEE Frontiers in Education Conference, October 10 - 13, 2001 Reno, NV, *IEEE*, 2001.

José A. Cruz, William J. Frey, Halley D. Sanchez, and Miguel A. Torres, “Meeting the Ethics Challenge In Engineering Education: Re-Accreditation and Beyond”, 34th ASEE/IEEE Frontiers in Education Conference, October 20 – 23, 2004, Savannah, GA, *IEEE*, 2004.

Keita Sugihara, “Developing Teaching Methods for an Engineering Ethics Curriculum”, International Conference on Engineering Education, July 21–25, 2003, Valencia, Spain.

Sarah Pfattetcher, “Teaching vs. preaching: EC2000 and the engineering ethics dilemma”, *Journal of Engineering Education*, Jan 2001.

Thomas Litzinger, John Christman, Andy Lau, Nancy Tuana, and John Wise, “Learning and Teaching Ethics in Engineering: Preparing Engineering Faculty to Teach Ethics”, Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition, *American Society for Engineering Education*, 2003

Vincent M. Brannigan, “Teaching Ethics in the Engineering Design Process: A Legal Scholar’s Perspective”, 33rd ASEE/IEEE Frontiers in Education Conference, November 5-8, 2003, Boulder, CO, *IEEE*, 2003

Joseph R. Herkert, “Continuing and Emerging Issues in Engineering Ethics Education”, *National Academy of Engineering*, Volume 32, Number 3 - Fall 2002

Keith Schimmel, “ABET 2000 - Can Engineering Faculty Teach Ethics?”, Christian Engineering Education Conference, 2000

The above are required reading. There are many more papers worth exploring.

Deliverables and Due Dates:

DUE: September 18, 2009

Supplemental curriculum with classroom delivery strategy covering ethics in engineering to be appended to the current PLTW POE course. This curriculum must use the APPB learning model and meet ABET 2000 ethics requirements. Curriculum includes, but is not limited to, the following materials:

- Scope of the material paper
- List of key terms
- Introductory presentation power point to be presented to the POE class including key concepts and essential questions
- List of activities to be distributed across all seven POE units: include individual, team, and class activities with a clear purpose, lesson plan, and assessment strategy for each activity.
- List of resources for students
- Learning assessment strategy

Due: December 4, 2009

Evaluation of supplemental curriculum. This should include, but is not limited to the following:

- Empirical data of student performance (must meet FERPA guidelines)
- Anecdotal data of student performance (must meet FERPA guidelines)
- Evidence that curriculum meets ABET ethics requirements
- Student feedback evaluation
- Personal statement on the supplemental curriculum effectiveness

Note that covering the current POE curriculum in the typical allotted time is no easy task. New POE instructors frequently struggle to cover all of the material during their first time teaching the course. The supplemental curriculum needs to be incorporated into the current POE course in such a way so that the least amount of extra time is required for its delivery. This also will be no easy task. You will need to use a great deal of creativity and your intelligence guided by your experience to put together this supplemental material. The expectation is that you will find this a very enlightening, rewarding, and worthwhile experience.

It will be expected that POE teachers who enroll for graduate credit will submit weekly (at minimum) progress reports to the POE course Affiliate Professor.

For questions and/or further information contact Robert A. Becker at the email address above.