Texas A&M University

Core Curriculum

Initial Request for a Course Addition to the Fall 2014 Core Curriculum

Foundational Component Area: Language, Philosophy and Culture

In the box below, describe how this course meets the Foundational Component Area description for Language, Philosophy and Culture. Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.

The proposed course must contain all elements of the Foundational Component Area. How does the proposed course specifically address the Foundational Component Area definition above?

We consider rights as they are understood in different cultures, the Western concept of individualism and whether it can be accepted by cultures in the Far East. We consider the concept of well-being and how it relates to technology in various cultures. We explore techniques for ethical analysis and how they can be used in looking at the ethical ideas in various cultures. We examine the "capabilities approach" to economic development and how technology can provide the foundation for well-being, however it is defined. We consider rule-based ethics and how it relates to virtue-based ethics, which is more widely accepted in some cultures. We look at the question whether there can be a universal professional ethics or whether such a concept can be different in different cultures. We look at bribery, gifts, extortion, nepotism and other issues as they are understood in non-western cultures.

We ask the students to write a paper on the relationship of their personal ethics to professional ethics and common morality.

Core Objectives

Describe how the proposed course develops the required core objectives below by indicating how each learning objective will be addressed, what specific strategies will be used for each objective and how student learning of each objective will be evaluated.

The proposed course is required to contain each element of the Core Objective.

Critical Thinking (to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information):

We challenge the student to develop and demonstrate critical thinking in several ways. For example, one of the tools we teach for the analysis and resolution of ethical conflicts is the classification of ethical conflicts as moral, conceptual, application, or factual issues. When an ethical conflict is identified as one of these types of issues, identifying the most promising resolutions is made clearer. Classifying a given ethical conflict into one of these categories proves to require critical thinking and careful analysis, and the students are drilled on this skill.

The students are taught to identify the audience of the ethical conflict (any party that might be affected or impacted) and to identify aspects of the obvious resolutions (to do X or not to do X) that impact these parties. They are taught to assess and analyze these impacts based on two moral theories (utilitarianism and respect for persons) and to evaluate the choice between the two obvious resolutions. When neither of the obvious resolutions is ethically tenable, we introduce the idea of a Creative Middle Way solution—synthesizing an alternative resolution that satisfies all the ethical constraints of the conflict. Engineers are good at identifying solutions to engineering design challenges (solutions that satisfy various constraints), so it is not surprising that the students are often good at synthesizing Creative Middle Way solutions.

We discuss innovation, and the value of innovative solutions, but we particularly focus on how innovation in engineering design can increase risk and can require more detailed and thorough engineering analysis to answer questions that are not raised by proven engineering designs. Examples of innovative design that are included in our
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discussions include the von Korman vortex shedding of the Tacoma Narrows bridge (a design very similar to the Golden Gate bridge) and the unforeseen effects of design wind loadings on the innovative structural framing of the Citicorp tower. The objective is to have the student recognize when his proposed design reaches outside the envelope of accepted practice, and to know that he/she may then have an ethical obligation to look for design issues that are not raised by accepted practice.

Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):

ENGR/PHIL 482 is a certified "W" (Writing Intensive) course, and is only offered as 900-level sections. The course is certified until January 2016, and has been certified since the university's adoption of the requirements for "W" courses in each curriculum; it may have been the first W-certified course in the College of Engineering. Students enrolled in this writing-intensive course each write a minimum of 5500 words each semester, and recitation sections are kept small (26 students) to allow close interaction during writing review and feedback. Students do not receive a passing grade in the course without at least a 60% average on the writing component. While the emphasis is on written communication skills, the small section recitation meeting format promotes frequent (and often enthusiastic) discussions facilitating honing of oral communication skills. The course enhances communications skills through small and large group discussion, writing and visual representations of engineering topics, issues and data central to course reading. Material from this course will include written texts and such visual representations as photographs, illustrations, videos, or graphical representations of data. Student teams are required to make presentations to their recitation section on assigned topics of discussion, including both visual and oral elements.

With our focus on engineering communications, we emphasize the importance of concise and unambiguous writing. Ambiguous communications allow the reader to come away with a different interpretation than intended by the writer, which can literally be a fatal flaw in engineering communications.

At least one lecture focuses entirely on engineering communications, with detailed examples of flawed communications and the problems caused by those examples. Various forms of communications are discussed, including oral communications, e-mail, memoranda, and formal engineering reports. In other lectures throughout the course, the importance of effective engineering communications is also emphasized, but detailed writing instruction and feedback occurs in the weekly recitation sections.

Social Responsibility (to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities):

We identify and highlight two different aspects of professional ethics; preventive ethics and aspirational ethics. Typically professional ethics, particularly as adopted in the practice of engineering, has been characterized as preventative ethics—codes of ethics include detailed prohibitions against unethical practices such as conflicts of interest, performing unnecessary work, overbilling, violations of law, etc., but as engineering codes of ethics have evolved the emphasis has shifted. In the early years of engineering practice (19th century) the engineer's primary responsibility was considered to be loyalty to his/her employer or client. Today most codes, like the NSPE model code, charge the engineer with "holding paramount" the public health, safety, and welfare, even when those values might conflict with the interests of employer or client. Furthermore, the codes are increasingly emphasizing the engineer's responsibility to the environment. While the language in most instances is not strong (the engineer "should" examine the environmental impact of his/her designs), the profession is clearly moving in the direction of acknowledging an increasing commitment and responsibility to sustainability and reduction of environment impact by engineered works and products. We typically have four or five lectures on environmental issues.

We discuss at some length social issues like exploitation and paternalism. Engineers working on projects in developing countries are often faced with difficult decisions related to these issues, and we discuss several cases to help these students understand these issues and develop an objective method of analysis so that they can formulate, defend, and be comfortable with, their own decisions when faced with challenging social issues.
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like these. These lectures and subsequent discussions also highlight cultural differences as well as international differences in the practice of engineering.

We discuss privacy, intellectual property, and other social issues raised by technology; we hope engineers of the future will better understand how technology is socially embedded and how it changes our social norms (examples: microwave cooking, cell phones, Facebook, ...). We typically include two or more lectures on risk management, emphasizing the differences in the way engineers quantify risk and the way laymen think about risk, which sometimes complicates public acceptance of engineering design decisions.

Personal Responsibility (to include the ability to connect choices, actions and consequences to ethical decision-making):

We contrast professional ethics with personal ethics, pointing out that some areas overlap and some areas do not. We discuss the consequences of violations of various codes of ethics, indicating that the code of ethics in the Engineering Practices Act carries the weight of law for licensed professional engineers in Texas, while adherence to codes of ethics for various professional societies is voluntary in nature and required only of members in those organizations. We spend much time on topics like gifts, conflicts of interest, and the appearance of conflicts of interest, emphasizing that the reputation of the individual engineer is critically important for his or her success in a profession where ethical behavior is a prerequisite to individual success. Students are given analytical tools and exercises to help them determine whether a gift or trip offered by a client or vendor might be problematic.

Please be aware that instructors should be prepared to submit samples/examples of student work as part of the future course recertification process.