



Online Ethics Center
FOR ENGINEERING AND SCIENCE

Nature and Human Values Course

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Description

This activity is considered an NAE Exemplar in Engineering Ethics Education and was included in a 2016 [report](#) with other exemplary activities. This activity describes a course called Nature and Human Values (NHV), which links personal, professional, and environmental ethics to engineering, energy, and emerging technologies.

Body

Exemplary features: Multidisciplinary faculty involvement; foundational required course that is evaluated over the course of the students' education; real-world ethics

problems; difficult problems that lack clear right and wrong answers.

Why it's exemplary: Every freshman takes Nature and Human Values (NHV), which links personal, professional, and environmental ethics to engineering, energy, and emerging technologies. Lectures and readings by diverse experts in fields ranging from anthropology and history to nanotechnology and nuclear engineering emphasize the social, cultural, political, and moral context of engineering. Research and writing assignments require students to apply ethical theories as parts of solutions to real-world engineering cases and problems. Students use strategies of negotiation and mediation to help stakeholders make decisions about the ethical use and deployment of engineering designs and technologies. We regularly assess students' baseline knowledge of ethics and engineering in context, which they apply in their senior design and other upper-division coursework. NHV is a foundational component of CSM's Ethics across the Curriculum (EAC) initiative and was integral to an NSF-funded project called "NanoSTEP: Nano-Science, Technology, Ethics, and Policy."

Program description: Nature and Human Values gives students ethical preparation for their engineering practice by highlighting ways that new technologies and engineering feats are changing people, society, and culture; exploring the evolving definitions of nature and the environment and how they impact human interactions and occupations; and emphasizing the obligation to forge ethical solutions to debates that acknowledge the values of all stakeholders. The class stresses written and oral communication as a crucial component of professional and civic dialogue, and encourages critical reading, thinking, and conversation about engineers' specific ethical obligations as professionals and their broader moral, social, and environmental responsibilities as world citizens. Participants include eight full-time faculty in the Division of Liberal Arts and International Studies, 4–5 adjunct faculty, and the director and assistant director of the division. Each year about 1,200 students take the course, most of whom are freshmen.

NHV's educational goals are that by the end of the course, students will (1) Demonstrate understanding of major ethical theories and concepts by applying them to contemporary and recent debates on technology, resource use, and environmental issues, as well as to engineering practices; (2) Critically read and

analyze arguments, accurately identify the central argument in readings, and synthesize diverse points of view; (3) Construct logical, effective, well-organized arguments whose central claims are well supported and that accurately present and adequately respond to competing arguments; (4) Successfully research topics related to engineering, ethics, and the environment, make effective use of source material in a researched paper, and correctly document sources; (5) Write clear, readable, grammatical prose developed through the process of drafting and revision; and (6) Demonstrate understanding of the impact of engineering and applied science in social and environmental contexts.

The course has its own textbook, written and edited by its faculty, containing common readings and content related to engineering, ethics, and communication. Each week, all students attend a large-group lecture and also engage in 3 hours of seminar-style learning in smaller classes. They write three papers of escalating complexity throughout the semester, using skills in summary, analysis, synthesis, argumentation, and research, which culminate in the writing and presentation of a mediated solution to an unresolved debate regarding engineering and ethics. Students take a common final exam that tests their understanding of and ability to apply ethical theories in context.

Assessment information: The final paper grades and exam allow us to determine whether students (a) are able to apply ethical theories to real-life situations and (b) understand the broader social, environmental, and cultural contexts of engineering ethics. We adjust lectures and readings according to their performance on these measures. Each semester, NHV students are also more broadly assessed in six categories: Application of Ethical Concepts; Critical Thinking and Reading; Constructing an Argument; Research; Writing and Mechanics; and Engineering in Context. Students are ranked from 1 (Lacking) to 4 (Advanced) for each of these outcomes, which we use to inform our curricular development of this foundational 100-level course. The NHV assessment rubric is then compared to those for our division's 200- and 400-level courses, helping us to see the development of skills across a student's entire educational experience. Data from spring 2012 through fall 2014 show a steady increase in skill development across all NHV outcomes, with students demonstrating the highest performance in the categories of "Engineering in Context" (3.24 avg. out of 4) and "Application of Ethical Concepts" (3.06 avg. out of 4).

Additional resources:

1. NHV textbook: www.hmpublishing.com/featured-titles/english/nature-and-human-values.html
2. NanoSTEP poster presentation:
<https://dspace.library.colostate.edu/handle/11124/16996>
3. [NHV Syllabus](#)
4. [NHV Course Callendar - Spring 2016](#)
5. [NHV Major Paper Assignments](#)

Rights

Use of Materials on the OEC

Resource Type

Educational Activity Description

Parent Collection

NAE Exemplars in Engineering Ethics Education

Topics

Controversies

Emerging Technologies

Energy

Environmental Justice

Sustainability

Discipline(s)

Engineering

International Perspectives

Teaching Ethics in STEM