ETHICS AND ENGINEERING

ECE/PHILOSOPHY 316
SPRING SEMESTER
2011

SYLLABUS

The word "syllabus" is from the Modern Latin *syllabas*, the result of a misprint in a 15th century edition of Cicero for *sittybas*, plural of *sittyba*, meaning a "list" (originally a piece of parchment used as a label for a papyrus roll). The term has now taken on the meaning of "a summary or outline containing the main points, especially of a course of study" (*Webster's New World Dictionary of the American Language* [New York: World Publishing Co., 1953, page 1476]). Throughout the semester as a course in *Advanced Composition*, we will be studying the historical roots and current usage of the English language. As a course also in *Philosophy*, it is fitting to note that the title of Plato's *Republic* in Greek is πολιτεια,— transliterated as *politeia* — meaning the condition and rights of a citizen; hence, citizenship. The English title of the *Republic* has its origin in Cicero's translation of the Greek into Latin as *res publica* (*res*, thing + *publica*, feminine of *publicus*, public). The term *republic*, however, "does not convey precisely the correct connotation" that *politeia* had for Plato. (See the beginning reference note to Book I of Plato's *Republic*, translated by Alan Bloom [New York: Basic Books, 1968; 2nd ed. 1991, 439–40, and the article by Richard Talaska, "Philosophical Reasoning in Ethics and the Use of the History of Philosophy" in *Teaching Philosophy* 20 [June 1997]:121–41.)

Understanding another person — whether it be Plato or a close friend — is indeed complex; but as we listen with care, genuine dialogue is possible. Through the medium of the written word, we will be in conversation with many different authors during the course of the semester, some of whom will become close friends. As you listen and engage these authors in dialogue, keep your English dictionary close at hand in all of your work to assist you in understanding the etymology and development of key terms in the discussion.

Instructor

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Course Home Page

http://courses.ece.uiuc.edu/ece316
The home page has links to resources in engineering ethics on the Web.

Classes

Section E3: Tuesdays and Thursdays, 9:30–10:50 a.m., Room 329 Gregory Hall
Section E4: Tuesdays and Thursdays, 12:30–1:50 p.m., Room 57 Everitt Laboratory

Prerequisites

Junior standing and Rhetoric 105. Junior standing means that the course will be taught at the level of an upperdivision course in Advanced Composition and Philosophy.

Credit

3 hours. ECE/Philosophy 316, "Ethics and Engineering," satisfies University General Education requirements for Advanced Composition and Humanities and the Arts (Historical and Philosophical Perspectives).

Course Objectives

- To read and think critically
- To develop moral reasoning skills
- To improve writing skills in an engineering context
- To understand multiple perspectives and to respect others of diverse persuasions
- To study the fundamental structure of human personhood, the grounding of moral action, and the development of moral character as the precondition of true citizenship and of integral work in a profession

Required Texts

- Charles E. Harris, Michael S. Pritchard, and Michael J. Rabins, *Engineering Ethics: Concepts and Cases,* 4th ed. (Belmont, CA: Wadsworth, 2009)

- A three-volume integrated set of assigned readings — *Volume 1: Introduction, Volume 2: Normative Ethical Theories, and Volume 3: Windows into Applied Ethics* — available in the textbook department at the Illini Union Bookstore.

Electronic Reserves

Selected course material will be available through the University of Illinois Electronic Reserves (http://www.library.illinois.edu/ereserves/). See the Daily Schedule for the listing of specific readings.

Important Reference Works

A good dictionary and grammar are essential tools that will assist you greatly in your use of the English Language. *Webster's Dictionary* in an unabridged form is an excellent reference work that provides clear definitions and an etymological history of each word. The *Oxford English Dictionary* can be viewed online through the University Library home page under *Research Tools, Online Research Resources* (www.library.illinois.edu). From this site, you can also consult the *Oxford American Thesaurus of Current English.* For a comprehensive English grammar, see Sidney Greenbaum, *Oxford English Grammar* (Oxford: Oxford University Press, 1996).

Other Sources

Other recommended works are *A Writer's Reference*, seventh edition (2010), by Hacker and Sommers, for a review of the fundamental principles of writing; and *Elements of Style* ([1935], 1959, 1972, 1979, 2000), by Strunk and White, for a simple, classic statement of the basic principles of English Composition.

Reflection Papers and Assigned Readings

Daily reflection papers constitute an important component of your work during the semester. Reflection papers will crystallize your understanding of the readings and will prepare us all for our discussion together in class; they will also help you learn the art of clear and concise writing, a critical skill which is developed through consistent and regular practice. Your papers will be read and evaluated (check or check + / –), but not graded.

Each reflection paper is to be *typed, double-spaced, and a full one-page (or more) reflection* upon the assigned readings for the day. Type your *name and submission date* on a *single line* as the header of your paper. Begin the body of the paper on the next line, using twelve-point font and one-inch margins. View your daily reflection papers as a progressive series of cumulative home-work assignments. Reflection papers will be due each class period, except for the days on which you submit a draft or final version of a major writing assignment — namely, the mission statement, the three response papers, and the final research paper. In-class questions over the required readings may be given on the days for which there are no reflection papers.

You are responsible for all of the assigned readings — and on the daily attendance sheet, you will indicate the amount of the readings that you have completed — but use your reflection papers to focus your attention on a portion of the readings that was particularly significant to you. Briefly summarize the substance of *the author's position* and then reflect upon the meaning and significance of the reading, developing *your own position* with well-reasoned argumentation in dialogue with the author. The reflection papers, together with your completion of the assigned readings for each class period, will count toward a significant portion of your final course grade.

Personal Mission Statement

Graded writing assignments for the semester will begin with a substantive three-page paper in which you construct your own mission statement. The draft must be submitted electronically in Microsoft Word format before class begins on February 1. A hard-copy of the final version, along with a printed copy of the evaluated initial draft, will be due on April 28.

Response Papers

During our journey this semester, you will write three response papers, each consisting of a complete draft and a final version. The draft will be given substantive comments, but only the final version will be graded. For full credit, a complete draft must be submitted on time and the draft included along with the final version. A grading rubric will accompany each assignment.

All papers must be double-spaced, in 12-point type, with one-inch margins. Your name and the submission date should appear on a separate title page. The drafts of your response papers must be submitted electronically before class begins on the required due date. The final version must be submitted in hard-copy format, together with a printed copy of the evaluated electronic draft.

Due Dates for Response Papers:

Response Paper #1: *Article Analysis* (3 pages)
A complete draft is due February 3; the final version is due February 10.

Response Paper #2: *Case Study* (3 pages)
A complete draft is due February 17; the final version is due February 24.

Response Paper #3: *Normative Ethical Theories* (5 pages)
A complete draft is due March 17; the final version is due March 31.

Research Paper

As the final writing project of the course, you will complete a substantive research paper of eleven pages or more in length. You will carefully explore in your paper the ethical implications of a topic of your choice using the Notes-Bibliography citation format of the *Chicago Manual of Style* as outlined in Turabian, *A Manual for Writers*, chapters 15–17 (see the course electronic reserves under *Chicago Manual of Style).* The same principles of submission — electronic draft and hard-copy final version — will be followed.

At the end of the semester, you will also give a five-minute presentation of your research project in Power Point format, followed by five minutes of questions from the class. Due dates for each step of the research project are indicated below. The research paper and in-class presentation function together as the final project of the course.

Due Dates for Research Paper:

Research Topic	February 15
Research Paper Bibliography	March 3
Research Paper Outline	March 29
Complete Draft	April 7
Peer Review	April 14
Final Version	April 21
Project Presentations	April 21, 26, 28, May 3

Class Participation

Daily attendance is required and will be recorded each day. Your attendance and participation in class will be a significant factor in determining your final grade. The synergy of the course hinges upon your active engagement with your colleagues in exploring the fundamental ideas that we will be studying throughout the semester.

Classroom Guidelines

- Class will start promptly at the beginning of the University scheduled time for each section. Make every effort to be at your desk — ready to work — five minutes before class begins.
- Bring with you to class each day the printed texts of the assigned readings as specified on the daily schedule. Careful textual reading and informed discussion together in class will be essential to the internal dynamics of the course. The importance of this requirement cannot be overemphasized.
- Turn off all personal electronic devices — including cell phones and laptop computers — before the beginning of class. Refrain from eating and from reading non-related course materials during class.
- As class begins, have ready at hand your reflection paper on the assigned readings. For days on which there is a major writing project due, be prepared for a brief in-class written reflection on the readings.

Course Grading

Attendance and Class Participation 10%
Reflection Papers and Assigned Readings 25%
Response Papers 30%
Mission Statement 5%
Research Paper 25%
Research Project Presentation 5%

Plus and Minus Scale

95% A
90% A-
85% B+
80% B
75% B–
70% C+
65% C
60% C-

Review of Paper Submission Guidelines

All reflection papers are to be submitted in hardcopy format on the day they are due. All drafts of the major writing projects must be submitted electronically before class on the specified due date. Final versions of the mission statement, the three response papers, and the research paper must be in hardcopy, submitted together with a printed copy of the evaluated draft

The University guidelines for Advanced Composition require 20–30 pages of *revised* writing. Hence, all of the major writing assignments must be the complete number of pages — including both draft and final version — in order to fulfill the required University stipulations.

Academic Integrity

See http://www2.uiuc.edu/admin_manual/code/rule_33.html. Violations of the standards of academic integrity will result in appropriate disciplinary action.

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DAILY SCHEDULE

* = Readings available through the University of Illinois Electronic Reserves:
http://www.library.illinois.edu/ereserves/

Class #1 Tu 1/18 The Universe of the University
Course Overview, *Gilbane Gold*

VOLUME I
INTRODUCTION

Class #2 Th 1/20 Moral Theory: Concepts and Cases

Pritchard and Holtzapple, "Responsible Engineering: *Gilbane Gold* Revisited," 217–230
Grahm, "Palchinsky's Travels," 23–31
Fleming, "Engineers of Death," 19

Class #3 Tu 1/25 Work, Responsibility, and Human Personhood

Covey, *The Seven Habits of Highly Effective People: Restoring the Character Ethic*
"Inside-Out," 32–35; Habit 1: Principles of Personal Vision, 66–76, 78–80; and
Habit 2: Principles of Personal Leadership, 98–100, 103, 106, 109

Class #4 Th 1/27 Social Context and the Professions

Engineering Ethics, Chapter One, "Why Professional Ethics?," 1–21
Greenwood, "Attributes of a Profession," 67–77
Grose, "Danger Zone: What It Takes To Fix America's Crumbling Infrastructure," 28–32
[See also ASCE, "Report Card for America's Infrastructure," 2005, available online at
http://www.asce.org/reportcard/2005/index.cfm., as cited in Case #3, "Bridges,"
in *Engineering Ethics*, 236.]

Class #5 Tu 2/1 The Moral Responsibility of Engineers
Draft of Personal Mission Statement Due

Guest Speaker: Captain A. Shane Coats, Commandant of Cadets, ROTC Program, Department of Air Force Aerospace Studies, University of Illinois at Urbana-Champaign, relating personal experience in the use and employment of the CV–22 Osprey

Engineering Ethics, Chapter Two, "Responsibility in Engineering," 22–46

Alpern, "Moral Responsibility for Engineers," 187–95
Thompson, *The V-22: Time Investigation*, 36–37, 39–40, 42, 44

[* For further study of the V–22 case, see Gertler, "V–22 Osprey Tilt-Rotor Aircraft: Background and Issues for Congress," 1–26; plus Appendixes A, B, and C, 27–52.]

Class #6 Th 2/3 Class Member Introductions
The History of Engineering
Professional Codes of Ethics
Draft of Response Paper #1 Due

Dunwoody, et al., *Fundamental Competencies for Engineers*, 9–13, 25–26
Davis, "A History of Engineering in the United States," 18–30, 196–203
IEEE and NSPE Codes of Ethics

Class #7 Tu 2/8 Language and Communication Skills

Sullivan, *Fundamentals of Logic*, 3, 5, 6–13, 14–15
[* See the *Fundamentals of Logic* on electronic reserves for further discussion of the fundamental structure of language and the three essential functions of the intellect in human cognition — the concept (29–74), the proposition (75–110), and the act of reasoning (111–203).]
Zinsser, *On Writing Well*, Chapter 2: Simplicity, 7–13
* Williams, "The Grammar of Clarity" and "Cohesion, Coherence, Concision"

VOLUME II
NORMATIVE ETHICAL THEORIES

Class #8 Th 2/10 The Discipline of Philosophy:
Epistemology, Metaphysics, and Ethics
Ethical Theories: Teleological and Deontological Perspectives
Final Version of Response Paper #1 Due

Engineering Ethics, Chapter Three, "Framing the Problem," 47–70
* Tolkien, *Lord of the Rings*, 3, Part I, Book Two, "The Bridge of Khazad-Dum," 335–46, and "The Breaking of the Fellowship," 411–23

Class #9 Tu 2/15 Tools and Methods of Case Study Analysis
Research Topic Due

Engineering Ethics, Chapter Four, "Resolving Problems," 71–89
[* For guidance in formulating a research topic, see *The Craft of Research*, Part II, "Asking Questions, Finding Answers," Chapter Three: "From Topics to Questions," 35–50, and Chapter Four: "From Questions to a Problem," 51–67.]

Class #10 Th 2/17 The Scientific Method and the Tests of Truth
The Principles of *Contradiction* and *Causality*
Draft of Response Paper #2 Due

Sandage, "Cosmology," 321–34
Principle of *Contradiction*: Aristotle, *Metaphysics*, Book IV, 731–32; 735–38 [1003a–1012b]
Principle of *Causality*: Aristotle, *Posterior Analytics*, 110–11 [71a–72b];
and the *Metaphysics*, Book V, 752–53 [1012b–1013b]
Adler, *Aristotle*, 39–46

Class #11 Tu 2/22 Normative Ethical Naturalism
Aristotle, Darwin, and Nietzsche
Finding Sources, Engaging Sources

Aristotle, *Nicomachean Ethics*, Book I [1094–1103]
White, "Preface," and "The Pursuit of Happiness," xi–xii, 3–11

[A contemporary exposition of Aristotle's literary corpus can be found in Shields, *Aristotle* (London and New York: Routledge, 2007). For other perspectives on *Ethical Naturalism*, see Darwin, *The Descent of Man*; Nietzsche, *On the Genealogy of Morality*; and Spinoza, *Ethics*.]

[* For guidance in finding sources for your research paper, see *The Craft of Research*, Chapters 5–6: "From Problems to Sources," 68–83, and "Engaging Sources," 84–101.]

Class #12 Th 2/24 The Structure of Aristotelian Ethics
Final Version of Response Paper #2 Due

Aristotle, *Nicomachean Ethics*, Book II [1103–1109]
White, "The Pursuit of Happiness," 12–21, 307–16

Class #13 Tu 3/1 Normative Ethical Idealism
Plato, Kant, and Hegel

Kant, *Grounding for the Metaphysics of Morals*, "Preface" [387–92], "Transition from the Ordinary Rational Knowledge of Morality to the Philosophical" [393–405]
Paton, "The Good Will," 34–37, 44–45, "Duty," 46–55, 55–57

[A systematic introduction to Kant's literary corpus can be found in Guyer, *Kant* (London and New York: Routledge, 2006). For a modern retrieval and interpretation of Kant's work as applied to contemporary moral theory, see the work of Rawls as summarized in Freeman, *Rawls* (London and New York: Routledge, 2007); in particular, Chapter 7: "Kantian Constructivism," 284-323. For further study of other perspectives on *Ethical Idealism*, see Plato, *The Republic*; Hegel, *The Phenomenology of Spirit*; Schwartz, *The World of Thought in Ancient China*; Raju, *The Philosophical Traditions of India*; and Hackett, *Oriental Philosophy*.]

Class #14 Th 3/3 The Structure of Kantian Ethics

Annotated Research Bibliography Due

Kant, *Grounding for the Metaphysics of Morals*, "Transition from Popular Moral Philosophy to a Metaphysics of Morals" [406–45]; "Transition from a Metaphysics of Morals to a Critique of Pure Practical Reason" [446–47]

Paton, "The Maxim of Morality," 58–62, "The Law," 69–73

* *Chicago Manual of Style* citation format, outlined in Turabian, *A Manual for Writers*, Part II: "Source Citation." (Read carefully Chapter 15: "General Introduction to Citation Practices," 133–40, and Chapter 16: "Notes-Bibliography Style: The Basic Form," 141–59.

Chapter 17: "Notes–Bibliography Style: Citing Specific Types of Sources," 160–215, provides examples of proper citation as templates for the majority of sources you will encounter. All research paper references are to be cited in *Notes–Bibliography* format, not in *Parenthetical Citations–Reference List* format [discussed in Chapters 18 and 19 of Turabian, *A Manual for Writers*, 216–80].)

Class #15 Tu 3/8 Normative Ethical Theism
Augustine, Aquinas, and Luther

Aquinas, *Summa Theologiae*, Question #2 [5–17], #5 [61–81], #6 [83–93]
Genesis 1:1–31

[For other perspectives on *Ethical Theism*, see the *Talmud* and the *Koran*. For a recent study of the cosmological argument in the tradition of Aquinas and Leibniz, see O'Connor, *Theism and Ultimate Explanation: The Necessary Shape of Contingency* (Oxford: Blackwell, 2008).]

Class #16 Th 3/10 The Structure of Biblical Theism

Selected Texts of the Biblical Narrative [*Genesis* 2–*Revelation* 22]

VOLUME III
WINDOWS INTO APPLIED ETHICS

Class #17 Tu 3/15 The Engineer and Society

Bellah, et al., *Habits of the Heart*, "Preface," vii–viii
Alexis de Tocqueville, *Democracy in America*, 27–35, 39
Martin and Schinzinger, *"*Engineering as Social Experimentation,*"* 88–106

Class #18 Th 3/17 Technology and Society
Draft of Response Paper #3 Due

Engineering Ethics, Chapter 5, "The Social and Value Dimensions of Technology," 90–114

Gotterbarn, Miller, and Rogerson, "Software Engineering Code of Ethics," 102–7

[* See *The Craft of Research*, Part III: "Making a Claim and Supporting It," 105–70, for guidance in developing the argument structure of your research paper.]

Spring Vacation, University of Illinois at Urbana-Champaign, March 19–27

Class #19 Tu 3/29 Fiduciary Relationships and Conflict of Interest
Research Paper *Outline* Due

Guest Speaker: William L. Schaller, an established lawyer with Baker & McKenzie LLP in Chicago, discussing issues of trade secrets and fiduciary relationships. Textual focus: Schaller, "Trade Secret Inevitable Disclosure," *Journal of Patent and Trademark Office Society* (May–June 2004): 336–58; 411–29.

Engineering Ethics, Chapter 6, "Trust and Reliability," 115–34
Bayles, "Obligations between Clients and Professionals," 305–16

Class #20 Th 3/31 The Frontiers of Cyberspace
Final Version of Response Paper #3 Due
***Chicago Manual of Style* Citation Format**

Spinello, *CyberEthics: Morality and Law in Cyberspace*, 1–10, 29–52
[* For a brief survey of the history of the Internet, see Moschovitis, et al., *History of the Internet: A Chronology, 1843 to the Present*, 1–94. See also *cyberlaw.stanford.edu* and the current work of Lessig at *lessig.org*.]
* Principles of Effective Writing: Williams, "Sustaining the Longer Sentence," 79–105, 205–17

Class #21 Tu 4/5 The Engineer's Responsibility for Safety

Engineering Ethics, Chapter 7, "Risk and Liability in Engineering," 135–64
Petroski, *To Engineer Is Human*, "Preface," xi–xii, Chapter 1: "Being Human," 3–5, 9–10, and Chapter 8: "Accidents Waiting to Happen," 85–97
The Philadelphia Inquirer, June 14 and June 7, 1979 [See Petroski, *To Engineer is Human*, 3, for the reference to Auth's proposed solution in *The Philadelphia Inquirer* to the engineering problems that were occurring in 1979.]
Martin and Schinzinger, "Dimensions of Engineering," 16–20
"The Hyatt Decision: Two Opinions," 69–72

Class #22 Th 4/7 Employee–Employer Relations
Complete Draft of Research Paper Due

Engineering Ethics, Chapter 8, "Engineers in Organizations," 165–90; 266–67 ["Pinto" Case]
De George, "Ethical Responsibilities of Engineers in Large Organizations," 175–86
James, "Whistle-Blowing: Its Moral Justification," 263–78

Class #23 Tu 4/12 The *Challenger* and *Columbia* Case

Engineering Ethics, Chapter 7:155–56; Chapter 8:183–88
Bell and Esch, "The Fatal Flaw in Flight 51-L," 36–51
Boisjoly, "… Moral Responsibility and the Working Engineer," 6–14
The CAIB Report: Columbia Accident Investigation Board, "History as Cause: *Columbia* and *Challenger*," 195–204 [For the full text of the report, see www.caib.us.]

Class #24 Th 4/14 Engineers and the Environment
Peer Review of Research Papers

Engineering Ethics, Chapter 9, "Engineers and the Environment," 191–210
* Principles of Effective Writing: "Emphasis, Elegance, Economy"

Class #25 Tu 4/19 Choosing a Vocation
Obligations of the Profession

Fleddermann, "Doing the Right Thing," 112–14
Meese, "The Sealed Beam Case: Engineering in the Public and Private Interest," 1–20
Martin and Schinzinger, "Saving Citicorp Tower," 12–14
Morgenstern, "The Fifty-Nine Story Crisis," 45–53

Class #26 Th 4/21 Final Version of Research Paper Due
Research Project Presentations

Class #27 Tu 4/26 Research Project Presentations

Class #28 Th 4/28 Research Project Presentations
Final Version of Personal Mission Statement Due

Class #29 Tu 5/3 Research Project Presentations

Class #30 Final class session of course summary and evaluation to be held during the scheduled final examination time for the University of Illinois, Urbana-Champaign, Spring Semester, 2011

Section E3: Friday, May 6, 2:00–3:20 p.m.
Section E4: Friday, May 13, 7:00–8:20 p.m.

(Example Assignment)

Reflection on the Assigned Readings for February 3, 2011

Davis, "A History of Engineering in the United States," 18–30, 96–203,
and Dunwoody, et al., *Fundamental Competencies for Engineers*, 9–13, 25–26,
in conjunction with the IEEE and NSPE Codes of Ethics.

Question #1

The reading by Davis provides "A History of Engineering in the United States," tracing its roots from 1776 to the end of the nineteenth century. Davis concludes his essay with a brief section on "Ethics and the Profession of Engineering." Reflect on why you think there was a distinct focus on the writing of professional codes of ethics in the field of engineering in the twentieth century. Integrate your answer with your reflections on the list of engineering achievements in the twentieth century, cited in the text by Dunwoody, *Fundamental Competencies in Engineering*. How did the development of technology in the twentieth century lead to the formation of a technological substructure that now undergirds all of modern society, and how is the ongoing sustainability of the technological infrastructure of our society permeated by questions of ethics?

Question #2

Reflect on the structure and substance of the IEEE and NSPE codes of ethics. How would you respond to the claim that "if a person is really honest and responsible, then he does not need a code of ethics and if he needs one then it will not do him any good" (John Ladd, "Collective and Individual Responsibility in Engineering: Some Questions," *IEEE Technology and Society Magazine* [June 1982]:3). What is your interpretation of the meaning and significance of professional codes of ethics?