

BEN 602 / CEN 602

**ETHICAL ISSUES IN
ENGINEERING AND RESEARCH**

Fall 2015

Instructor: Prof. Dana Radcliffe
Office: CST 4-206L
Telephone: 729-9195
Office hours: MW 9:45 – 12:15 and by appointment
Email: dradclif@syr.edu

Every day, the world becomes more dependent on advances in science and technology. Almost every field of human endeavor—from personal communications to medicine to national defense—is constantly being reshaped by the results of scientific research and technological innovation. Indeed, our future welfare will be determined in large part by developments in science and technology and our ability to harness them for useful purposes. Given our increasing reliance on the efforts of scientists and engineers, it is essential that they conduct their work responsibly, taking care not to violate the trust society has placed in them but to adhere faithfully to the norms of their professions. Unethical behavior by scientists and engineers poses serious risks to those individuals, their research programs, their organizations, and other stakeholders.

Consequently, it is crucial that students preparing for careers in science and engineering acquire a firm understanding of their fields' professional standards and the ability to guide their judgments and actions by those norms. Like ethical decision-making itself, this educational task is far from easy. In a particular case, for example, it may not be obvious what the ethical issues are, or it may be hard to see which professional obligations apply, or different obligations may conflict.

This course is designed to address the challenge arising from the facts (i) that society depends on scientists and engineers to act ethically, maintaining their own integrity and that of their professions, *and* (ii) that making ethically sound decisions, especially in complex situations, can be very difficult. The readings will provide pertinent background material on the sorts of ethical issues students will face in their careers and the professional norms to be applied in resolving those issues. Considerable time will be devoted to class discussion of cases, as students will be expected to engage in thoughtful dialogue about problematic choice situations, offering their own suggestions and responding constructively to those of others in the class.

In general, the main goals of this course are to enable students to appreciate the critical importance of ethical conduct in their professions, recognize ethical issues when they occur, and make ethically sound decisions in dealing with those issues. Ancillary to these aims, the class seeks to help students cultivate attitudes and personal attributes that

contribute to professional integrity, a basic requirement for responsible conduct in engineering and scientific research.

Texts:

- National Academy of Science, National Academy of Engineering, and the Institute of Medicine, *On Being a Scientist: A Guide to Responsible Conduct in Research*, 3rd ed. (National Academies Press, 2009). (Available at Schine bookstore.)
- Adil E. Shamoo and David B. Resnik, *Responsible Conduct of Research*, 2nd ed. (Oxford University Press, 2009). (Available at Schine bookstore.)
- A course reader. (Available at Schine bookstore.)
- Periodical articles on Blackboard, in the “Assignments” folder.

Grading:

- Five case write-ups (2 pgs.) 35%
- A final-project case analysis (5 pgs.) 30%
- Six discussion memos (1 pg.) 25%
- Class participation 10%

This course is offered for variable credits. Students taking it for 1 or 2 credits are required to attend the 9 weeks of the course devoted to the Responsible Conduct of Research, take part in class discussion, and do four case-write ups. Students taking it for 2 credits are also required to do the final-project case analysis.

Accordingly, for 2 credits, the grade is based on:

- Four case write-ups (2 pgs.) 55%
- A final-project case analysis (5 pgs.) 35%
- Class participation 10%

For 1 credit, the grade is based on:

- Four case write-ups (2 pgs.) 90%
- Class participation 10%

Case write-ups: These will be analyses of assigned ethical-problem cases. Except for the first one, these assignments will be done in two parts: (a) An initial reaction to a case, to be handed in at the beginning of the class session in which we discuss that case, and (b) a reflective analysis of the case, in light of class discussion, to be handed in at a subsequent class session. An explanation of this general approach is given in one of the readings for September 24, Bebeau’s “Developing a Well-Reasoned Response to a Moral Problem in Scientific Research.”

Final-project case analysis: This assignment will resemble the analysis done in the case write-ups but be more detailed. The student can write a rough draft of the paper, meet with the instructor to discuss that draft, make revisions taking into account the

instructor's comments, and submit the final draft through Turnitin by 5:00 pm on Wednesday, December 16 (Talk to the instructor if you wish to submit a rough draft.) The student will select the topic for the case analysis.

Discussion memos: These will be one-page reflections on questions or issues raised by some of the assigned readings and taken up in class. Seven memos will be assigned, but this portion of the final grade will be based on the best six submissions.

The writing assignments will be both (i) submitted in hard copy at class on the due date and (ii) submitted through Turnitin on Blackboard, also on the due date and time. You will be able to use Turnitin's "Generate Originality Report" prior to submitting the final version of each assignment. The similarity score should be zero, apart from quotes or references. REMEMBER: PLAGIARISM IS A VIOLATION OF THE UNIVERSITY'S ACADEMIC INTEGRITY POLICY. ALL WORK YOU TURN IN MUST EITHER BE YOUR OWN WORDS OR PLACED IN QUOTES AND THE SOURCES CITED.

Class participation: Each student is expected to do the assigned reading and take an active part in class discussion. At the end of the semester, the instructor will assess the level and quality of each student's contribution to class discussion, assigning a grade for class participation. Attendance, which will be taken at each class session, will be factored into the calculation of this portion of the final grade.

The grading scale used in this course is as follows: A = 94 – 100; A- = 90 – 93; B+ = 87 – 89; B = 84 – 86; B- = 80 – 83; C+ = 77 – 79; C = 74 – 76; C- = 70 – 73; D = 65 – 69; F = below 65.

Assignment Schedule:

Wed., Sept. 2	Memo 1 assigned
Wed., Sept. 9	Memo 1 DUE
	Memo 2 assigned
Mon., Sept. 14	Memo 2 DUE
Wed., Sept. 16	Memo 3 assigned
Mon., Sept. 21	Memo 3 DUE
Wed., Sept. 23	Case Write-up 1 assigned
Wed., Sept. 30	Case Write-up 1 DUE
	Memo 4 assigned
Mon., Oct. 5	Memo 4 DUE (12:15 pm)
	Case Write-up 2 assigned
Wed., Oct. 7	Case Write-up 2(a) DUE
Mon., Oct. 12	Case Write-up 2(b) DUE
Wed., Oct. 14	Case Write-up 3 assigned
Mon., Oct. 19	Case Write-up 3(a) DUE
Wed., Oct. 21	Final Project assigned

Mon., Oct. 26	Case Write-up 3(b) DUE Memo 5 assigned
Wed., Oct. 28	Case Write-up 4 assigned
Mon., Nov. 2	Case Write-up 4(a) DUE
Wed., Nov. 4	Memo 5 DUE (12:15 pm)
Mon., Nov. 9	Case Write-up 4(b) DUE
Wed., Nov. 11	Case Write-up 5 assigned Memo 6 assigned
Mon., Nov. 16	Case Write-up 5(a) DUE
Wed., Nov. 18	Memo 6 DUE
Mon., Nov. 30	Case Write-up 5(b) DUE
Wed., Dec. 2	Memo 7 assigned
Wed., Dec. 9	Memo 7 DUE
Wed., Dec. 16	Final Project DUE (5:00 pm)

University Policies

***Academic Integrity:* Each student in this course is expected to abide by the Syracuse University Code of Academic Integrity: (<http://academicintegrity.syr.edu>). Any work submitted by a student in this course for academic credit must be the student's own work. Sources quoted or paraphrased in written assignments must be properly cited, either in footnotes or in the text.**

Students with Disabilities: Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor. Accommodations, such as exam administration, are not provided retroactively; therefore, planning for accommodations as early as possible is necessary. For further information, see the ODS website, <http://disabilityservices.syr.edu/>.

Religious observances: SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

Schedule of Topics and Readings

- Mon., Aug. 31 **Course Introduction**
- Wed., Sept. 2 **Ethical Decision Making**
 - Dana Radcliffe, "Training Ethical Decision Makers," *Cornell Human Resources Review*, September 8, 2011. [Blackboard: Reading (1)]
 - Messick and Bazerman, "Ethical Leadership and the Psychology of Decision Making," *Sloan Management Review* (1996) 37: 9-22. [Blackboard: Reading (2)]
 - Dana Radcliffe, "A Drug-Maker's Ethical 'Mistakes,'" *Huffington Post*, August 6, 2012. [Blackboard: Reading (3)]
- Mon., Sept. 7 NO CLASS (Labor Day)
- Wed., Sept. 9 **Introduction to Engineering Ethics**
 - S. Nichols and W. Weldon, "Professional Responsibility: The Role of the Engineer in Society," *Science and Engineering Ethics* (1997) 3: 327-337. [Blackboard: Reading (4)]
 - S. Unger, "Examples of Real World Engineering Ethics Problems," *Science and Engineering Ethics* (2000) 6: 423-430. [Blackboard: Reading (5)]
- Mon., Sept. 14 **Engineering Codes of Ethics**
 - *NSPE Code of Ethics*. [Blackboard: Reading (6)]
 - *AICHE Code of Ethics*. [Blackboard: Reading (7)]
 - *BMES Code of Ethics*. [Blackboard: Reading (8)]
- Wed., Sept. 16 **The Role of Codes of Ethics in Engineering**
 - Departments of Philosophy and Mechanical Engineering, Texas A&M University, "The Space Shuttle Challenger Disaster." [Blackboard: Reading (9)]
 - M. Davis, "Thinking Like an Engineer: The Place of a Code of Ethics in the Practice of a Profession," *Philosophy & Public Affairs* (1991) 20, no. 2: 150-167. [Blackboard: Reading (10)]
- Mon., Sept. 21 **Engineering and Moral Character**
 - P. Vesilind, "The Good Engineer," *Science and Engineering Ethics* (1999) 5: 437-442. [Blackboard: Reading (11)]
 - M. Pritchard, "Responsible Engineering: The Importance of Character and Imagination," *Science and Engineering Ethics* (2001) 7: 391-402. [Blackboard: Reading (12)]

- Wed., Sept. 23 **Risk and Responsible Engineering**
 - M. Martin and R. Schinzinger, "Engineering as Social Experimentation," Chapter 4 of *Introduction to Engineering Ethics*, 2nd ed., McGraw-Hill, 2010, pp. 77-104. [Course Reader]
 - A. Ross and Nafsika Thanassoulis, "The Social Nature of Engineering and its Implications for Risk Taking (2010) 16: 147-168. [Blackboard: Reading (13)]
- Mon., Sept. 28 **Responsible Engineering in Lesser-Developed Nations**
 - E. Schlossberger, "The Responsibility of Engineers, Appropriate Technology, and Lesser Developed Nations," *Science and Engineering Ethics* (1997) 3: 317-326. [Blackboard: Reading (14)]
 - Harris, "Engineering Responsibilities in Lesser-Developed Nations," *Science and Engineering Ethics* (4): 321-331. [Blackboard: Reading (15)]
- Wed., Sept. 30 **Introduction to Research Ethics**
 - *On Being a Scientist*, pp. 1-3, 48-49.
 - *Responsible Conduct of Research*, pp. 3-13, 26-29, 348-354.
 - M. Bebeau, "Developing a Well-Reasoned Response to a Moral Problem in Scientific Research." [Blackboard: Reading (16)]
- Mon., Oct. 5 **Data Acquisition and Management (I)**
 - *On Being a Scientist*, pp. 8-14, 28.
 - *Responsible Conduct of Research*, pp. 39-67.
- Wed., Oct. 7 **Data Acquisition and Management (II)**
- Mon., Oct. 12 **Mentoring and Collaboration**
 - *On Being a Scientist*, pp. 4-7.
 - *Responsible Conduct of Research*, pp. 68-80.
- Wed., Oct. 14 **Collaboration between Academia and Industry**
 - *Responsible Conduct of Research*, pp. 81-97.
- Mon., Oct. 19 **Authorship**
 - *On Being a Scientist*, pp. 35-38.
 - *Responsible Conduct of Research*, pp. 98-109.
 - J. Borenstein, "Responsible Authorship in Engineering Fields: An Overview of Current Ethical Challenges," *Science and Engineering Ethics* (2011) 17: 355-364. [Blackboard: Reading (17)]
- Wed., Oct. 21 **Publication and Peer Review (I)**

- *On Being a Scientist*, pp. 29-34.
 - *Responsible Conduct of Research*, pp. 110-139.
- Mon., Oct. 26 **Publication and Peer Review (II)**
- Wed., Oct. 28 **Misconduct in Research (I)**
 - *Responsible Conduct of Research*, pp. 140-166.
 - *On Being a Scientist*, pp. 15-23.
- Mon., Nov. 2 **Misconduct in Research (II)**
 - L. Sims, “‘Sherry’s Secret’: Case Study and Commentary on Research Ethics,” *Science and Engineering Ethics* 2001) 7: 147-150. [Blackboard: Reading (18)]
 - D. Johnson, “Commentary on ‘Sherry’s Secret’,” *Science and Engineering Ethics* (2001) 7: 151-152. [Blackboard: Reading (19)]
- Wed., Nov. 4 **Intellectual Property (I)**
 - *On Being a Scientist*, pp. 39-41.
 - *Responsible Conduct of Research*, pp. 167-188.
- Mon., Nov. 9 **Intellectual Property (II)**
- Wed., Nov. 11 **Conflicts of Interest and Scientific Objectivity (I)**
 - *On Being a Scientist*, pp. 43-47.
 - *Responsible Conduct of Research*, pp. 189-214.
- Mon., Nov. 16 **Conflicts of Interest and Scientific Objectivity (II)**
- Wed., Nov. 18 **The Use of Animals in Research**
 - *On Being a Scientist*, pp. 24-27.
 - *Responsible Conduct of Research*, pp. 215-235.
- Mon., Nov. 23 NO CLASS (Thanksgiving Break)
- Wed., Nov. 25 NO CLASS (Thanksgiving Break)
- Mon., Nov. 30 **The Protection of Human Subjects in Research**
 - *On Being a Scientist*, pp. 24-27.
 - *Responsible Conduct of Research*, pp. 236-264.
- Wed., Dec. 2 **Protecting Vulnerable Human Subjects in Research**
 - *Responsible Conduct of Research*, pp. 265-288.
- Mon., Dec. 7 **Genetics, Cloning, and Stem Cell Research**
 - *Responsible Conduct of Research*, pp. 289-322.

Wed., Dec. 9

International Research

- *Responsible Conduct of Research*, pp. 323-347.