Ethics for Engineers 1st edition Peterson Test Bank

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Instructor's Manual

Howdy!

The aim of the Instructor's Manual and Test Bank is to provide you, the instructor, with information and resources that will help you guide your students through *Ethics for Engineers*. For each of the sixteen chapters, we have prepared a PowerPoint presentation, a chapter summary, twenty multiple-choice questions, some essay questions, as well as links to a couple of relevant Internet resources.

Most of the material in this manual was prepared by my assistant, Mr. Robert Reed. I am very grateful for his efforts and I am extremely pleased with the result. I have made some minor changes here and there, so if you find any inaccuracies, they are most likely mine. Feel free to send me an email if you have any questions or suggestions. I usually respond within two to three days. My address is martinpeterson@tamu.edu

With best wishes,

Martin Peterson

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Features of the Instructor's Manual and Test Bank

- Two sample syllabi
- Summaries of the main themes and lines of argument of each chapter
- Test bank contains:
  - Essay questions for each chapter
  - Multiple-choice questions for each chapter
- Links to relevant websites for each chapter
- Key terms for each chapter
- Case studies for each chapter

Support Materials for *Ethics for Engineers*

Along with the *Instructor's Manual and Test Bank*, Oxford University Press offers a **companion website** that includes:

- An **Instructor Resources** section that contains all the materials in the *Instructor's Manual and Test Bank* and lecture outlines in PowerPoint format.
- A **Student Resources** section that contains chapter summaries, key terms, weblinks, case study questions, and self-quizzes with multiple-choice questions on each chapter of the book so that students may check their basic understanding of the key points.

Please visit the Oxford Higher Education website for more information.

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About *Ethics for Engineers*

Ethics for Engineers provides in-depth coverage of major ethical theories, professional codes of ethics, and case studies in a single volume. Incorporating numerous practical examples and about 100 review questions, it helps students better understand and address ethical issues that they may face in their future careers. Topics covered include whistle-blowing, the problem of many hands, gifts, bribes, conflicts of interest, engineering and environmental ethics, privacy and computer ethics, ethical technology assessment, and the ethics of cost–benefit analysis and risk and uncertainty.

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Sample Syllabus A (Version That Covers Ethical Theories)

COURSE DESCRIPTION

This course in engineering ethics provides in-depth coverage of major ethical theories, professional codes of ethics, and case studies. Topics covered include whistle-blowing, the problem of many hands, gifts, bribes, conflicts of interest, engineering and environmental ethics, privacy and computer ethics, ethical technology assessment, and the ethics of cost–benefit analysis and risk and uncertainty.

LEARNING OUTCOMES AND MAJOR OBJECTIVES

As a result of meeting the requirements in this course, students will:

- Be able to identify, analyze, and reflect on ethical problems in engineering.
- Develop a basic understanding of ethical theories and how they inform common engineering practices.
- Be familiar with some of the classic case studies in engineering ethics and some of the typical ethical and professional issues which arise in engineering.
- Know the NSPE code of ethics and the code of at least one other major professional society or organization in engineering.

To achieve these outcomes and objectives, students are encouraged to participate actively in class discussions. Students are required to do a substantial amount of writing in response to the material presented in the course.

PREREQUISITES: Junior classification

REQUIRED TEXT: Peterson, M. (2020). *Ethics for Engineers*. New York: Oxford University Press.

ATTENDANCE AND PARTICIPATION

[State your attendance policy.]

A NOTE ON E-MAIL COMMUNICATION

As preparation for writing effectively in their careers, students are expected to communicate professionally with instructors and teaching assistants using email. Professional style includes an appropriate salutation and closing and reasonable care in the construction of the message.

GRADED COMPONENTS

Exams

There will be two exams. They may include multiple-choice, short answer, and essay questions. Exams are cumulative.

In-Class Presentation

Students will work in groups of [*n* students] on an in-class presentation about one of the case studies covered in the textbook. Students are encouraged to actively search for additional material about each case in the library and online. Presentations must include visual aids such as PowerPoint. Students

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are expected to prepare their presentations outside class. Each student in the group must give part of the presentation in class. More detailed instructions will be provided during the semester.

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Students will be asked to write [2, 3, or 4] short papers on a topic assigned by the instructor. Each short paper, which should be about 1,500 words long, is worth [×%] of the course grade. Students can revise each short paper. The maximum score that a revision can earn is 20 points above the grade given the initial submission.

GRADED COMPONENTS

Participation	10%
Presentation	10%
First Exam	20%
Second Exam	20%
Short Paper 1	20%
Short Paper 2	20%

GRADING

A	90% - 100%
B	80% - <90%
C	70% - <80%
D	60% - <70%
F	<60%

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THE SEMESTER AT A GLANCE

[This schedule is based on the assumption that the class meets twice weekly for about 75 min.]

	Class	Read	Additional Homework
Week 1	1. Introduction 2. Professional Codes of Ethics	Chapter 1 Chapter 2	Read "The Fifty-Nine Story Crisis" by Joe Morgenstern
Week 2	1. The Challenger and Columbia Cases 2. The History of Engineering	Chapter 2 Chapter 3	Watch: https://www.youtube.com/watch?v=-O_DMyHdq_M
Week 3	1. The Methods of Applied Ethics 2. Utilitarianism and Egoism	Chapter 4 Chapter 5	Watch: https://www.youtube.com/watch?v=bRPE0IImxzs
Week 4	1. Kantian Ethics 2. Virtue Ethics 3. Rights	Chapter 6	Read: https://plato.stanford.edu/entries/kant-moral/ Take a look at: https://www.buildchange.org/about/staff/elizabeth-hausler/
Week 5	1. Exam 1 2. Whistle-Blowing	Chapter 7	Prepare for exam Watch: https://www.youtube.com/watch?v=YQ04V8IjwAQ
Week 6	1. Conflicts of Interests 2. Group Presentation	Chapter 8	Watch: https://www.youtube.com/watch?v=e8_2AI99JUA
Week 7	1. Cost–Benefit Analysis 2. Group Presentations	Chapter 9	First paper due Read: https://www.autosafety.org/wp-content/uploads/import/phpq3mJ7F_FordMemo.pdf Watch: https://www.youtube.com/watch?v=-_gU50mfehI
Week 8	1. Risk and Uncertainty 2. Group Presentations	Chapter 10	Read: http://science.sciencemag.org/content/236/4799/280
Week 9	1. Privacy 2. Group Presentations	Chapter 11	Take a look at: http://faculty.uml.edu/sgallagher/Brandeisprivacy.htm
Week 10	1. The Concept of Responsibility 2. Group Presentations	Chapter 12	Watch: https://www.youtube.com/watch?v=98l3Us8IU-I\

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Week 11	1. Technology Assessment 2. Group Presentations	Chapter 13	Browse: http://www.princeton.edu/~ota/
Week 12	1. Optimism versus Pessimism 2. Group Presentations	Chapter 14	Watch: https://www.youtube.com/watch?v=m64X1hMCJoE
Week 13	1. The Ethics of Artifacts 2. Group Presentations	Chapter 15	Second paper due
Week 14	1. Sustainability and Engineering 2. Group Presentations	Chapter 16	Browse: https://www.sustain.ucla.edu/about-us/what-is-sustainability/
Week 15	Exam 2		Prepare for exam

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Sample Syllabus B (Emphasis on Case Studies)

COURSE DESCRIPTION

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Week 2	1. The Challenger and Columbia Cases	Chapter 2	Watch: https://www.youtube.com/watch?v=-O_DMyHdq_M
Week 3	1. The Ford Pinto Case 2. Cost–Benefit Analysis	(Chapter 5) Chapter 9	Read: https://www.autosafety.org/wp-content/uploads/import/phpq3mJ7F_FordMemo.pdf Watch: https://www.youtube.com/watch?v=-_gU50mfehI
Week 4	1. Engineers without Borders 2. Build Change	Chapter 2 (Chapter 6)	Read: https://plato.stanford.edu/entries/kant-moral/ Take a look at: https://www.buildchange.org/about/staff/elizabeth-hausler/
Week 5	1. Exam 1 2. Whistle-Blowing	Chapter 7	Prepare for exam Watch: https://www.youtube.com/watch?v=YQ04V8IjwAQ
Week 6	1. Conflicts of Interests 2. Group Presentation	Chapter 8	Watch: https://www.youtube.com/watch?v=e8_2AI99JUA
Week 7	1. The History of Engineering, Prior to 1700 1. The History of Engineering, 1700–	Chapter 3	First paper due
Week 8	1. Risk and Uncertainty 2. Group Presentations	Chapter 10	Read: http://science.sciencemag.org/content/236/4799/280
Week 9	1. Privacy 2. Group Presentations	Chapter 11	Take a look at: http://faculty.uml.edu/sgallagher/Brandeisprivacy.htm
Week 10	1. The Concept of Responsibility 2. Group Presentations	Chapter 12	Watch: https://www.youtube.com/watch?v=98l3Us8IU-I\
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Week 12	1. Optimism versus Pessimism 2. Group Presentations	Chapter 14	Watch: https://www.youtube.com/watch?v=m64X1hMCJoE
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Week 15	Exam 2		Prepare for exam

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Chapter 1: Introduction

Summary

The subject matter of engineering ethics primarily concerns questions about professional obligations engineers have in virtue of being engineers. In the United States, the practice of engineering is regulated at the state level. Each state has its own licensure board, and the licensure requirements vary somewhat from state to state. Licensed engineers have the right to use the title "professional engineer" (PE). Only licensed engineers are authorized to offer engineering services to the public and to sign and seal construction plans and other key documents.

Questions about what engineers "may," "must," or "ought" to do have legal as well as ethical dimensions, but legal and ethical norms do not always overlap each other. Some actions are ethically wrong but legally permitted. According to natural law theory, morality determines what is, or should be, legally permissible and impermissible. Legal positivists believe that law and morality are entirely distinct domains, meaning that we cannot infer *anything* about what is, or should be, legally permitted from claims about what is morally right or wrong.

In the 1960s and 1970s, a series of engineering disasters triggered fundamental concerns about the value of engineering and technological development. Technological pessimists question the value of technological progress; technological optimists point out that while it is true that some technological processes are hard to control and predict and sometimes lead to unwanted consequences, the world would have been much worse without many of the technological innovations of the past century. The legal term "negligence" can be defined as "a failure to exercise the care and skill that is ordinarily exercised by other members of the engineering profession in performing professional engineering services under similar circumstances." (Dal Pino, J. "Do you know the standard of care?", Council of American Structural Engineers, 2014, p. 4.) Engineers who fail to meet this standard of care violate the law and typically act unethically.

Learning Objectives

After studying this chapter, students should:

- Be familiar with how the engineering profession is regulated.
- Be familiar with the main ideas of technological optimism and technological pessimism.
- Understand the distinction between macroethics and microethics and the implications for engineers.
- Be familiar with the distinction between moral and legal codes and how they bear on professional conduct.

Essay Questions

1. William LeMessurier lied to the public about the Citicorp building. Did the extreme circumstances excuse his lie?
2. How do moral norms differ from legal ones, and can it ever be morally permissible to break the law?
3. What is the difference, if any, between science and engineering?

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*4. Should all engineers be licensed?
*5. Technological optimism versus pessimism: Which position is most plausible?

Multiple-Choice Questions

1. When LeMessurier realized in the summer of 1978 that the Citicorp tower could collapse in a moderate storm, he knew he had to act fast. Which of the following actions did LeMessurier take?
a) He informed the building's owner about the problem, contacted the City of New York, hired a team of weather forecasters to monitor the weather 24/7, and sent out a prerelease that correctly described the problem caused by strong winds.
b) He informed the building's owner about the problem, hired a team of weather forecasters to monitor the weather 24/7, and sent out a prerelease that correctly described the problem caused by strong winds.
*c) He informed the building's owner about the problem, contacted the City of New York, and hired a team of weather forecasters to monitor the weather 24/7.
d) He informed the building's owner about the problem, contacted the City of New York, hired a team of weather forecasters to monitor the weather 24/7, and wrote a letter to the National Society for Professional Engineers.

*2. What was the problem with the Citicorp building in New York designed by William LeMessurier?
a) The unusual glass facade of the tower made the tower vulnerable to perpendicular winds.
b) The unusual glass facade of the tower made the tower vulnerable to quartering winds.
*c) The unusual location of the load-bearing columns made the tower to quartering winds.
d) The unusual location of the load-bearing columns made the tower vulnerable to perpendicular winds.

3. The design flaw in the Citicorp building was first discovered by
a) LeMessurier while double-checking his calculations.
*b) an undergraduate engineering major who called LeMessurier's office.
c) the code enforcement arm of the City of New York.
d) None of the above

*4. What changes had the builders made to LeMessurier's design?
a) They moved the load-bearing columns away from corner of building.
b) They increased the amount of glass in the building.
c) They changed the number of load-bearing columns.
*d) None of the above

5. Why might the winds of a 16-year storm have the power to topple the Citicorp building?
a) There were two few columns.
b) Flooding might undermine the columns.
*c) A loss of power would disable the mass damper.
d) None of the above

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*6. Upon discovering the danger of a collapse, LeMessurier first
a) informed the building's owners.
b) informed the City of New York.
*c) developed a plan to fix the problem.
d) informed FEMA.

7. As Hurricane Ella approached New York with winds that would topple the building, LeMessurier
a) ordered an evacuation.
b) told the truth to the public about the danger.
c) contemplated suicide
*d) None of the above

*8. LeMessurier told the truth about the building's situation to
a) only those workers fixing the problem.
b) only the employees working in the building itself.
c) the media.
*d) None of the above.

9. The workers who repaired the design flaw in the building
a) worked with nondisclosure agreements barring them from talking to the press.
b) were chosen because they did not speak English.
c) were disguised every day when brought into the building.
*d) worked only at night.

*10. LeMessurier put out a press release about the repairs that, among other things, stated what?
a) The risk of collapse is quite low.
b) Only a 55-year hurricane could topple the building.
*c) There is no danger.
d) None of the above

11. The public only became aware of the full story when
a) LeMessurier put out another press release upon the completion of repairs.
*b) *The New Yorker* ran a story about it 17 years later.
c) a city council meeting the following year.
d) None of the above.

*12. LeMessurier's claim in the press release
*a) was an outright lie.
b) was illegal.
c) resulted in the loss of his license.
d) All of the above

13. The NSPE code of ethics holds that engineers shall "issue public statements only in an objective and truthful manner." Why might LeMessurier's actions be ethically acceptable anyway?

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a) The NSPE has exceptions for when one's professional reputation is in danger through someone else's mistake.
*b) The NSPE code also prioritizes public safety and the press release prevented a panic.
c) These are guidelines, LeMessurier had no proper duty to the public.
d) None of the above

*14. The main lesson of the LeMessurier case is that
a) the NSPE should be ignored.
b) one should always do whatever maximizes the consequences in the situation.
c) the NSPE should be followed to the letter of the law in all situations.
*d) None of the above

15. Both scientists and engineers must master mathematics and science; the difference is that engineering
a) is much easier than scientific research.
b) comes under ethical constraints; scientific research does not.
*c) is about making the subject matter of science useful.
d) None of the above

*16. In the United States, the regulations for engineers
a) come from the NSPE.
b) are developed by professional organizations.
*c) are mandated at the state level.
d) None of the above

17. Engineers who work for the US government
a) make regulations for the rest of the engineers.
*b) are exempted from being licensed engineers.
c) are subject to more strict licensing standards.
d) None of the above

*18. All of the following are ways to practice engineering without being licensed except
a) practice engineering in the United Kingdom, Germany, or Sweden.
b) obtain an industry exemption.
c) work for the US government.
*d) None of the above.

19. Microethics concerns
*a) an individual's act.
b) microeconomics.
c) scientific research standards.
d) None of the above

*20. According to legal positivism,
a) morality and the law cannot be treated as separate domains.
b) we can infer what should be legal by what is moral.

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c) laws are never morally neutral conventions.
*d) None of the above

Weblinks

The Ethics Center for Science and Engineering: https://www.onlineethics.org/
Morgenstern's article on the Citicorp Crisis in 1995: https://www.newyorker.com/magazine/1995/05/29/the-fifty-nine-story-crisis
William LeMessurier on the Citicorp Crisis in 1995: https://www.youtube.com/watch?v=um-7IlAdAtg
Stanford Encyclopedia of Philosophy: http://plato.stanford.edu/
Internet Encyclopedia of Philosophy: http://www.iep.utm.edu/

Key Terms

Ethics—Moral principles, values, virtues or other considerations that govern our behavior toward other persons or morally relevant entities.

Legal positivism—The view that law and morality are entirely distinct entities. Laws are social constructions, and we cannot infer anything about what is, or should be, legally permitted from claims about what is morally right or wrong.

Macroethics—The investigation of moral issues related to largescale societal problems, such as global warming.

Microethics—The investigation of moral issues that concern the behavior of individuals or small groups of people. Example: moral issues related to conflicts on interests in one's workplace.

Morals—Ethical principles, values, virtues or other considerations that govern our behavior toward other persons or ethically relevant entities.

Natural law theory—The view that moral concerns determine what is, or should be, legally permissible or impermissible.

Technological optimism—The view that technological progress has mostly improved our living conditions and that further technological advancements would make us even better off.

Technological pessimism—The view that technological progress has no or little value and that we are therefore no better off that we would have been without modern technology.

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