

# SCIENCE, TECHNOLOGY & HUMAN VALUES

Philosophy of Science & Technology (PST) 3127  
Fall 2009, Monday, Wednesday, Friday 10:05 to 10:55  
Lecture: Institute of Paper Science and Technology Room 109  
Discussion Sections: Time and classroom varies, see OSCAR for details

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## Catalog Description:

Exploration of the boundaries between science, religion, and social values, examining science and technology in a broader social context. Examines claims that science is isolated from social problems and values.

## Expanded Description:

We live in an increasingly science and technology-driven world and, by necessity, make scientific and technological decisions every day. When you choose what to eat or buy today or how to vote in local or national elections, you are making, in part, scientific and technological decisions. In the future, you may be involved in scientific and technological decision-making on a larger scale, perhaps influencing purchasing at a large corporation or helping develop or design new products.

Scientific and technological concerns often drive these decisions, but rarely will they tell the whole story. In this course we will explore how a range of other factors, ranging from ethical considerations to large-scale financial or political forces to the preferences or biases of a single individual, influence scientific and technological development. In addition, we will also examine how scientific and technological decisions may incorporate, either deliberately or by chance, specific values into the very structure of our modern world.

This course is designed to help you think about how and when science and technology are influenced by social concerns and, conversely, how science and technology influence society. To do this, we will take a multidisciplinary approach to the study of the scientific and technological enterprise as a whole as well as a variety of individual technologies. Specifically we will draw on insights from philosophy (primarily through the use of various ethical theories to frame our thinking), sociology, history, and public policy, among other disciplines.

When you finish this course, you should be able:

- Identify social factors that influence the development of science and technology
- Assess the impact of these factors on various technologies
- Think systematically about the direct and indirect impacts of scientific and technological decision-making
- Analyze scientific and technological decisions using a variety of ethical frameworks

## Course Format:

We meet for three fifty-minute periods each week. Most weeks we will meet as a class Monday and Wednesday and have smaller discussion sections on Friday. Discussions sections will start the second week of class.

## Summary of Course Requirements:

	Requirement	Percent of Grade	Quiz Date or Assignment Due Date
1	Quiz #1	45%	Monday, September 21, in-class
2	Quiz #2		Monday, October 19, in-class
3	Quiz #3		Wednesday, November 11, in-class
4	Quiz #4 / "Final"		Tuesday, December 8 at 11:30 am
5	Paper #1 (Ethical Reasoning)	15%	Wednesday, September 16, submit electronically by 10 am
6	Paper #2 (Technology Development)	25%	Monday, November 23, submit electronically by 10 am
7	Class Attendance and Participation	10%	Throughout the semester
8	Discussion Section Attendance	-	Throughout the semester
9	Discussion Section Participation	5%	Throughout the semester

## Detailed Descriptions of Course Requirements:

### 1, 2, 3, and 4 – Quizzes

Quizzes will be in-class and include primarily fill-in-the-blank, multiple choice and short-answer questions. There may be one or two longer "short essay" questions on some quizzes. The quizzes will require thoughtful integration of material from lectures, readings, discussions, and other materials presented in class (or discussion sections), along with your own original reflection and analysis. The quizzes will be cumulative in terms of the concepts covered, but content questions will focus on the most recent material. You will be graded on accuracy, breadth, and clarity. Your three best quiz scores count equally for 45% of your grade. Your lowest quiz is dropped. If you must miss a quiz for official Institute business, please provide documentation in advance (at least one class before the quiz) and you will be permitted to take a make-up quiz. If you fail to provide appropriate documentation in advance, or you miss a quiz for other reasons, the missed quiz will count as your dropped quiz.

### 5 and 6 – Papers

You will be required to write two papers during the semester on topics related to class material. Your first paper will focus on ethical reasoning and give you the opportunity to practice applying the ethical theories we discuss in class to specific scientific decisions. In the second paper you will examine how societal concerns and human values have shaped the development of a specific area of science or technology. This paper will be slightly longer and will require outside research to develop and support a thesis. More details about these assignments, including a choice of topics, will be provided in class and posted on t-square.

All papers will be submitted electronically using t-square. Paper due dates are announced far in advance and, in the absence of formally documented extenuating circumstances, you are expected to submit papers on time. Late papers will be accepted electronically until 2 days (48 hours) after the due date, but they will be penalized 1 grade per day or portion of a day they are late. You are welcome to submit papers early and should plan to do so if you will be unable to submit your paper on the specified due date for any reason (including official institute business).

### 7 – Class Attendance and Participation

To encourage student participation and engagement, we will use PRS transmitters.

Most classes will feature several PRS questions distributed throughout the period. These will take on a variety of forms. Some will have correct answers and be designed to assess your understanding of concepts we have discussed in class or your comprehension of the reading. Others will not have correct answers and will aim to encourage you to think about some of the controversial issues we discuss in class and illustrate the range of opinions held by members of the class. For all PRS questions, you will receive 2 points for responding. For questions with a correct answer, you will receive 2 additional points for giving the correct response. Your PRS grade for the semester will be calculated by dividing the sum of points you received on all PRS questions by 90% of the total points possible on all PRS questions. This score will be capped at 100%. (Please see the section on PRS under Course Policies below for more details.)

### 8 – Discussion Section Attendance

Attendance is mandatory for weekly discussion sections and will be taken at the start of each session. Each student is permitted two absences for any reason, but each additional absence will reduce your overall course grade by 3%.

### 9 – Discussion Section Participation

Discussion sections provide an opportunity for you and your classmates to discuss course material in more detail and relate the concepts introduced in lecture to current events. Your participation in discussion sections is important both for your own learning and for the learning experiences of your classmates. For this reason, regular participation is an expectation of the course. Participation encompasses two key components. First, working with a small group of students, you will be responsible for identifying a relevant article in a major newspaper or magazine and leading a discussion on this article. During discussion periods when you are not presenting, you should come to discussion section having completed the relevant reading and prepared to share your opinion. More details about the presentation will be provided on t-square.

### **Readings:**

#### Books (Required)

1. *Elements of Moral Philosophy* by James Rachels and Stuart Rachels, McGraw-Hill (2009), 6<sup>th</sup> Edition, 224 pages.
2. *An Enemy of the People* by Henrik Ibsen, Dover Thrift Edition (1999), 96 pages
3. *Cloning: A Beginner's Guide* by Aaron Levine, Oneworld Publications (2007), 192 pages
4. *Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, A Man Who Would Cure the World* by Tracy Kidder, Random House Trade Paperbacks (2004) 317 pages

#### Other (Available on t-square or library reserves)

The Belmont Report. "Ethical Principles and Guidelines for the Protection of Human Subjects of Research." The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. April 1979.

Greenberg, Daniel S. (2003) *Science, Politics and Money: Political Triumph and Ethical Erosion*. University of Chicago Press. Chapters 10, 12, and 13.

Kleinman, Daniel L. (2005). *Science, Technology and Society: From Biotechnology to the Internet*. Blackwell Publishing. Chapter 6

Merton, Robert K. (1942) "The Normative Structure of Science" published in *The Sociology of Science: Theoretical and Empirical Investigations*. The University of Chicago Press. Chapter 13.

Weisman, Alan. (2007) *The World Without Us*. Thomas Dunne Books. Chapters 3 and 9.

### **Course Policies:**

Atmosphere: To maintain a professional and collegial atmosphere, I ask that you arrive on time to class and keep disruptions during class to a minimum. For instance, I expect that cell phones and other similar devices will be turned off during class. I will strive to end class in a timely manner. Laptop use is not permitted in class. You are welcome to print copies of my PowerPoint slides before class for note-taking purposes.

Communication: Email is the best way to contact me and I will try to respond promptly, usually within 24 hours. I check email less frequently on the weekend and may not be able to respond to inquiries until Monday. You are, of course, encouraged to ask questions before or after class or stop by my office hours. If my office hours are not convenient for your schedule and you would like to meet, please email me to arrange an alternate time.

Honor Code: You are expected to abide by the Georgia Tech Honor Code guidelines at all times (for details, see <http://www.honor.gatech.edu/>). In the context of this course, quizzes should be completed on your own without any unauthorized aids. While we will brainstorm topics and discuss your papers in class, all writing is expected to represent your own work, completed on your own specifically for this course. This means that you cannot copy text from other papers, websites, encyclopedias, or any other source without quoting any copied material and fully and accurately citing your sources. In addition, if you refer to, use, or build upon ideas from other work, even if you don't quote that work exactly, you should fully acknowledge your sources. For any questions involving these or any other Academic Honor Code issues, please consult me or see <http://www.honor.gatech.edu/>.

Personal Response System: We will utilize PRS transmitters to encourage participation and interaction when we meet as an entire class. You are required to have a PRS RF transmitter for this course. You are also responsible for bringing your PRS transmitter to class each day and ensuring that your GTID is correctly programmed in the transmitter. It is recommended that you use your own PRS transmitter. These are available at the bookstore if you do not already have one from another course. Alternatively, you may use a borrowed transmitter, but you must use the *same* transmitter for the entire course. If you switch transmitters in the middle of the course, you may not receive credit for answers with the second transmitter. PRS scores will be posted quickly after each class (typically the same day as class) and you are responsible for checking your posted scores. If you believe your score is incorrect for any reason, please notify me immediately. Appeals of PRS scores will not be considered more than one week after the scores have been posted.

In the context of this class, giving your PRS transmitter to a friend to "respond for you" when you are not in class is considered cheating. Similarly, covering for another student by using his or her transmitter is also cheating. Penalties for abusing the system in this manner include both students receiving a score of 0 for all PRS questions for the semester in addition to whatever penalties the honor court imposes.

Students with Disabilities: Georgia Tech offers accommodations to students with disabilities. If you need a classroom accommodation, please make an appointment with the ADAPTS office or provide me with the appropriate ADAPTS paperwork in office hours.

T-Square: This course will use T-Square to organize electronic materials. You should find copies of lecture notes, links to electronic versions of readings, example quizzes, etc there. You will also submit your papers online using t-square.

### **Tips for Success:**

Doing well in this course requires some time and effort, but the class shouldn't be overwhelming. Tips for doing well include completing and thinking about the reading before class and coming to each class with an open mind, prepared to discuss and debate a range of issues. You are also advised to start your papers early. I strongly recommend giving yourself time to look over and revise all of your writing before submitting it. Finally if you are unclear about any class material, be sure to ask questions either in class or office hours to clarify any confusion.

### **A Final Comment:**

I hope you find this class interesting, relevant to your lives, and even (at times) fun. If you have any comments about how the course is or is not working for you or suggestions about how the course could work better for you, please let me know.

### **Detailed Schedule (Subject to Change)**

#### **Week 1: Introduction / Course overview**

Aug 17 – Introduction

Aug 19 – Syllabus overview

Aug 21 – Defining Science **[Meet as a class in IPST 109]**

#### **Week 2: Introduction to Ethical Theories**

Aug 24 – Intro to Ethical Theories

[Reading] Rachels, Chapter 1 “What is Morality?” (13 pages)

Aug 26 – Cultural Relativism

[Reading] Rachels, Chapter 2 “The Challenge of Cultural Relativism” (17 pages)

Aug 28 – Intro discussion: Science, Technology & Privacy **[First discussion section]**

#### **Week 3: Ethical Theories**

Aug 31 – Ethical Egoism & Utilitarianism

[Reading] Rachels, Chapter 5 “Ethical Egoism” (17 pages)

[Reading] Rachels, Chapter 7 “The Utilitarian Approach” (12 pages)

Sept 2 – Utilitarianism (cont'd)

[Reading] Rachels, Chapter 8 “The Debate over Utilitarianism” (14 pages)

Sept 4 – Discussion sections

#### **Week 4: Ethical Theories**

Sept 7 – No Class meeting [**Labor Day**]

Sept 9 – Kant's Moral Theory

[Reading] Rachels, Chapter 9 "Are there Absolute Moral Rules?" (12 pages)

[Optional Reading] Rachels, Chapter 10 "Kant & Respect for Persons" (10 pages)

Sept 11 – Discussion sections

#### **Week 5: Ethical Theories**

Sept 14 – Social Contract Theory

[Reading] Rachels, Chapter 6 "The Idea of a Social Contract" (16 pages)

Sept 16 – Virtue Ethics

**[Assignment] Paper #1 Due**

[Reading] Rachels, Chapter 12 "The Ethics of Virtue" (14 pages)

Sept 18 – Discussion sections

#### **Week 6: Ibsen's *An Enemy of the People***

Sept 21 – **[Quiz] Quiz #1 in-class**

Sept 23 – Ibsen's *An Enemy of the People*

[Reading] Ibsen, Acts I to V (82 pages)

Sept 25 – Discussion: Ibsen's *An Enemy of the People*

#### **Week 7: The Norms of Science**

Sept 28 – Merton's Norms of Science

[Optional Reading] Merton, Chapter 13 (12 pages) [t-square]

Sept 30 – Gender in Science

[Reading] Kleinman, Chapter 6 (17 pages) [t-square]

Oct 2 – Discussion sections

#### **Week 8: The Politics of Science**

Oct 5 – No class meeting [**Fall Break**]

Oct 7 – Politics of Science

[Reading] Greenberg Chapter 10, 12 (35 pages) [t-square]

Oct 9 – Discussion sections

## **Week 9: Business of Science / Public Understanding of Science**

Oct 12 – Business of Science

Oct 14 – Public Understanding of Science  
[Reading] Greenberg Chapter 13 (28 pages) [t-square]

Oct 16 – Discussion sections

Note: Oct 16 is the last day to drop classes with a grade of 'W'

## **Week 10: Limits on Science**

Oct 19 – **[Quiz] Quiz #2 in-class**

Oct 21 – Human Subjects Research  
[Reading] Belmont Report [t-square]

Oct 23 – Discussion sections

## **Week 11: Limits on Science**

Oct 26 – Dual Use Research

Oct 28 – Controversial Science

Oct 30 – Discussion sections

## **Week 12: Case Studies: Biomedical Research**

Nov 2 – Animal cloning  
[Reading] Levine, Chapter 3 “Dolly and her scientific predecessors” (28 pages)  
[Reading] Levine, Chapter 4 “Animal cloning in the 21<sup>st</sup> Century” (24 pages)

Nov 4 – Human Cloning  
[Reading] Levine, Chapter 6 “The ethical debate over human cloning” (23 pages)

Nov 6 – Discussion sections

## **Week 13: Case Studies: Biomedical Research**

Nov 9 – Human Embryonic Stem Cell Research  
[Reading] Levine, Chapter 5 “Embryonic stem cells and the promise of therapeutic cloning” (23 pages)

Nov 11 – **[Quiz] Quiz #3 in-class**

Nov 13 – *Mountains Beyond Mountains* Discussion I  
[Reading] Kidder Chapter 1 through 12 (118 pages)

### **Week 14: Public Health Ethics**

Nov 16 – TBD

[Reading] Kidder Chapter 13 through 19 (52 pages)

Nov 18 – Health Disparities & Biomedical Research in Developing Countries

[Reading] Kidder Chapter 20 through 23 (56 pages)

Nov 20 – *Mountains Beyond Mountains* Discussion II

[Reading] Kidder Chapter 24 through Afterword (61 pages)

### **Week 15: Environmental Ethics**

Nov 23 – Population Control

**[Assignment] Paper #2 Due**

Nov 25 – Sustainability

[Reading] Weisman Chapter 3, 9 (35 pages) [t-square]

Nov 28 – No class meeting [Thanksgiving Holiday]

### **Week 16: Review / Wrap-up**

Nov 30 – *Mountains Beyond Mountains*

Dec 2 – Wrap-up [last class meeting]

Dec 4 – No discussion section meetings

**Final Exam: Thursday, December 8 at 11:30 am**