

# SCIENCE, TECHNOLOGY AND HUMAN VALUES

## Science and Technology Studies 101 / History of Science 101

Fall 2003

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Bronfman 117; XT 2239

The purpose of this course is to examine and assess the nature of science and technology, and their interactions with each other and with society, focussing especially on their influence on what humans value. As an introduction to science and technology studies (STS), it provides acquaintance with the major positions and schools in STS. The course employs a variety of perspectives and approaches, including the historical, philosophical, sociological, and quantitative. It is concerned with obtaining a broad overview of the diversity of thought about science and technology rather than a deep analysis of any one school or interpretation. The attempt to acquire a more sophisticated and comprehensive picture of science and technology is ultimately aimed at enabling a more critical and knowledgeable consideration of how social and individual values mold, and in turn are molded by, scientific and technological developments. To that end, the course concerns itself with questions in ethics, social responsibility, human nature, and public policy.

Class meetings (MWF 10:00 - 10:50 a.m.) primarily consist of discussion of issues and questions raised in the assigned reading.

Requirements: Class participation, 3 exercises, 2 papers (#1: 3-5 pp, #2: 5-7 pp), 2 hour exams, and a short quiz, each respectively worth approximately 20%, 20%, 30%, 28%, and 2% towards the final grade, which will be sensitive to active class participation [attendance, quality & frequency of interaction]

Textbooks: The required texts for the course are:

Bronowski, J.	Science and Human Values
Collins/Pinch	The Golem: .... Science
Collins/Pinch	The Golem at Large: ....Technology
Kuhn, T.	The Structure of Scientific Revolutions
Teich, A.	Technology and the Future [9th editions]
Volti, R.	Society and Technological Change [4 <sup>th</sup> edition]
Winner, L.	The Whale and the Reactor

In addition, the following packet of items assigned as reading is available at cost [\$9.00] in Bronfman 189 from Ms. Kate Fletcher, Administrative Assistant:

1.	H. Bauer	So-called "scientific method"	(Sep. 10)
2.	J. B. Conant	There is no scientific method	(Sep. 10)
3.	Karl Popper	Science: conjectures and refutations	(Sep. 10)
4.	M. Black	Is Induction an acceptable scientific tool?	(Sep. 10)
5.	B. Brody	Confirming.....the New Riddle of Induction	(Sep. 10)
6.	E. McMullin	Reactions to the Logical Positivist...	(Sep. 10)
7.	Troxell/Snyder	Causes and David Hume	(Sep. 10)

8.	C. Hempel	A Philosopher.... Scientific Method	(Sep. 12)
9.	M. Martin	Two Models for Explanation in the Sciences	(Sep. 12)
10.	J. Hospers	What is Explanation?	(Sep. 12)
11.	R. Root-Bernstein	Setting the Stage for Discovery	(Sep. 12)
12.	A. Sayre	The Making of a Discovery	(Sep. 15)
13.	Gross/Levitt	Higher Superstition: Academic Left ff	(Sep. 24)
14.	Et al	Excerpts on Ethics	(Oct. 1)
15.	R. S. Morison	Visions	(Oct. 31)
16.	Franke/Chasin	The Kerala Experiment	(Nov. 10)
17.	K. Coyle	ACCESS: Not Just Wires	(Nov. 14)
18.	N. Postman	Informing Ourselves to Death	(Nov. 14)
19.	Et al	Computer Ethics, Privacy, Scenarios	(Nov. 17)
20.	L White, Jr.	Historical Roots of our Ecological Crisis	(Nov. 19)
21.	Gross/Levitt	Environmentalism	(Nov. 21)
22.	J. Tierney	Recycling is Garbage	(Nov. 21)

### SCHEDULE OF CLASS MEETINGS AND READINGS

#### 1. Introduction, Orientation.

1. Fri., Sept. 5 Science and technology studies (STS); component disciplines and approaches. Interrelation of science, technology, society, and values. What questions does this approach answer?

#### 2. Science - A Cult of Creativity? A Moral Model? A Social System? Source of Values?

2. Mon., Sept. 8 Creativity in art and science. Origins of scientific ideas. Do scientists invent or discover? Does science instill a higher moral sensitivity? What human values are most consonant with science? How might science contribute to ethics? Bronowski, Chapters 1- 3.

#### 3. Philosophy of Science: Is there a "Scientific Method"? How do we know what we know? What assumptions do we make about the ultimate nature of reality?

3. Wed., Sept. 10 What different types of scientific "method" are there? What makes a science "science" - Experiment? Observation? The (il)logic of "proof."

Falsification. The problem of induction. Cause.  
Bauer "So-called" 25-37; Conant "No Method"  
 206-7; Popper "Refutations" 81-86; Black  
 "Induction" 154-161; Brody "New Riddle" 216-18;  
McMullin "Positivism" 229-237; Troxell/Snyder  
 "Causes" 242-247

4. Fri., Sept. 12 Inseparability of method and metaphysics. The  
 Primer Syndrome - simplicity/complexity.  
 Reductionism, holism. Why do we trust scientific  
 explanation? Discovery, verifiability, justification.  
Hempel "Method" 193-205; Martin "Explanation"  
 257-264; Hospers "Explanation?" 265-274;  
Root-Bernstein "Discovery" 108-118
  
4. Sociology of Science - How is science structured socially? How did  
 science change in moving from little science to Big  
 Science? Is there much place left for the lone  
 scientist?
  
5. Mon., Sept. 15 What are the norms and values of the scientific  
 community? What social institutions embody  
 or support science? What practices challenge  
 established norms? [Lecture - discussion]  
Sayre "Making a Discovery" 124-131
  
6. Wed., Sept. 17 How did science and research practice change in  
 moving from little science to Big Science?  
 Science as profession. "Technoscience."  
 The End of Science? [Lecture - Discussion]
  
5. The Structure of Scientific Revolutions: An Influential Model. Scientific Knowledge  
 as Social Construction  
  
 Scientific "progress" as non-linear, non-  
 cumulative, and socially constructed. Paradigms,  
 normal science, crises, and revolutions. The  
 jigsaw puzzle model of science. Objectivity.  
 Relativism.
  
7. Fri., Sept. 19 Kuhn, Preface, 1-110 (paradigm, normal  
 science, anomalies, crisis, revolution)
  
8. Mon., Sept. 22 Kuhn, 111-210, (revolution; resolution,  
 incommensurability, "progress," postscript)
  
6. Science - A Separate Culture?

9. Wed., Sept. 24 Do the two cultures exist? Need they? Is their separation harmful? What are the "Science Wars"? Bronowski, Chapter 4: "The Abacus and the Rose"; EXERCISE #1: Read Gross and Levitt The Higher Superstition, 1-15; 71-106; 234-257, and write a one page position paper on it for discussion as a current example of the Two Cultures.
7. What do we really need to know about science and how it works?
10. Fri., Sept. 26 Case Studies I: Golem, Ch. 1-3
11. Mon., Sept. 29 Case Studies II: Golem, Ch. 4-7

## 8. Scientific Knowledge and Its Social Problems

12. Wed., Oct. 1 Ethics and Social Responsibility  
 What is, has been, and should be the relationship between ethics and science? Can ethics survive modern science? In the light of what we think we know, how ought we to behave?  
Excerpts on Ethics

**IF Mountain Day on 3,10, or 17, THEN redate through Mon 10/20**

13. Fri., Oct. 3 Ethical Issues. What about fraud in scientific research? Can scientific research be objective and unbiased? Is scientific knowledge neutral?  
FIRST PAPER: Reporting Science to the Public

## 9. Thinking about Technology

14. Mon., Oct. 6 What technology "is", how and why it changes and a brief social history of its development and diffusion.  
Volti, Chapters 1-5 (3-85)
15. Wed., Oct. 8 Different Ways to Think about Technology  
Teich, 9<sup>th</sup>: pp 1-45 [Marx, Pool, Weinberg, Berry Florman] plus Postman and Hughes from 8<sup>th</sup>.  
 Teich, 8<sup>th</sup>: pp. 1-58 [Marx, Postman, Hughes, Weinberg, Berry, Florman] plus Pool from 9<sup>th</sup>.
16. Fri., Oct. 10 More Ways to Think about Technology  
Teich 9<sup>th</sup>: pp 47-68 [Mesthene, McDermott]  
 Teich 8<sup>th</sup>: pp 59-80 [Mesthene, McDermott]

-----**FALL READING PERIOD**-----

## 10. Philosophy of Technology

17. Wed., Oct. 15 An introduction. Winner, Chapters 1-3 (56 pp)

## Review and Consolidation

18. Fri., Oct 17 **Hour Exam**

## 11. What do we really need to know about technology? How technology really works?

19. Wed., Oct. 22 The Golem at Large: Intro, Ch. 1-4 (1-92)
20. Fri., Oct. 24 The Golem at Large: Ch. 5-7, Conclusion (93-155)

## 12. Communication

21. Mon., Oct. 27 Volti, Part 4 (pp 181-215)

## 12. Transformation of Work

22. Wed., Oct. 29 Volti, Part 3 (pp 129-175)  
Teich 9<sup>th</sup>: Zuboff, Jenkins [268–275; 119–134]  
Teich 8<sup>th</sup>: Zuboff, Jenkins [294-301; 121-136]

## 13. Biomedicine, Public Health, and Ethical Dilemmas

23. Fri., Oct. 31 What is all this health for? What limits ought there to be on biomedical technology, if any?  
Teich 8<sup>th</sup> Weinberg, Kass: [213-255]; plus Bush, Murray, and Groopman from 9<sup>th</sup> [196-208,225-7]  
Teich 9<sup>th</sup>, Weinberg Bush, Murray, Kass, Groopman [185-227]  
Morison, "Visions"  
Volti, Ch. 7 (pp. 107-123)
24. Mon., Nov. 3 Public Health, Risk, and Medical Ethics  
Continuing discussion; no reading assigned  
SECOND PAPER: Technological Literacy

## 14. The Control of Technology

25. Wed., Nov. 5 Is Technology Autonomous? What can individuals, institutions, governments do?  
Volti, Chs. 15-17, (pp 265-308)  
Teich 8<sup>th</sup>: Sclove [pp. 103-120]  
Teich 9<sup>th</sup>: Sclove [pp. 91-108]

- 26.** Fri., Nov. 7                    Is there any hope in technology assessment?  
Teich 9<sup>th</sup>: Cerruzzi, [229-241] plus Kahn & Wiener,  
 Brody, Coates et al, from 8<sup>th</sup> [171-189, 202-212]  
Teich 8<sup>th</sup>: Cerruzzi, Kahn and Wiener; Brody;  
 Coates, Mahaffie, and Hines [169-212]

15. Appropriate Technology - The Lure of Decentralization

- 27.** Mon., Nov. 10                Is there a better way to integrate technology  
 with society?  
Teich 9<sup>th</sup>: Schumacher, Goodman, Sandar, Wajcman  
 [71-90, 109-118, 135-147]  
Teich 8<sup>th</sup>: Schumacher, Goodman, Wajcman  
 [81-102; 137-149] plus Sandar fr, 9<sup>th</sup> [109-118]  
Exemplar from Kerala [Franke/Chasin]
- 28.** Wed., Nov. 12                Questioning Appropriate Technology and  
 Decentralization  
Winner, Chs. 4,5 (61-97)  
EXERCISE #3 Due: Terms and Phrases in STS

16. Computer Technology

- 29.** Fri., Nov. 14                Revolution? or "Mythinformation"?  
 Should the "computer society" be X-rated?  
Winner, Ch. 6 (98-117)  
Teich 9<sup>th</sup>: Lessig [258-267] plus Negroponete,  
 Norman from 8<sup>th</sup> [303-336]  
Teich 8<sup>th</sup>: Negroponete, Norman [303-336] plus  
 Lessig from 9<sup>th</sup> [258-267]  
Coyle, "ACCESS," Postman, "Informing"
- 30.** Mon., Nov. 17                Computers, Ethics and Privacy  
Teich 9<sup>th</sup>: Morrison and Forester [232-247]  
Teich 8<sup>th</sup> :, Morrison and Forester [259-275]  
Examples and Scenarios [from Packet, "et al"]

## 17. The Fate of Nature in a Technological World

31. Wed., Nov. 19 Is Western technology antithetical to nature?  
Winner, Ch. 7 (121-137)  
White, "Historical Roots of Ecological Crisis"  
Volti, Ch. 6 (pp. 88-104)
32. Fri., Nov. 21 Are Deep Ecology, Recycling, and  
Environmentalism Overdone?  
Tierney, "Recycling"  
Gross/Levitt, 149-178; 227-228; 231-233

## 18. Review and Consolidation - Technology

33. Mon., Nov. 24 **Hour Exam**

-----**THANKSGIVING**-----

## 19. "Risk", Vulnerability, and the Future

34. Mon., Dec. 2 Winner, Ch. 8 (138-154)  
Teich 9<sup>th</sup>: Lovins & Lovins, Martin, Joy, Brown &  
Duguid [165-183; 295-322]  
Teich 8<sup>th</sup>: only the above from 9<sup>th</sup>

19. Science, Technology, and Human Values - or is it Embarrassment?  
Technology and Politics, Now and Future

35. Wed., Dec. 4 Winner, Ch. 9 (155-163), Ch. 10 (164-178)  
Looking at STS.

## 20. STS: Retrospect and Prospect

36. Fri., Dec. 6 Quiz. Review; Suggestions; SCES