

STS 2150 :

A Critical Approach to Scientific and Technological Revolutions

Fall 2013
Section 001

9:05 MWF
305 Edwards Hall

Instructor:

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Course Description:

Everyone knows how important science and technology have become in contemporary society. And everyone also knows that both have yielded rich benefits which have changed society in countless ways. But few have thought critically about science and technology as social institutions, with their own hierarchical social structures, interacting with each other as well as the groups which make up society at large. And even fewer have contemplated the dramatic challenges which the revolutionary developments in science and technology have brought. It is the purpose of this course to develop the analytic tools to understand dramatic, revolutionary developments in science and technology. Topics include

- the processes of scientific and technological revolution,
- the relations between science and technology, and
- the causal interactions of scientific and technological revolutions with contemporary society and culture.

The discussion of these topics leads to important questions about the control of science and technology in a democratic society.



The course objectives, learning outcomes, and strategies of this course conform to the guidelines of both the *Critical Thinking (CT²)* and the *Science and Technology in Society* programs. The principal prerequisite of critical thinking is the awareness or self-consciousness of one's own reasoning patterns, as well as those in the works of others. Once attention is directed towards the thinking processes in an argument or explanation –whether it is under construction or subject to examination- the types of reasoning (causal, deductive, inductive) which are employed in the argument may be identified. Then, the argument may be assessed by reference to the appropriate standards of correctness for the particular type of reasoning employed.

CT² Course Assessment: CT² courses are assessed on the basis of their achievement of their learning outcomes, as measured by student improvement on CAT tests. The tests are used only

to guide the further improvement of the course and they do not reflect on you, your participation in the course, or your final grade. The test will be administered at the beginning of the course (Friday, August 23rd) and at the end (December 4th).

STS and CT^2 Course Objectives:

- **STS**: to *acquire* and *learn to further develop* a wide-ranging, humanistic perspective comprehending the significance and import of radical scientific and technological change,
- **STS**: to *develop* the tools and skills to further one's perspective of radical change,
- **STS** and CT^2 : to acquire the tools to *analyze* multifaceted choices and *synthesize* the complex factors involved in critically judging issues related to the adoption of new technology or the support of scientific initiatives,
- **STS** and CT^2 : to *master* the logical and rhetorical skills required for the construction and evaluation of arguments involving diverse topics drawn from science, technology, and society.



STS and CT^2 Student Learning Outcomes:

It is an important goal of to teach students the strategies and tactics required to think critically about revolutionary developments in science and technology. It is equally important to learn general-purpose critical thinking strategies applicable to other subjects as well. The Student Learning Outcomes of this course fully integrate these aims in combined **STS** and CT^2 learning outcomes. Upon completion of the course, students will be able to

- *Identify* distinct types of arguments by identifying their structure,
- *Analyze* arguments of each of the distinct types,
- *Identify* the criteria applicable to the different types of argument,
- *Evaluate* arguments of different types according to the applicable criteria,
- *Synthesize* factors extrapolated from distinct conceptual contexts to solve multi-dimensional challenges,
- *Communicate* complex ideas and arguments effectively, using valid/correct arguments and explanations.

Resources: The following resources are linked to the 'Resources' button in the Taskbar on the Blackboard Homepage for the course:

- Problem Papers: The Basics
- Constructing Causal Arguments
- References in Problem Papers

Text:

Thomas Oberdan. *Science, Technology, and the Texture of Our Lives*. Third edition.

(Anderson: Tavenner, 2013). (Referred to as '*Texture*' in the Schedule of Topics & Readings below.)

Additional readings will be linked to the 'Schedule of Topics and Readings' (below).

Office Hours: MWF 8:00-9:00 and 11:00-12:15.

Requirements

Quizzes contain questions pertaining only to the material which has been assigned in the syllabus, to determine your grasp of its essentials. Quizzes will be available from 8:00 a.m. to 10:00 p.m. in the “Quizzes” folder linked to the Taskbar. Your computer skills and the condition of your equipment are your responsibility. To maximize your grade in such cases, *save each answer as soon as you enter it*. Quizzes will remain open for only 15 minutes. Missed quizzes may not be made up. For further hints which will help you maintain your Quiz grade, see “Tips for Quizzes” on the Taskbar. (Quizzes are worth 10% of the final grade).

Scenarios are brief presentations (to the class) of ideas, opinions, and arguments. The Scenarios are typically paragraph-length statements about some particular scientific or technological achievement, its acceptance in the professional community, or its effects on society. After a short class discussion, students will be asked a series of questions concerning the critical analysis of the Scenario, its assessment relative to the standards which have been discussed, and the relations of the scenario to other issues raised in the course. Scenarios present excellent opportunities to exercise and develop *analytical critical thinking skills* in the assessment of arguments. (Scenarios are worth 20% of the final grade.)

Problem-Papers are short argument essays which provide an opportunity to exercise *analytical critical thinking skills* in the assessment of the significance of some scientific development or technological innovation as well as *synthetic critical thinking skills* in relating it to social matters. A successful Problem-Paper will satisfy the following requirements:

- An accurate grasp of complex causal sequences between developments (whether in science, technology, or society) and their effects (whether in science, technology, or society). (See ‘Constructing Causal Arguments’ linked to ‘Resources’ button in Taskbar on the Blackboard Homepage for the course.)
- An assessment of which connections are genuinely causal rather than merely sequential or correlational.
- The ability to synthesize and unify ideas by transferring the understanding developed in one context to matters in a remote, unrelated situation. Assignments will be announced (on the course “Homepage” in Blackboard) and accessible (in the “Problem Papers” folder in the Taskbar). Your essay must be submitted as a (double-spaced) Word document (no more than 500 words), uploaded on the response page for the Assignment in Blackboard.
- The guidelines for Problem papers are explained in the “Tips for Assignments”, linked to the Taskbar. The Blackboard Learn system will not accept submissions after the deadline has passed.

Problem Papers are excellent artifacts for demonstrating satisfaction of **STS** and **Critical Thinking** competencies. (Problem Papers are worth 60% of the final grade.)

Class Presentations will present students with the opportunity to demonstrate their *analytical critical thinking skills* in the assessment and evaluation of the hype surrounding a particular technological innovation currently under development while, at the same demonstrating their *synthetic critical thinking skills* in constructing a case for the technology currently under development which they think will be “the next big thing.” Findings will be presented to the class in the form of PowerPoint presentations the last week of class (see schedule). The PowerPoint presentation will provide an excellent **Critical Thinking Artifact**. (Class Presentations are worth 10% of the final grade.)

Attendance: Attendance is required but there are obviously times when absences are unavoidable. For such occurrences, three grace absences are allowed. After that, every two absences will decrease the final grade by one letter. Use of an electronic device in class for any purpose unrelated to the class (text-messaging, checking scores on ESPN, etc.) constitutes an absence.

Nota Bene: Feel free to contact the instructor (through email) with any questions you may have about assignments, grading, etc. I will make my best effort to respond to emails received between Monday and Friday (9:00-5:00) within 24 hours. Be sure to follow up on questions pertaining to your quizzes and tests promptly, while the exercise is still fresh in our minds. To ensure that these matters are handled expeditiously, it is necessary to restrict discussions to *quizzes and tests which have been completed within the past week*.

eportfolios: Your Problem Papers would make a significant contribution to your eportfolios. Be sure to place each one in the *STS* folder or the *Critical Thinking* folder of the eportfolio. Be sure to include the question they address when submitting them.

Academic Integrity: All infractions of the University policy on Academic Integrity will be reported to the Dean of Curriculum, in accordance with University regulations. No exceptions. For details, see pp. 28-9 of the Undergraduate Announcements.

Schedule of Topics and Readings

Week **Dates** **Topics** **Readings**

1	8/21 – 8/23	Introduction: The syllabus, STS, and <i>CT</i> ²	Syllabus
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		Preliminary CAT Test (8/23)	
2	8/26 – 8/30	Determinism Technology and the Construction of Society	<i>Texture</i> , Ch. 1 Langdon Winner, "Technologies as Forms of Life" Technologies as Forms of Life (webpage)
3	9/2 – 9/6	The Neolithic Revolution in Agriculture	Robin Wright, "The Great Experiment," "Guns, Germs, and Steel" Part I (video)
4	9/9 – 9/13	Fundamentals of STS Popular Perceptions of Science and Technology	<i>Texture</i> , Ch. 2 Handlin, "Science and Technology in Popular Culture"
5	9/16 – 9/20	Popular Perceptions of Science and Technology (cont.) Methods	Handlin, "Science and Technology in Popular Culture" <i>Texture</i> , Ch. 3
6	9/23 – 9/27	Globalization	The World is Flat 3.0: Summary Thomas Friedman: The World is Flat 3.0 (2007)
7	9/30 – 10/4	Hypothesis Testing The Industrialization of Agriculture	<i>Texture</i> , Ch. 4 Michael Pollan, <i>The Omnivore's Dilemma</i>, Ch. 1

			“ King Corn”
8	10/7 – 10/11	Sustainable Agriculture	Project: Clemson Student Organic Farm (TBA)
9	10/14 – 10/18	Fall Break!!! The Dynamics of Change	<i>Texture</i> , Ch. 5
10	10/21 – 10/25	The Dynamics of Change (cont.)	Thomas Kuhn, "Introduction" to <i>The Structure of Scientific Revolutions</i> The Copernican Revolution
11	10/28 – 11/1	The Print Revolution	The Gutenberg Revolution The Spread of Printing Presses

12	11/4 – 11/8	Electronic Media	Neil Postman, “The Day Our Children Disappeared” (article)  N. Carr, “Is Google Making Us Stupid?”
13	11/11 – 11/15	The Cognitive Effects of Digital Technology	Andrew Blum: “What is the Internet, really?” (2012) Sherry Turkle: “Alone, but Connected” (2012) "Attached to Technology.. ."

			<p>Daphne Bavelier: “Your brain on video games”</p> <p>P. W. Singer: “Military Robots and the Future of War” (2009)</p>
14	11/18 – 11/22	Social Context and Social Responsibility	<p><i>Texture, Ch. 6</i></p> <p>J. Diamond, "Collapse"</p> <p>"The Story of Stuff" (video)</p> <p>Oreskes and Conway, "Distorting Science..."</p> <p>Hydraulic Fracturing 101</p> <p>"Breaking Fuel from Rock"</p> <p>"Methane on Tap"</p>
15	11/25 – 11/26	The Industrial Revolution	<p>The Evolution of the Steam Engine</p>
16		Bio-Medical Innovations	<p>Anthony Atala: “Printing a human kidney” (2011)</p> <p>Max Little: “A test for Parkinson’s with a phone call” (2012)</p> <p>Quyên Nguyen: “Color-coded surgery” (2012)</p> <p>Jack Choi: “On the virtual dissection table” (2012)</p>

17	12/2 - 12/6	The Next Big Thing CAT Test (12/4)	Class Presentations on “The Next Big Thing”.
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12/9 – 12/16 Finals Week: Final Problem Paper Due at the time assigned for the Final Exam in this course.