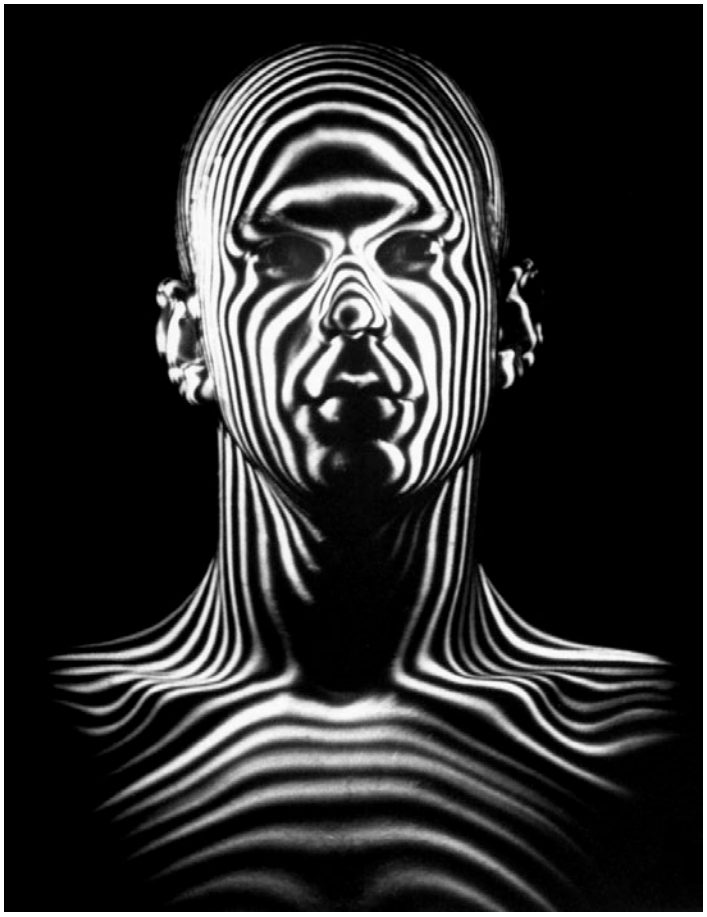
Harvard University
History of Science 129
Science and the Cold War



Spring 2011
Science Center 252
Lecture: Mondays and Wednesdays, 10am-11am
Discussion: Fridays, 10am-11am

Instructor
Alex Wellerstein

Course description

This course will look at the history of science during the Cold War, with a primary focus on science in the United States. Broad questions about the evolving relationship between science and the state in the twentieth century will be explored through key episodes from the physical, biological, and social sciences. Topics will include the arms race, the military-industrial-academic complex, Big Science, government secrecy, McCarthyism,

the space race, the Vietnam War, international cooperation and competition, and student resistance.

Books to purchase

The following books will be available for purchase at the Harvard Coop, and can also be purchased online if you do so in advance. Both of these books are available to read online for free, through the course website (Harvard has a subscription to a service which hosts them), if that is an acceptable option for you. Both books are also on reserve at Lamont.

- Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1996)
- Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (Columbia University Press, 1993).

Grades

The final grade for students will be calculated according to the following requirements: Two written assignments (10% for assignment #1, 15% for assignment #2), final paper (25%), mid-term examination (15%), final exam (20%), section participation (15%).

Section participation requires both attendance and actual participation in discussions, showing evidence of having done the reading, and so on.

Examinations

The midterm examination will be in-class on **March 7**, the final exam will be held according to the finals schedule. The midterm and final exam will be similar in format and length. Review handouts with detail on possible content will be made available at least one week before the exam. The exams will be a mixture of identifications and essay responses, and will draw upon information from both the readings *and* the lectures. Some of the mandatory content will be exclusively drawn from the lectures. The exams are closed-book.

Assignments

There are two targeted assignments (papers to be written with specified sources and on specific topics), and one final research paper. They should all be considered to be serious papers and serious academic work, and for the targeted assignments, special attention should be paid to the specific instructions given in the prompts. The final research paper is an open-ended research paper that may be about any subject related to the course, pending approval from your TF. More instructions on these assignments will be given as the course is under way.

All assignments should be printed in Times New Roman (not Calibri, not Arial, not Courier!), 12 point font, double-spaced, with one-inch margins on all sides. The page lengths given are not set in stone — if you go a little over, or a little under, don't waste

time fretting about it. Going extremely over or under the limits may result in a bad grade; the TF retains the option to stop reading lengthy papers whenever they are over the limit.

Written assignments are due *at the beginning* of lecture on the weeks specified in the schedule. Assignments brought in by flustered students at the middle and end of lecture will be judged to be one day late, and "the printer ran out of toner" will *not* be accepted as a valid excuse.

Each day an assignment is late means it will lose a third of its final grade (from A to A-, from B+ to B, etc.). This adds up quickly. Be aware and use good judgment. It is always a good idea to be in contact with your TF if you believe that an assignment will be late.

Whatever your current confidence in your writing ability, if you are interested in boosting your writing skills to another level, please don't hesitate to take advantage of the Harvard College Writing Center. All great writers rely on editors and the eyes of others. Writing is a skill that can be learned and improved upon over time. Even good writers can and do get better.

Use good citation practices. It is recommended that you use the Turabian citation style guidelines (which will be posted to the course website). Whenever referencing specific quotes or ideas from a work, cite it, including the page number. (The page number is rather important—it tells us that you probably didn't just get this off of Wikipedia.)

On Wikipedia: your instructor has contributed to many pages on Wikipedia regarding the topic of this course over the years. That does not mean that Wikipedia is a very reliable source by itself — it often is not. It does mean that if you copy something indiscriminately off of Wikipedia, and don't cite it, your instructor probably will know where it is from. If you copy text verbatim from Wikipedia, you may be copying text that your instructor has in fact written! Don't risk it!

Lectures

Lectures are mandatory and will contain content that is not available in the readings, yet can still be on the exams. Lectures will not be videotaped. Slides from the lectures will be posted on the course website after each lecture, but these are only meant as a reference for later review of notes. They will not be of much use if you do not attend the lectures.

Please refrain from doing non-course related activities on laptops during lectures. It is rude, distracting to others around you, and in the end, just a poor use of your valuable time. Numerous studies have shown that although nearly everybody *thinks* they are a good multitasker, everybody is actually quite poor at it when faced with the many distractions of the web. Your TF may have their own laptop policies for your section.

Section

Section attendance and participation is mandatory. Should you need to miss section, contact the TF in order to work out an alternative assignment to complete instead. Please talk with your TF if you are unclear as to what the expectations for section participation are. Section conduct should be courteous and respectful of your fellow students.

Readings indicated on the lecture schedule are *recommended* to have been done before the lecture under which they are listed, but it is *mandatory* that you do them before section. In particular you should be prepared to discuss the *argument* being made in any of the journal articles we read.

University policies and regulations

We uphold University policies and regulations on the observation of religious holidays, sexual harassment, racial or ethnic discrimination, and assistance available to students with disability issues. Any students requiring special accommodation should talk to the Head TF as soon as possible. We also uphold University policy with respect to cases of plagiarism. Students should make themselves familiar with the respective University regulations and are encouraged to bring any questions or concerns to the attention of the teaching staff.

Collaboration with other students is permitted for section preparation, so long as it is not used as a means to get out of doing assigned reading. Student written work must be individual and without collaboration, with the exception of discussion of general approaches to assignments or assistance with proofreading.

It should go without saying, but plagiarism is unacceptable and *horrible administrative consequences* will follow in its wake. If you find yourself despairing on an assignment, it is better to e-mail your TF and get feedback rather than doing something rash. It is better to lose a bit of the assignment grade because you turned something in a little late than to plagiarize and risk failing the course and getting kicked out of school. If you are in doubt about plagiarism or citation practices, please contact your TF *before* turning an assignment in.

Lecture and Reading Schedule

If a reading assignment is underlined, it means it is a primary source. If it is not, it is a secondary source. Primary sources are readings from the historical period being studied: focus not only on their content, but on the language used to make their particular argument, and the assumptions they either make or take for granted. Use the primary sources to get a "feel" for the thinking of the period. For secondary sources, pay particular attention to the specific arguments made by the author *about* the Cold War. All readings will be posted online. It is recommended you purchase hardcopies of the Edwards and Leslie books.

WEEK 1: Beginnings

Mon. 1/24: *Is there a "Cold War science"?*

Readings:

- Hunter Heyck and David Kaiser, "Introduction" to "New Perspectives on Science and the Cold War"
- Paul Edwards, *The Closed World*, chapter 1: "'We Defend Every Place': Building the Cold War World."

Wed. 1/26: *Prelude: Science, war, and the state, 1870-1945*

Readings:

- Daniel Kevles, *The Physicists*, chapters 7 and 8: "A Need for New Patrons" and "War Should Mean Research"
- Larry Owens, "The Counterproductive Management of Science in the Second World War: Vannevar Bush and the Office of Scientific Research and Development"

WEEK 2: A new American postwar order

Mon. 1/31: *Lessons from World War II: Radar and the Manhattan Project*

Readings:

- Thomas P. Hughes, *American Genesis,* chapter 8: "Tennessee Valley and Manhattan Engineer District"
- Peter Galison, *Image and Logic*, chapter 4: "Laboratory War: Radar Philosophy and Los Alamos Man"
- Vannevar Bush, "Scientific Weapons and a Future War" (1949)

Wed. 2/2: *Managing postwar science*

Readings:

- Vannevar Bush, *Science—The Endless Frontier* (1945)
- First draft of the McMahon Act (1945)
- The Atomic Energy Act (1946)
- Jessica Wang, *American Science in an Age of Anxiety,* chapter 1: "Competing Political Visions for Postwar Science"

WEEK 3: Red science

Mon. 2/7: *Science, technology, and ideology in the USSR*

Readings:

- Loren Graham, *Science in Russia and the Soviet Union*, chapter 6: "Stalinist Ideology and the Lysenko Affair"
- Leon Trilling, "Styles of Military Technical Development: Soviet and U.S. Jet Fighters, 1945-1960"

Wed. 2/9: *From a Soviet bomb to an American H-bomb*

Readings:

- Michael Gordin, *Red Cloud at Dawn*, chapter 3: "Larger than Enormoz"
- "United States Objectives and Programs for National Security (NSC-68)," (1950)
- Peter Galison and Barton Bernstein, "In Any Light: Scientists and the Decision to Build the Superbomb, 1952-1954"

ASSIGNMENT #1 DISTRIBUTED

WEEK 4: Space races

Mon. 2/14: *Sputniks, Mutniks, and the US response*

Readings:

- Walter McDougall, *The Heavens and the Earth,* chapter 2: "Political Rains and First Fruit: The Cold War and Sputnik"
- David Kaiser, "Cold War Requisitions, Scientific Manpower, and the Production of American Physicists after World War II"

Wed. 2/16: *The Space Race: Science, propaganda or both?*

Readings:

- John F. Kennedy, Address at Rice University (1962)
- Thomas Hughes, *Rescuing Prometheus*, chapter 3: "Managing a Military-Industrial Complex: Atlas"
- Walter McDougall, *The Heavens and the Earth*, introduction, and chapter 17: "Benign Hypocrisy: American Space Diplomacy"

WEEK 5: Did science "sell out"?

Mon. 2/21: **NO CLASS:** *President's Day*

Get a start on the readings for the next section, because they are long!

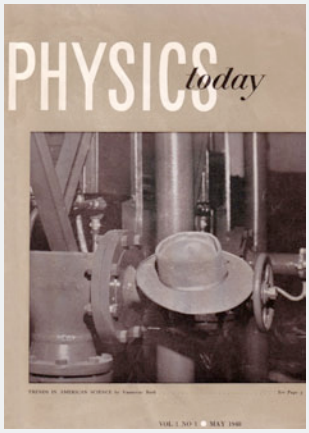
Wed. 2/23: *The Military-Industrial-Academic Complex*

Readings:

- Paul Forman, "Behind Quantum Electronics: National Security as Basis for Physical Research in the United States, 1940-1960"
- Daniel Kevles, "Cold War and Hot Physics: Science, Security, and the American State, 1945-1956"
- Dwight D. Eisenhower, "Farewell Address" (1961)

ASSIGNMENT #1 DUE IN LECTURE

WEEK 6: The two faces of importance



Mon. 2/28: *Scientists under scrutiny*

Readings:

- David Kaiser, "The Atomic Secret in Red Hands? American Suspicions of Theoretical Physicists during the Early Cold War"
- *In the Matter of J. Robert Oppenheimer* (1954) (excerpt)
- FBI File of J. Robert Oppenheimer (excerpt)

Wed. 3/2: *Big Science*

Readings:

- Alvin Weinberg, "Impact of Large-Scale Science on the United States" (1961)
- Stuart Leslie, *The Cold War and American Science,* chapters 1-5.

WEEK 7: Science for hire

Mon. 3/7: **MIDTERM EXAM** (in class)

Wed. 3/9: *Think tanks and summer studies*

Readings:

- Ann Finkbeiner, *The Jasons,* chapter 2: "Jason is Born"
- Paul Edwards, *The Closed World*, chapters 3 and 4: "SAGE" and "From Operations Research to the Electronic Battlefield."
- Project Vista, Final Report (1951), chapter 5: "Atomic Warfare."
- Herman Kahn, *On Thermonuclear War* (1960) (excerpt)
- James Newman, "Two Discussions of Thermonuclear War" (1961)

ASSIGNMENT #2 DISTRIBUTED

3/14-3/18: SPRING BREAK

Have a blast! Get some rays!

Optional beach reading that will give you some amusing facts with which to amaze your friends:
"The Effect of Nuclear Explosions on Commercially Packaged Beverages" (1955)

WEEK 8: Global Cold War science

Mon. 3/21: *The politics of international science*

Readings:

- Dwight Eisenhower, "Atoms for Peace" (1953)
- John Krige, "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence"
- Ronald E. Doel, et al., "National States and International Science: A Comparative History of International Science Congresses" (intro, section on United States, and conclusion only)

Wed. 3/23: *Science between the superpowers*

Readings:

- Alexis De Greiff, "The Tale of Two Peripheries: The Creation of the International Centre for Theoretical Physics in Trieste"
- Itty Abraham, *The Making of the Indian Atomic Bomb*, chapter 2, "Creating the Indian Atomic Energy Commission"

WEEK 9: Anti-technocratic resistance

Mon. 3/28: *Rising environmentalism*

Readings:

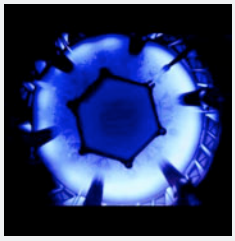
- Rachel Carson, *Silent Spring* (1962) (selection)
- Spencer Weart, *Nuclear fear*, chapters 10 and 11: "The New Blasphemy" and "Death Dust"
- Zuoyue Wang, *In Sputnik's Shadow*, chapter 12: "Responding to Rachel Carson's *Silent Spring*, 1962-1963"

Wed. 3/30: *Science, the university, and the Vietnam war*

Readings:

- Pamphlet, "Who Rules Columbia?" (1968)
- *TIME magazine*, "The Case for Secret Research" (1967)
- Stuart Leslie, *The Cold War and American Science,* chapters 8-9.
- Ann Finkbeiner, *The Jasons*, chapter 5, "Villains"
- Zuoyue Wang, *In Sputnik's Shadow*, chapter 15: "PSAC, the Vietnam War, and the ABM Debate, 1964-1968"

ASSIGNMENT #2 DUE IN LECTURE



Fri. 4/1: **Field trip to the MIT Nuclear Reactor!**

WEEK 10: Cold War biology and psychology

Mon. 4/4: *The politics of DNA*

Readings:

- Jan Sapp, *Beyond the gene: Cytoplasmic inheritance and the struggle for authority in genetics*, chapter 6: "The Cold War in Genetics"
- Walter F. Bodmer and Luigi Luca Cavalli-Sforza, "Intelligence and Race" (1970)
- Michelle Brattain, "Race, Racism, and Antiracism: UNESCO and the Politics of Presenting Science to the Postwar Public"

Wed. 4/6: *Free will in the Cold War? Psychology in the 1950s-1960s*

Readings:

- B.F. Skinner, *Beyond Freedom and Dignity* (1970), chapter 1: "A Technology of Behavior"
- David Engerman, "Social Science in the Cold War"
- Rebecca Lemov, *World as Laboratory*, chapter 10: "The Impossible Experiment"

WEEK 11: Late Cold War science and the state

Mon. 4/11: *The long dream of controlled nuclear fusion*

Readings:

- William C. Gough and Bernard J. Eastlund, "The Prospects of Fusion Power" (1971)
- *For section:* Chandra Mukerji, *A Fragile Power*, chapters 1 and 4: "Scientists as an Elite Reserve Labor Force" and "Managing the Scientific Labor Force"
- *For section:* Naomi Oreskes, "A Context of Motivation: US Navy Oceanographic Research and the Discovery of Sea-Floor Hydrothermal Vents"

Wed. 4/13: *The mature arms race*

Readings:

- David Holloway, "Nuclear Weapons and the Escalation of the Cold War, 1945-1962"
- Donald Mackenzie, "Nuclear Missile Testing and the Social Construction of Accuracy"
- Treaty on the Non-Proliferation of Nuclear Weapons (1968)

WEEK 12: Making the information age

Mon. 4/18: *Electronic revolutions*

Readings:

- Thomas Misa, "Military Needs, Commercial Realities, and the Development of the Transistor, 1948-1958"
- Christophe Lécuyer, "Silicon for Industry: Component Design, Mass Production, and the Move to Commercial Markets at Fairchild Semiconductor, 1960-1967"

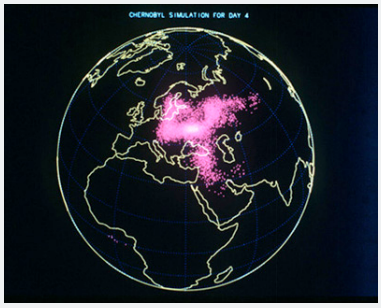
Wed. 4/20: *The rise of the computer*

Readings:

- Paul Edwards, *The Closed World,* chapters 6 to 9: "The Machine in the Middle" through "Computers and Politics in Cold War II."
- *TIME magazine* articles:
    1. "The Thinking Machine" (1950)
    2. "The Cybernated Generation" (1965)
    3. "The Age of Miracle Chips" (1978)
    4. "A New World Dawns" (1983)

FINAL PAPER PROPOSAL DUE IN SECTION

WEEK 13: Cold War legacies



Mon. 4/25: *Nuclear hopes, nuclear fears, redux*

Readings:

- Spencer Weart, *Nuclear Fear*, chapter 15: "Reactor Poisons and Promises"
- J. Samuel Walker, *Three Mile Island*, chapter 10: "The Long-Term Effects of Three Mile Island"
- David Hoffman, *The Dead Hand*, chapters 1-3.

Wed. 4/27: *Ghosts of the Cold War*

Readings:

- Daniel Kevles, "The Changed Partnership"
- David Kaiser, "The Other Evolution Wars"
- J. R. McNeill, "The Biosphere and the Cold War"

Important dates:
Assignment #1 due: **February 23**
Midterm exam: **March 7**
Assignment #2 due: **March 30**
Final exam: TBA, during finals period
Final paper due: **By the end of finals period (May 13)**

Discarded hydrogen bomb casing from the 1950s, discovered in a classified landfill in New Mexico in 1998. The casing is now on display at an Air Force museum.

Assignment #1: Experts in the Early Cold War

Hardcopy due at the beginning of lecture on February 23, 2011

Your assignment is to do a close, contextualized reading of a provided transcript of an executive (secret) meeting of the Joint Committee on Atomic Energy from January 1950, titled "Development of a Super Weapon," (on the website) and to write an essay **not longer than 5 pages in length** discussing the context of the document. When and where and why was this source produced? Who are the main participants, and what kinds of authorities do they represent? What is the document that the Congressmen are discussing in the transcript? What led up to and followed the meeting depicted?

In addition to contextualizing this transcript, your essay should also make an argument about what this document tells us about the contested roles of scientific and political expertise in the early Cold War. What do these politicians regard as the proper role for scientific experts in making policy? Which experts do they esteem and which do they disregard? On what do they base their arguments?

Cite any sources you use, even for the briefest of contextualizations. (Citing Wikipedia for giving background on individual people or committees discussed is okay. You may cite lectures as well by using the format: Professor Wellerstein, "Name of Lecture," History of Science 129, Harvard University (Date). You are not expected to do library research for this paper, though you may make judicious use of internet resources and course readings (esp. the Galison & Bernstein, and Gordin). It is recommended that you use Turabian citation format (Google it for lots of examples), but it is not mandatory. Whatever format you use, be consistent.

Be sure to use both quotes from the transcript and references to other relevant readings in the course so far. In addition, you may also need to use Internet resources (for identifying individuals, committees, etc.) and your lecture notes (for broader context).

Because of the relatively short length of this assignment, you must be judicious in your choosing of topics and quotes to focus on — do not allow the assignment to simply be a selection of quotes with light commentary. Focus on depth over breadth: it is better to develop two ideas well than five ideas poorly.

You should cite the JCAE transcript as: **Transcript of Executive Session ("Development of a Super Weapon"), Joint Committee on Atomic Energy, 81st Congress, 2nd Session (9 January 1950).** Please use the page numbers at the bottom left corner of the transcript for citation purposes (page 1 of the PDF is page 387 of the transcript).

Note that the transcript contains some matters that are not germane to the main question of the Super bomb — don't let them bog you down or overly transcript you. This is a raw transcript, and real historical events are often much more messy (and incoherent) than historians' reconstructions. Note also that any place there is a stamp that says "Sanitized Copy — Sensitive Information Deleted," that means that text was removed when it was declassified in 1989. (The number to the right of each removal — e.g. "6.2" — refers to a Freedom of Information Act exemption, usually on national security grounds.)

Your paper should be written in Times New Roman (please no Calibri or Arial), 12-point font, double-spaced, 1-inch margins, with page numbers and your name on each page (e.g. "Wellerstein, 5" in the bottom right corner).

Assignment #2: Cold War Movie Night

Hardcopy due at the beginning of lecture on March 30, 2011

Choose one of the following Cold War films in which science and/or technology plays a major role in the plot. Watch the film (they are all on reserve at Lamont), and write an essay **not more than 7 pages in length** on the film's depiction of science and/or technology in the contexts and frameworks explored in this course.

Make a strong argument about how the film you have chosen is representative of or emblematic of concerns about science and technology of the particular historical context in which the film was made. All of these films were aimed at very broad audiences (though not all had great popular receptions). In what way do they reveal popular conceptions of science for their historical period? In what ways are they responsive to contemporary issues regarding science and technology, and in what ways did they work to shape later public understanding of these issues? Did the film itself affect the future discourse on science and technology in the Cold War period?

You must do some research into the specific historical contexts of these films. One easy and fruitful way to do this is to use ProQuest Historical Newspapers (in the *Library and Research Resources* part of the course website) to search for newspaper reviews of the film from the time in which it was first aired. You may also want to search JSTOR to see if there are any historical references to the film that may be of use. You are not expected to read every single article or book that mentions these films, but you should be able to explain their context to a reader who is not familiar with the films or the issues involved.

You may also, if you choose, consider how our understanding of the film has changed over time, if you feel this is the case (in some cases, this might be aided by watching any recent remakes or sequels of said film, if they exist — but this is not strictly required, even if said remakes or sequels exist).

You should read chapter 10 of Paul Edwards' *The Closed World* before watching your chosen film, in order to use it as a model and a potential theoretical framework to either use or argue against.

As before, your paper should be double-spaced, 1-inch margins, Times New Roman font, stapled, with your name on it, and with page numbers. Your paper should include a bibliography listing all sources cited. I recommend using the Turabian citation format (Google it for examples), but you can use any standard format you want, as long as your style is consistent.

If you would like to choose a film other than those on this list, please get permission first by e-mailing Prof. Wellerstein by March 27. (Note that some of these films have been remade more recently—use the Cold War editions noted!) All of the below should be available on reserve at Lamont.

The Day the Earth Stood Still (1951)
Gojira (Godzilla) (1954)
Them! (1954)
On the Beach (1959)
Inherit the Wind (1960)
The Manchurian Candidate (1962)
Dr. Strangelove (1964)
Fail-Safe (1964)
2001: A Space Odyssey (1968)
Soylent Green (1973)
Star Wars (1977)
The China Syndrome (1979)
Tron (1982)
The Right Stuff (1983)
WarGames (1983)
The Terminator (1984)
Brazil (1985)
Predator (1987)

Final paper assignment

Hardcopy due to Prof. Wellerstein's mailbox (3rd floor Science Center) by May 13, 2011

Your assignment is to write a 8-10 page research paper on a topic of your choice that relates in some way to any of the material discussed during this course and involves any of the broader themes discussed by this course. Your paper should make an argument, and should marshal historical examples to support this argument. For a paper of this length, organization is key. You should feel free to divide the paper into sections which tackle different aspects of your general topic.

It is not required that you do primary source research for this paper. However, primary source research often allows you to say something "new" more easily than analysis of secondary sources does, so you are encouraged to do it if it is possible with your topic. The "Library and Research Resources" section of the course website has considerable links for online or local primary research possibilities. Keep in mind that primary research can be time consuming — you won't be able to get it done at the last minute, though you have plenty of time between now and the due date if you are organized about it.

Take care not to pick *too* broad a topic. You will not be able to do very broad topics justice in a 10 page paper. If you want to find a way to attack a big issue, find an historical episode, or person, or concept, that helps you do so.

You must write up a very short (1 paragraph) final paper proposal and turn it in by Friday, April 22. It need not know exactly what your thesis or argument is going to be, but it explain what you are planning to tackle, and identify a few general sources you plan to use. This is just meant to be a way to force you to come up with a topic sometime before the end of the semester, and to allow Prof. Wellerstein to be sure that you aren't trying to do something impossible for the length of the assignment. You are not locked into it permanently, but if you want to change your topic after submitting the paper proposal, you must get approval from Prof. Wellerstein. This is all for your own good.

As before, your paper should be double-spaced, 1-inch margins, Times New Roman font, stapled, with your name on it, and with page numbers. Your paper must include a bibliography listing all sources cited. I recommend using the Turabian citation format (Google it for examples), but you can use any standard format you want, as long as your style is consistent. An 8 page paper is perfectly acceptable — you do not need to "pad" the paper. Please try not to go over the 10 page limit.

If you are completely at sea, get in touch with Professor Wellerstein, and he can help you pick a topic that is tailored to your interests. If you would like to do primary research, get in touch with Professor Wellerstein and he can help you out.

Another great resource is Fred Burchsted (burchst@fas.harvard.edu), the Widener Research Librarian assigned to topics in the History of Science.