Department of History – University of South Carolina

History 492P

Information Technology Revolutions: Past and Present

Tuesday and Thursday, 3:30-4:45 PM, Gambrell Hall 250

Dr. Joseph November
Gambrell Hall 212
Office Hours: Wed. 1:00-3:00, Th. 10:00-12:00, other times by appointment
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Course Description:

When the digital electronic computer first appeared, one expert in the field estimated that a half-dozen of the big, expensive machines would satisfy America's computing needs. The nation now depends in its daily life on hundreds of millions of tiny, cheap computers, most of them embedded within large information and communications systems or beneath the surface of devices ranging from airplanes to toasters. Computers we can see and use fill our offices, schools, and homes. They have become a commodity, a common appliance.

In the process, computers have come to embody a computational mode of thinking that has shaped not only the solution of problems but their very conceptualization. During the past two decades in particular, the capacity to build interactive models simulating our understanding of the workings of stars, molecules, economies, environments, living systems, warfare, and even the human mind has fundamentally changed the way we think about the world and ourselves. The instant availability of immense amounts of information from around the world is now reshaping our sense of what we can know and how we go about finding it out.

There was nothing inevitable about the development of the computer over the past half-century, either as a device or a way of thinking. Its evolution has been contingent on scientific and technological innovation, on economic and political circumstances, and, perhaps most importantly, on entrepreneurial matching of technical possibilities with potential markets. The course will examine a variety of historical sources, including early computers and software, to explore how the world of the computer acquired its present form.

The course is designed for students with a particular interest in history or computing, though students need not be majors in those disciplines.

Learning Outcomes:

Upon successful completion of the course, students will have learned to:

- Convey sound historical arguments by drawing on primary and secondary sources
- Identify the chronological and geographical settings of important developments in the history of computing worldwide
- "Read" an artifact to gain insight into the society that built it
- Recognize historical relationships between developments in science, information technology, and society

Course Requirements:

You are responsible for completing the assigned readings (~70 pages) each week. Your mastery of the readings will not only help your participation in class, but also your performance in the entire course. Besides the two examinations, you are also required to write three 750-1000-word (3-4 pages, double-spaced) essays, bearing in mind that as an historian your job is to make an argument supported by explicit and precise references to the assigned texts and lecture materials.

Grading:

Your grade in the course will be determined by this formula:

Writing Portfolio (3 Essays):	45%
Midterm:	20%
Final Exam:	25%
Pop Quizzes and In Class Activities:	10%

Required Texts:

One textbook is required for this class. All other readings will be posted to Blackboard. Please let me know during the first week of class if you are not able to log on to this course in Blackboard!

Martin Campbell-Kelly & William Aspray, *Computer: The History of the Information Machine* (2004 – *Second Edition*)

Course Policies:

Cheating deprives you of the opportunity to learn as much as you possibly can in this course. Therefore, cheating wastes your time and mine. But cheating is a more serious than a simple waste of time, because it presents someone else's effort as your own and disrespects the other students in the class by offering you an advantage more honest students are not

availing themselves of. As such, cheating provides a direct conflict to the Carolinian Creed by compromising both your academic and personal integrity.

Consequently, cheating will be actively and aggressively policed in this class; cheating of any sort will be turned into the Dean's Office. This policy applies to both cheating on exams and plagiarism on papers.

1. You may not bring any study aids or crib sheets to class for exams. You may not copy from any other student, either directly or by way of electronic aids such as cell phones, etc. The exam will be actively proctored; we will circulate through the room looking for violators. Exams are also designed to prevent cheating by asking questions in a way that cannot easily be copied or cribbed.

2. Plagiarized papers are those that present anyone other than your own ideas as your thoughts. This includes information pasted from websites as well as published materials. Papers plagiarized from the internet will be harshly penalized. If you use external sources, you must provide proper citations (you will be given a handout about how to do proper citations before the first paper). Paper topics are also designed to minimize the possibility of plagiarism (especially to minimize downloading papers); therefore you must cohere to the paper guidelines. All of this effort is to provide a level-playing field for the assignments in the class and to reward truly exceptional personal effort. Please feel free to speak to me if you have any questions about how to properly cite your sources. Ignorance is not an excuse!

PLAY IT SAFE. DO NOT CHEAT—IT'S NOT WORTH IT! WHEN IN DOUBT ABOUT FOOTNOTING, ERR ON THE SIDE OF CAUTION AND CITE YOUR SOURCE.

Extensions: Requests for deadline extensions will be considered only until one day before the class in which the project is due. This means there will be no last-minute extensions, regardless of the legitimacy of the cause (this includes computer glitches, printer problems and hangovers—please backup your work to prevent last minute disasters and "act like you got some sense"). **Papers are due at class time and must be handed in printed on actual paper (i.e., no emailed papers, period)**. Late assignments will be penalized one grade per class meeting the paper is late.

Note about Office Hours:

I encourage you to visit me during office hours. I would be very pleased to talk to you about the material in the class or any other relevant topic that might be on your mind. I am especially eager to meet with you if you are having trouble with the class, either in preparation for one of the assignments or more generally with the reading load or the style of discussion or anything that might be worrying you. I can only help you if I know what the problems are.

Course Schedule:

8/21 (Th) Opening discussion: Welcome to the History of Computing

8/26 (T) Reading the Machine

Langdon Winner, "Do Artifacts Have Politics?" *Daedalus* (Winter, 1980), 121-136.

Mahoney, Michael S. "The History of Computing in the History of Technology." *IEEE Annals of the History of Computing* 10 (1988): 113-125.
URL: http://www.princeton.edu/~mike/articles/hcht/hchtfr.html

8/28 (Th) Who's a Computer? What's a Computer?

Written Assignment 1 due:

Conduct your own reading, working directly with any non-computer artifact to elicit its meaning from its structure. Your reading, set forth in a 3-page (double-spaced) essay, should focus on the object itself. What systems of knowledge, technology, and transportation are necessary to produce (from raw materials) and use such an object? Is the object useful by itself? What can this object tell you about the society that produced it? You may seek assistance from secondary sources for technical details, but information of a broader sort not rooted in the physical design of the artifact will be treated as irrelevant. We are interested not in what others have said about the object, but in what you can see in it.

09/02/08 (T) Babbage's Enlightened World

Martin Campbell-Kelly & William Aspray, *Computer: The History of the Information Machine* (2004 – Second Edition), 3-21.

Charles Babbage, *On the Economy of Machinery and Manufactures,* chapters 1, 8, 20
http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/babbage/
http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/babbage/babb1 (chapters 1 & 8)
http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/babbage/babb2 (chapter 20)

09/04/08 (Th) Romantics Against Computing
L.F. Menabrea, *Sketch of the Analytical Engine* (1842)
http://www.fourmilab.ch/babbage/sketch.html

09/09/08 (T) Taylorism, Skyscrapers, and Paperwork
Jackson Lears, "Man the Machine." The New Republic (September 1, 1997), 25-32.
Campbell-Kelly & Aspray, 23-44

09/11/08 (Th) Turing's Possibly Impossible World
Christopher H. Nevison, *Turing Machines and What Can Be Computed*
Play with a Turing Machine Simulator, using either software provided by me or online (e.g. http://web.bvu.edu/faculty/schweller/Turing/Turing.html)

09/16/08 (T) World War II Computing 1: Turing and the Bombe
Selections regarding Alan Turing's work from Andrew Hodges' website: http://www.turing.org.uk/turing/

Campbell-Kelly & Aspray, 45-65.

09/18/08 (Th) World War II Computing 2: Johnny and the Bomb
Campbell-Kelly & Aspray, 69-91.

Howard Aiken, "Proposed Automatic Calculating Machine," as reprinted in *Makin' Numbers*, Cohen, I.B. and Welch, G.W, eds. (1999).

"First Draft of a Report on the EDVAC" (1945)

09/23/08 (T) "Giant Brains": Electronics and the Postwar Emergence of Scientific Computing
Campbell-Kelly & Aspray, 93-115

Vannevar Bush, "As We May Think," *The Atlantic Monthly*, July 1945

9/25/08 (Th) The Computer Industry Starts Up
Thomas Haigh, "The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954-1958." *IEEE Annals of the History of Computing* 23, 4 (2001).

9/30/08 (T) Sowing the Whirlwind

Written Assignment 2 due:
You have come across a discarded computer operations manual (to be discovered by you in the library or online) that dates to the 1950s or 1960s. In a 4-page (double-spaced) essay, describe the capabilities and limitations of that early syste,. What knowledge was necessary to operate the computer? What did users do then that was different from what they do today? What does the manual tell you about the society that produced it? Would have you liked to have entered that line of work?

10/02/08 (Th) MIDTERM EXAM 10/2/06 IN CLASS (covers material to 9/30)

10/07/08 (T) The Transistor and the Birth of Silicon Valley
View "Birth of the Transistor"

Read timelines on PBS site for documentary, "Transistorized!"
http://www.pbs.org/transistor/

10/14/08 (T) The LINC Revolution
J.C.R. Licklider, "Man-Computer Symbiosis", *IRE Transactions on Human Factors in Electronics*, HFE-1(1960), 4-11, and "The Computer as Communication Device", *Science and Technology*, April 1968 [reprints by Systems Research Center of DEC, Palo Alto.

Joe November, "LINC, Biology's Revolutionary Little Computer," *Endeavour*, 28 (2004), 125-131.

10/16/08 (Th) System 360 and the Mythical Man-Month
Frederick P. Brooks, Jr., "The Mythical Man-Month" (1975)

IBM Songs:
http://www-03.ibm.com/ibm/history/exhibits/music/music_clips.html

Campbell-Kelly & Aspray, 117-137.

10/21/08 (T) "Machines Who Think": The Roots of Artificial Intelligence
John McCarthy, Marvin Minsky, Nathaniel Rochester, Claude E. Shannon, A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence (1956)

Alan M. Turing, "Computing Machinery and Intelligence," *Mind* 59(1950).

10/23/08 (Th) "What Computers Can't Do": AI Grows Up
Excerpts from: Hubert L. Dreyfus, *What Computers Can't Do* (1972); Pamela McCorduck, *Machines Who Think* (1979).

10/28/08 (T) Multics, Unix, and the New Languages
Campbell-Kelly & Aspray, 185-204.

Dennis M. Ritchie, "The Development of the C Language"

10/30/08 (Th) Less is Moore: Intel and the Microprocessor
Campbell-Kelly & Aspray, 141-162

Supplemental reading: Cadet Hall of Fame (USMA)
http://www.dean.usma.edu/ietd/cchall.cfm

11/06/08 (Th) Computing Gets Personal I
Campbell-Kelly & Aspray, 207-229.

View *Pirates of Silicon Valley*

11/11/08 (T) Computing Gets Personal II
Campbell-Kelly & Aspray, 231-253

11/13/08 (Th) Fire in the Valley: Stanford, Intel, and Micro-computing in California
Campbell-Kelly & Aspray, 163-184.

11/18/08 (T) Computers and Gender
Michael S. Mahoney, "Boys' Toys and Women's Work: Feminism Engages Software," in Angela N.H. Creager, et al. (eds.), *Feminism in Twentieth Century Science, Technology and Medicine* (Chicago: University of Chicago Press, 2001), Chap. 9.

11/20/08 (Th) Simulation and Beyond
Michael S. Malone, "God, Stephen Wolfram, and Everything Else," *Forbes*, 11/27/2000
http://www.forbes.com/asap/2000/1127/162_print.html

11/25/08 (T) Weaving the World Wide Web
Campbell-Kelly & Aspray, 255-279

Written Assignment 3 due: Write a 4-page (double-spaced) essay on what you believe the most significant development in the history of computing has been. You can discuss a person, a system, a concept, etc. Be sure to support your claims with explicit references to the assigned texts, lecture notes, and/or movies.

12/02/08 (T) The Age of YouTube
Randy Pausch, "Achieving Your Childhood Dreams," 9/18/2007
http://www.youtube.com/watch?v=ji5_MqicxSo

12/04/08 (Th) Digital Distopia or Digital Utopia?
Bill Joy, "Why the Future Doesn't Need Us"
http://www.wired.com/wired/archive/8.04/joy.html

Vernor Vinge, "The Singularity"
http://www.ugcs.caltech.edu/~phoenix/vinge/vinge-sing.html
Excerpts from Raymond Kurzweil, *The Singularity Is Near: When Humans Transcend Biology* (2005).

FINAL EXAMINATION: December 9, 2008. 9:00 AM