HIST 399: How The Computer Became Universal

Thomas Haigh, Professor of History

Meets: Monday & Wednesday 1:00 - 2:15 in Honors House 195

Instructor: Thomas Haigh, Holton Hall 349. Office hours by appointment. Thomas.haigh@gmail.com

Format: This is intended to be an in-person seminar format class. Because of my professional travel commitments a small number of course meetings will take place via zoom. These are marked on the syllabus. Some course meetings will take place in my retrocomputing lab (Holton 402). Students will also need to sign up for lab times outside class to complete one of the assignments.

Description: While computer theorists often define programmable computers as "universal machines," following the work of mathematician Alan Turing, in practice the first electronic computers were specialized and limited giant machines hand-built for scientific calculations during the 1940s. Since then, the computer has undergone a remarkable transformation to produce today's smartphones, laptops, cloud data systems and embedded processors: technologies used daily by most of the humans on earth to accomplish every imaginable task in their personal and work lives.

This seminar tells the story of that transformation as a series of linked stories in which successive groups of users gave the computer new powers. The computer first became a scientific supertool, business data processing device, and military control system. Each group remade it according to its needs, along the way creating new platforms, software technologies, and hardware features. Later it became a communications medium, interactive tool, and personal plaything. Eventually it became a universal media device and publishing platform, before dissolving itself to replace the insides of our cars, telephones and televisions.

Textbook: Thomas Haigh & Paul Ceruzzi, *A New History of Modern Computing* (MIT Press, 2021). All other readings will be made available in Canvas.

Exciting news: the library has purchased a multi-user ebook edition, accessible here. It has a limited download ability that seems to be capped at 100 pages but you can read the whole book in a web browser. I also have some copies I can sell at author price ($20) to those of you who want a paper copy.

Learning Objectives

- Analyze and interpret a variety of historical sources, including texts, images, computer hardware, and computer software.
- Read and use primary and secondary sources critically and effectively

- Understand history both as a body of knowledge and as an intellectual and social process.
- Situate technological change without broader historical and cultural contexts.
- Use evidence and citations effectively to construct and support a larger argument

Breakdown of course credit

Course participation: 35%. Includes evidence of careful class preparation, active contribution to in-class discussion, and posts made prior to class for each week to the discussion forum. For each week (except the first week) you should post a paragraph or two ahead of class in the discussion forum for that module, focused on something you found interesting in the assigned reading. Each post should raise a question for possible discussion in class. I will use these to guide the in-class discussion. Please post by midnight the day before the first class in a module, i.e. by Sunday night, to give us a chance to read your post before class).

Term paper: 30%. The default form for this assignment will be a paper of 2-3,000 words on a topic selected by the student in consultation with the professor. It should advance an original argument through engagement with multiple class readings and additional relevant secondary sources. However, alternative formats can be negotiated for students with particular interests.

Two short papers: 10% each. Each advances an original argument through engagement with the readings for multiple weeks of class. At the beginning of semester the topics shown for each paper are those from last semester and are FYI. I may be updating them based on student interests and the focus of our discussion.

Material engagement paper: 15%. Based on an analysis of the student's own experiences using a vintage computer system installed in the retrocomputing lab. I will hold several lab sessions in which the lab is open for students outside class time, and some sessions of class will meet there.

Topics and Schedule

The course content is structured into the following modules. Each module will take one week of class time, and include several readings. **Note: Readings and topics will be updated during the course of the semester. Always refer to the latest online version of this syllabus!**

(NO CLASS JAN 22 - I am at a workshop in Cambridge).

1: The Computer is Invented (Week of Jan 27)

- Haigh & Ceruzzi, introduction & ch. 1Download Haigh & Ceruzzi, introduction & ch. 1
- Light, Jennifer S. "When Computers Were Women." *Technology and Culture* 40, no. 3 (July 1999): 455-483.
- Osborn, Roddy F. "GE and UNIVAC: Harnessing the High-Speed Computer." Harvard Business Review 32, no. 4 (July-August 1954): 99-107

2: The Computer Becomes a Scientific Supertool and a Data Processing Device (Week of Feb 3)

- Haigh & Ceruzzi, chs. 2 & 3
- Haigh, Thomas. "Masculinity and the Machine Man." In *Gender Codes: Why Women are Leaving Computing*, edited by Thomas J Misa, 51-71. Hoboken, NJ: IEEE Computer Society Press, 2010
- Worthington, W B. "Application of Electronics to Administrative Systems." *Systems and Procedures Quarterly* 4, no. 1 (February 1953): 8-14

3: The Computer Becomes a Real Time Control System and an Interactive Tool (Week of Feb 10)

- Haigh & Ceruzzi, chs. 4 and 5
- Rankin, Joy Lisi. *A People's History of Computing in the United States*. Cambridge, MA: Harvard University Press, 2018. Chapters 1 & 2 only.
- Levy, Steven. 1984. *Hackers: Heroes of the Digital Revolution*. Garden City, NY: Anchor Press/Doubleday. Chapters 1-3 only.

4: The Computer Becomes a Communications Platform (Week of Feb 17)

- Haigh & Ceruzzi, ch. 6.
- Turner, Fred. 2006. "Virtuality and Community on the WELL." Chapter 5 in *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*. Chicago: University of Chicago Press.
- "The Boshwash News" (a collection of pages between chapters) in Hiltz, Starr Roxanne and Murray Turoff. 1993. The Network Nation: Human Communication Via Computer. Boston: The MIT Press. (1st ed: Addison-Wesley, 1978).

5: The Computer Becomes a Personal Plaything, Part 1: Early Personal Computing (Week of Feb 24)

- Haigh & Ceruzzi, ch. 7 (to p. 189 only)
- Evans, Christopher. 1979. The Micro Millennium. New York: Viking. Chapters 5-7, 10-11 and 15-16 (pages 72-111, 146-175 and 236-262).
- Petrick, Elizabeth. “Imagining the Personal Computer: Conceptualizations of the Homebrew Computer Club 1975-1977.” IEEE Annals of the History of Computing. Vol. 39, No. 4. Oct-Dec 2017, pp 27-39.

- Lowood, Henry. 2009. “Videogames in Computer Space: The Complex History of Pong.” IEEE Annals of the History of Computing 31, no. 3:5-19.

Retrolab: Apple IIe (expanded version of Apple II). Morrow Micro Decision (CP/M system). Altair simulator online at https://s2js.com/altair/sim.html.

6: The Computer Becomes a Personal Plaything, Part 2: Home Computers (Week of Mar 3)
Haigh & Ceruzzi, ch. 7 (the rest).

- Nooney, Laine. *The Apple II Age*. Chicago, Il: University of Chicago Press, 2023. Ch. 6 only.
- Gazzard, Alison. *Now the Chips Are Down*. Cambridge, MA: MIT Press, 2016. Ch. 1 only.
- Spufford, Francis. "Masters of their Universe." *The Guardian*, 18 Oct, 2003.
- Švelch, Jaroslav. *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games*. Cambridge, MA: MIT Press, 2019. Ch. 3 only.

Retrolab: Atari VCS, BBC Microcomputer, Sinclair Spectrum 128.

(Short paper #1 Due March 7)

7: The Computer Becomes Office Equipment, Part 1: Word processors and Spreadsheets (Week of Mar 10)

- READINGS MAY BE UPDATED

- Haigh & Ceruzzi, Ch. 8 (we'll focus on the part up to p. 216 plus 223-227 on software)
- Levy, Steve. 1984. "A Spreadsheet Way of Knowledge." Reprinted version from medium.com.
- Haigh, Thomas. 2006. "Remembering the Office of the Future: The Origins of Word Processing and Office Automation." *IEEE Annals of the History of Computing* 28 (4):6-31.
- Kirschenbaum, Matthew. 2016. *Track Changes: A Literary History of Word Processing*. Cambridge, MA: Harvard University Press. Chapters 5 and 7 only.

Retrolab: VisiCalc running on an Apple II, Lotus 1-2-3 running on an IBM Portable PC, Wordstar and Wordperfect running on various PCs. Kaypro II CP/M machine.

(Week of Mar 17: NO CLASS because SPRING BREAK!)

8: The Computer Becomes Office Equipment, Part 2: The IBM PC (Week of Mar 24 -- both sessions online)

- READINGS MAY BE UPDATED

- Haigh & Ceruzzi, Ch. 8 (continued)
- Williams, Gregg. "A Closer Look at the IBM Personal Computer." Byte 7, no. 1 (January 1982): 36-68.
- Nooney, Laine. "How the Personal Computer Broke the Human Body," Vice.com, May 12, 2021.
- Tinn, Honghong. "From DIY Computers to Illegal Copies: The Controversy Over Tinkering with Microcomputers in Taiwan, 1980-1984." *IEEE Annals of the History of Computing* 33, no. 2 (Apr-Jun 2011): 75-88.

Retrolab resources: IBM Portable PC, IBM PCjr, Zenith PC laptop, 386 desktop PC.

9: The Computer Becomes a Graphical Tool (Week of Mar 31 -- both sessions online)

- Haigh & Ceruzzi, Ch. 9
- Reading TBA
- Hintz, Eric. "Susan Kare. Design Icon." *IEEE Annals of the History of Computing* 40, no. 2 (Apr-Jun 2018): 48-61.

Retrolab resources: Early Mac systems, Atari ST, Laserprinters, scanners.

10: The PC Becomes a Minicomputer (Week of April 7)

- Haigh & Ceruzzi, Ch. 10
- Ullman, Ellen. 1997. *Close to the Machine: Technophilia and its Discontents*. San Francisco: City Lights, 17-32 & 95-121.
- Coupland, Douglas. *Microserfs,* 1995. Chapter 1 (pages 1-42). New York: Harper. Given here as published online by Wired.com.

Retrolab: Windows 3.1 PC (386 desktop), Windows 95 desktop (Pentium), Windows 98 laptop (Pentium), Windows 2000 desktop PC (Pentium III).

11: The Computer Becomes a Universal Media Device (Week of April 14)

- Haigh & Ceruzzi, ch. 11
- Gaboury, Jacob. *Image Objects: An Archaeology of Computer Graphics*. Cambridge, MA: MIT Press, 2021. Chapter 5 only.
- Sterne, Jonathan. *MP3: The Meaning of a Format*. Durham, NC: Duke University Press, 2012. Chapter 6 ("Is Music a Thing?") only.

- Mossberg, Walter. "Apple Brings Its Flair for Smart Designs to Digital Music Player," *Wall Street Journal*, November 1, 2001. (A review of the original iPod)

Retrolab: Various cameras, iPod (3rd generation), iPod Shuffle, MP3 players running on Windows 95 (Pentium desktop), 98 (Pentium laptop), MacOS (PowerPC) & Windows 2000 (Pentium III). DVD player on Pentium III. Nintendo 64 console.

Material Engagement Paper Due April 19

12: The Computer Becomes and Publishing Platform and a Network (Week of April 21)

- Haigh & Ceruzzi, chs. 12 & 13
- Ricard, Jack. "Webwatch: Mosaic Netscape Network Navigator."*Boardwatch*, December 1994, 40-49.
- Levy, Steven. 2012. "Don't Be Evil." Ch. 3 of *In the Plex: How Google Thinks, Works, and Shapes Our Lives*. New York: Simon & Shuster.

Retrolab: Old web browsers running on various Windows and Mac computers. I will try to get some of them online, or at least loading historical websites from disk. Also, see https://oldweb.today/ to emulate old browsers with websites caches at archive.org.

13: The Computer is Everywhere and Nowhere: Smartphones and PDAs (Week of April 28)

- Haigh & Ceruzzi, Ch. 14
- Ames, Morgan. *The Charisma Machine: the Life, Death, and Legacy of One Laptop Per Child*. Cambridge, MA: MIT Press, 2019. Introduction & ch. 1 only.
- Merchant, Brian. The One Device: The Secret History of the iPhone. New York: Little, Brown, 2017. Chs. 8 and 12 only.

Retrolab: Windows 3.1 slate computer (486), Apple Newton, various Palm Pilots, Dell Axim PDA, Windows Phone.

(Short Paper #2 Due May 3)

14: Apocalyptic Epilogue (Week of May 5) - READINGS WILL BE UPDATED

- Haigh & Ceruzzi, Ch. 15
- Discussion, feedback, and course evaluations.
- Dzieza, Josh. "The 8th Wonder of the World," The Verge, Oct 19, 2020.
- Metz, Cade et at, "Ego, Fear and Money: How the A.I. Fuse Was Lit," New York Times, December 3, 2023.

- Weise, Karen et al, "Inside the A.I. Arms Race That Changed Silicon Valley Forever," New York Times, December 5, 2023.
- Simon, Herbert A. "The Corporation: Will It Be Managed By Machines?" In Management and Corporations 1985, edited by Melvin Anshen and George Leland Bach, 17-55. New York: The McGraw-Hill Book Company, 1960 Pages TBA

(Term Paper Due May 17)

Grading Scale

I will use the weightings given above to turn your performance in each area of the course into a numerical average. This will translate to your overall course grade as follows:

Grade	Lower bound	Upper bound
A	94.00%	N/A
A-	91.00%	93.99%
B+	88.00%	90.99%
B	85%	87.99%
B-	82%	84.99%
C+	79.00%	81.99%
C	76.00%	78.99%
C-	73.00%	75.99%
D+	70.00%	72.99%
D	67.00%	69.99%
D-	64.00%	66.99%
F	N/A	63.99%

Course Specific Policies

- **Class Attendance:** Attendance is required and will be taken at each class meeting section. Everyone is allowed to miss two discussion meetings without penalty. You will be penalized by 1.25% on your **overall course grade for** your third unexcused absence, and by another 1.25% for each additional unexcused absence after that. Missing several classes will lower your overall grade and may make the difference between passing and

failing the course. However you should not attend the discussion section if you are feeling ill or have been exposed to COVID-19. If the absence occurs for reasons outside your control, such as a medical or family emergency or a technological breakdown, please get in touch with me as soon as possible.

- **Late Work:** All work will be penalized by 2% for each day or part day after the deadline it is received. All deadlines are shown in Canvas. It is your responsibility to be aware of them. I suggest marking them on your calendars now. Deadline will never move forward from those shown at the start of the semester. The maximum reduction will be to a score of 50%. Extensions require a good reason and should be arranged in advance.
- **All Papers Are Required**: You will automatically receive the grade of F for the course if you fail to submit any paper, even if averaging in a zero for the missing paper(s) might otherwise give you a different overall grade.
- **Academic Misconduct:** This course is subject to the University's Academic Misconduct policy, which can be found on the web here (). Please read it carefully. Any evidence of plagiarism on the assignments or cheating on the examinations will be punished with a grade of 'F' for the **entire course.** This includes handing in work for which you have received credit in another course (even if it is your work), handing in someone else's work or a portion of their work, cheating on examinations, or failing to acknowledge (cite) your sources. Directly quoted material not placed within quotation marks or indented is also plagiarism, even if you do include a citation.
- **Use of Generative AI:** Feel free to use whatever tools help you in learning the course materials. However papers should be written by you, not by a computer, and reflect your own writing style and ideas. The use of AI to cheat on assignments is hard to prove, but one tell tale sign is the presence of invented citations. If you cite sources that do not exist and are unable to produce them when I request then I will treat this as academic misconduct and give an F grade for the course. Fabricating sources is academic misconduct whether done by you or by a computer. For this reason, I suggest saving copies or links for all cited sources. Because the paper assignments in this course have focused questions and require references to specific assigned materials you would in any event find that AI tools produce bad papers.
- **Participation by Students with Disabilities:** If you need special accommodations in order to meet any of the requirements of this course, please work with the Accessibility Resource Center to obtain documentation of your needs.
- **Workload Policy:** You will spend about 38 hours in class (75 minutes x 30 classes). For a typical student, doing the assigned readings and taking careful notes should take about 4 hours for each of the 15 topics, for a total of up to 60 hours. There are three short papers, each of which might take 12 hours to produce. The term paper might take 20

hours to do well. All together, the course should take approximately 154 hours of work time for a typical student. However students will be graded according to the work they produce, not the time spent producing it.

General UWM Course Policies

In addition to the above course-specific policies, all standard UWM course policies apply. These are available from https://uwm.edu/secu/syllabus-links/.

GER Learning Outcomes

Because it is offered with the HIST 399 code, this course satisfies the divisional breath requirement for Social Sciences. The course achieves this by satisfying the two following learning outcomes. Students will be able to:

a. recognize and analyze intrapersonal, interpersonal, and/or socio-cultural factors associated with individual behavior, collective action, or societal development; and

b. identify and critically evaluate the function, structure and development of human collectivities, organizations, institutions, and cultures, their infrastructures and interrelationships;

In addition, the course addresses the following UW System Shared Learning goal

c. Effective Communication Skills including listening, speaking, reading, writing, and information literacy.

These will be assessed using additional rubric items for three of the term papers. (a) will be assessed with a rubric item when grading paper 1. (b) will be assessed as a rubric item when grading paper 2. (c) will be assessed with a rubric item when grading the term paper.

Required Statement from the History Department

“As you can see, I am the author/co-author of *A New History of Modern Computing*, for which I receive royalties of $2.40 per new book sold. I do not receive any royalties from the sale of second-hand books. I will donate the royalties that I receive from assigning this book to this class to the UWM Foundation’s Friends of History account, which supports undergraduate scholarships.”