

MANUFACTURING MINDS

From Babbage to ChatGPT

STSC 2421-401 | HSOC 2421-401 | Fall 2023

MW 7:00–8:29pm, [PCPE 100](#)

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When asked to tell its own history, ChatGPT answers literally, describing (vaguely of course) its own training data set. When pressed to describe the longer history of “technology like you,” it mentions early computer science, programs that played chess or solved math problems, before naming deep learning algorithms and big data as the key breakthroughs. This lineage is not untrue, but it ignores the wider context in which individuals and organizations have come to pursue this strange dream of crafting an intelligent object. As an uncannily lucid conversation partner who freely performs all manner of textual tasks, ChatGPT participates in a longstanding tension in the history of information technology between the goals of manufacturing minds and making mindless clerical workers. In this course we historicize that tension in three domains—calculation, games, and knowledge work—all of which directly inform our efforts to imagine what ChatGPT and its ilk might be. Throughout, we will attend to the ways machinery shaped specific tasks’ construction in relation to gender, race, and class identities. We will see how technologies often imagined as disembodied are always material, interacting with human bodies and physical environments.

Welcome to the course! We meet **Mondays and Wednesdays, 7:00 to 8:29 pm, in the Perelman Center for Political Science and Economics (133 S. 36th St.), room 100**. Both building entrances are ADA accessible. There’s a gender neutral restroom on the lower level, accessible by elevator.

All course materials will be available on Canvas. You do not need to buy anything for this course.

My office hours are Weds. 1:00–3:00 or by appointment. Please come say hi! There’s no need to let me know in advance that you’re coming, and you don’t need to have a specific question about your work. I’m also happy to arrange meetings outside my scheduled office hours – just email me and we can find a time that works. My office is in Claudia Cohen Hall (249 S. 36th St.), room 175. To get there, enter the College Office on the north side of the first floor and, at Reception, say you’re here to see me. The main ADA accessible entrance to Cohen Hall is on the east side of the building. Gender-neutral restrooms are on the ground floor.

EXPECTATIONS

COMMUNITY

We all share the responsibility to make this class a community where everybody is comfortable sharing their views and ideas. I prioritize operating with respect, courtesy, and sensitivity at all times, and I expect the same from you. Everyone is equally welcome here regardless of their race, ethnicity, gender identity, sexuality, religious beliefs, physical or mental health status, or socioeconomic status. We may not agree on every question concerning every issue that we consider in this course; respectful disagreement is welcome. We will engage in serious debate, deep thinking, attentive listening, and courteous dialogue.

Part of our shared commitment to this community is acting honestly within it. You are expected to uphold [Penn's Code of Academic Integrity](#) in all areas of the course. If you're unsure whether something would be a violation, please ask.

In particular: you are very welcome to see what ChatGPT has to say about things! One of our purposes here, after all, is to understand where this thing comes from and what it could be. But we also aim to understand what *human* intelligence is, and remains, in the age of a disorienting new technology. The process of writing is a particular kind of thinking, and our goal is to use that practice ourselves to develop our *own* perspectives on the technology. You are welcome to quote AI-generated text in your essays, if you like, in order to discuss it. Any AI-generated text should be clearly presented as a quotation. If you find it helpful to use a chatbot in some way, then describe that process honestly, and reflect explicitly on it. (Be aware that chatbots are prone to “hallucinate” nonexistent sources and fabricated “facts”; they cannot be trusted for information gathering.) This is not only about academic integrity; it also makes for a stronger, more interesting essay.

WEIGHTING OF REQUIREMENTS

Attendance and participation:	20%
Think Pieces:	30%
Group presentation:	20%
Final paper:	30%

ATTENDANCE AND PARTICIPATION

Class time will be a hybrid of lecture and discussion. Attendance and participation form a major part of this course. If you must miss class, you are required to submit a Course Action Notice through [Path@Penn](#).

Per university policy, absences due to medical reasons, family emergencies, and travel for varsity sports will be considered excused, meaning you'll have an opportunity to submit a brief assignment

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to make up the missed class. Absence for observance of holidays not formally observed by the university will also be excused, but **you must notify me in the first two week of the semester of any holidays for which you will miss class.** Your first unexcused absence will be treated as excused, no questions asked. Subsequent unexcused absences will affect your participation grade.

While I expect everyone to contribute to our conversations, I also recognize that speaking in front of groups does not come naturally to everyone, so speaking is not the only component of your participation grade. Some days, we will write and submit short responses during class time. These will not be formally graded; all thoughtful, well-informed responses will receive full credit.

THINK PIECES

Over the course of the semester you will submit several short pieces of writing (about 1,000 words each). Loosely speaking, each think piece should be motivated by an argument, that is some central claim that you propose early on, and then support using evidence from the readings. However, these essays need not be as argumentatively structured as a conventional history essay; your motivation may revolve more around a question than an answer, for example. The goal is pull your reader in with a sense that the piece has some overarching thing to say.

Late submissions will be penalized one third of a letter grade for each day they are late.

**** Think Piece Flex Days:* You have two flex days to use for any reason on any think piece. Each flex day grants you a 24-hour extension, no questions asked. You may use both on the same assignment, or one each on two different think pieces. **To use flex days, you must indicate in writing at the top of the essay that you are using (one or two) flex days on that piece.** Flex days **cannot** be used on the final paper, as I have already given it the latest possible due date.

1. Reflection on Two Sources

DUE: 11:59pm, Tuesday, September 26, 2023

Select two readings from Unit I. Briefly describe the content and historical context of each, then put them in conversation with one another. Do their viewpoints align? Conflict? A bit of both? What is your position on the issues at stake? How might reading these sources side by side change our view of them, and of AI?

2. On the Act of Calculating

DUE: 11:59pm, Sunday, October 22, 2023

Describe one way (electronic or paper-based) that you performed calculations in school at some point growing up. How would you describe what this practice demanded of your intelligence? Do you see the material device or supplies involved as participating in any sort of intelligence? Discuss this way of calculating in relation to at least two assigned readings from Unit II.

3. Pick one of the prompts below:

DUE: 11:59pm, Sunday, November 12, 2023

The Meaning of Chess/Go

Pick one of these games. Does the ability to play this game require and thus demonstrate true intelligence? You may either defend your own answer to the question, or put forward a historical thesis that describes changing and/or conflicting answers to this question. In either case your argument should involve analysis of at least three sources from Unit III.

A Game You Play

Discuss some aspect of your life at Penn, some practice you engage in, that might meaningfully be seen as a game. What is gained by analyzing it this way, and what might be obscured? Do you believe a computer could be made to play this game? Your think piece should discuss at least three readings from Unit III.

GROUP PRESENTATION

Your group has been hired to run a workshop for a team of employees at a major tech company on the lessons of history for the pursuit of responsible AI in the present and future. You may choose the more specific details of the scenario, and should communicate these in the framing of your presentation: what is the specific corporation (real or fictional) that your audience works for? were you hired by the board to speak to executive leadership? by the manager of a small team of programmers? by union organizers working with content creators? In any of these cases, your task is to make a case for what you see as the wisest attitude and actions to be taken today, supported by historical evidence from the course. Groups, and the episodes to be discussed, will be assigned later in the semester. More details to come.

Your presentation should be about 30 minutes. You will also submit to me any visual or other materials you use (slides, handouts, etc.) at the time of the presentation.

Presentations will be delivered Mon. Dec. 4, Weds. Dec. 6, & Mon. Dec. 11.

FINAL PAPER

The final paper is your opportunity to produce a substantial work of analytic and creative thinking in conversation with the course's material and themes. The tone of this work might be academic, or perhaps more like a work of long-form journalism (e.g. the *New Yorker* articles we read). On the Canvas page for the assignment, I suggest several forms your paper could take. Note that while some of these options focus on something other than assigned course readings, *all final papers have a central responsibility to show thorough engagement with the course material*. You're also welcome to propose a comparable alternative plan if you have an idea that doesn't fit one of the listed options!

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You will submit a **final paper proposal** (~200 words), **due 11:59pm, Wednesday, November 22.**

You must also **meet with me once to discuss your plans** for the paper. This can be before or after preparing your proposal – whichever you would find more useful. (I am also, of course, happy to meet with you more than once!)

The final paper is due at 11:59pm on Thursday, December 21.

This is the last day of the semester – please note that as I have already given you all the maximum possible time to work on it, I cannot grant flex days or extensions for the final paper. As with think pieces, late papers will be penalized one third of a letter grade for each day they are late.

RESOURCES & ACCOMMODATIONS

The Weingarten Center offers a variety of resources to support all Penn students in reaching their academic goals. All services are free and confidential. **To contact the Weingarten Center, call 215-573-9235.** The office is located in Stouffer Commons, 3702 Spruce Street, Suite 300.

Students with a disability or medical condition can request reasonable accommodations through the [Weingarten Center website](#). Disability Services determines accommodations on an individualized basis through an interactive process, including a meeting with the student and a review of their disability documentation. Students who have approved accommodations are encouraged to notify their faculty members and share their accommodation letters at the start of each semester. Students can contact Disability Services by calling 215-573-9235.

SCHEDULE

UNIT I. STRANGE CONVERSATIONS

01. Weds. Aug. 30: Introduction

No assigned readings.

02. Weds. Sept. 6: Who Are We Talking To?

Assigned reading:

A. M. Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (1950): 433–460.

Joseph Weizenbaum, "ELIZA—A Computer Program for the Study of Natural Language Communication Between Man and Machine," *Communications of the ACM* 9, no. 1 (1966): 36–45

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03. Mon. Sept. 11: Ghosts in Machines

Assigned reading:

Lucy Suchman, "Interactive Artifacts," chapter 2 in *Plans and Situated Actions: The Problem of Human–Machine Communication* (Cambridge: Cambridge University Press, 1987).

Sarah T. Roberts, "Your AI is a Human" in *Your Computer Is on Fire*, eds. Thomas S. Mullaney, Benjamin Peters, Mar Hicks, and Kavita Philip (Cambridge, MA: The MIT Press, 2021).

04. Weds. Sept. 13: What Are We Worried About?

Assigned reading:

Ali Breland, "Woke AI Won't Save Us," *Logic* 8, 3 August 2019,
<https://logicmag.io/bodies/woke-ai-wont-save-us/>

Sam Altman, "Planning for AGI and beyond" 24 February 2023,
<https://openai.com/blog/planning-for-agi-and-beyond>

Center for AI Safety, "Statement on AI Risk," undated [May 2023],
<https://www.safe.ai/statement-on-ai-risk#open-letter>

Marc Andreessen, "Why AI Will Save the World," 6 June 2023,
<https://a16z.com/2023/06/06/ai-will-save-the-world/>

Ted Chiang, "Will A.I. Become the New McKinsey?" *The New Yorker*, 4 May 2023,
<https://www.newyorker.com/science/annals-of-artificial-intelligence/will-ai-become-the-new-mckinsey>

UNIT II. CALCULATION AND CAPITAL

05. Mon. Sept. 18: Counting on Machines

Assigned reading:

Matthew L. Jones, "Calculating Machine," in Maria Rosa Antognazza (ed.), *The Oxford Handbook of Leibniz*, Oxford Handbooks (2018; online edn, Oxford Academic, 28 Jan. 2013).

Langdon Winner, "Do Artifacts Have Politics?," *Daedalus* 109, no. 1 (1980): 121–36.

06. Weds. Sept. 20: Calculating Labor

Assigned reading:

Charles Babbage, "On the division of mental labour," chapter xix in *On the Economy of Machinery and Manufactures* (London: Charles Knight, Pall Mall East, 1832).

Lorraine Daston, "Enlightenment Calculations." *Critical Inquiry* 21, no. 1 (1994): 182–202.

07. Mon. Sept. 25: Babbage's Engines

Assigned reading:

Charles Babbage, "Of the Analytical Engine," chapter viii in *Passages from the Life of a Philosopher* (London: Longman, Green, Longman, Roberts, & Green, 1864).

Meredith Whittaker, "Origin Stories: Plantations, Computers, and Industrial Control," *Logic* 19 (2023). <https://logicmag.io/supa-dupa-skies/origin-stories-plantations-computers-and-industrial-control/>

08. Weds. Sept. 27: The High Priestess of Mathematics

Assigned reading:

Ada Lovelace, "Notes on L. F. Menabrea's *Sketch of the Analytical Engine Invented by Charles Babbage*," <https://repository.ou.edu/uuid/6235e086-c11a-56f6-b50d-1b1f5aaa3f5e#page/1/mode/2up>. ***only pages 688–90 and 722–23***

Alison Winter, "A Calculus of Suffering: Ada Lovelace and the Bodily Constraints on Women's Knowledge in Early Victorian England," 202–39 in *Science Incarnate: Historical Embodiments of Natural Knowledge*, eds. Christopher Lawrence and Steven Shapin (Chicago: Chicago University Press, 1998).

Sydney Padua, "Lovelace—The Origin," 19 April 2009, <https://sydneypadua.com/2dgoggles/lovelace-the-origin-2/>

09. Mon. Oct. 2: Logical Computation

Assigned reading:

Swift, Jonathan (1726). *Gulliver's Travels*. Part III, Chapter V [beginning with "The author permitted to see the grand academy of Lagado ..."].

William Stanley Jevons, "On the Mechanical Performance of Logical Inference," *Philosophical Transactions* 160 (1870): 497–518; only read §§1–11.

10. Weds. Oct. 4: Mathematics at War

Assigned reading:

Edmund Callis Berkeley, "Speed—500 Additions a Second: Moore School's ENIAC (Electronic Numerical Integrator and Calculator)," 113–27 in *Giant Brains, or Machines That Think* (New York: Science Editions, Inc., 1961 [1949]).

Jennifer S. Light, "When Computers Were Women," *Technology and Culture* 40, no. 3 (1999): 455–83.

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11. Mon. Oct. 9: Calculation Goes Big

Assigned reading:

Lorraine Daston, "Calculation and the Division of Labor, 1750-1950," *Bulletin of the German Historical Institute* 62 (2018): 9–30.

Margot Lee Shetterly, "Out of the Past, the Future," chapter 21 in *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race* (New York: HarperCollins, 2016), 213–26.

12. Weds. Oct. 11: Bringing AI into the Fold

Assigned reading:

Alan R. Fersht, "AlphaFold – A Personal Perspective on the Impact of Machine Learning," *Journal of Molecular Biology* 433, no. 20 (2021).

UNIT III. THOUGHTFUL PLAY

13. Mon. Oct. 16: Mechanizing Chess

Assigned reading:

Louis Dutens, "A Description of an Automaton, which Plays at Chess," *Gentleman's Magazine* 41 (January 1771): 26–27.

Claude E. Shannon, "A Chess-Playing Machine," *Scientific American* 182, no. 2 (1950): 48–51.

14. Weds. Oct. 18: Chess Defeated

Assigned reading:

John McCarthy, "AI as Sport," *Science* 276, no. 5318 (1997): 1518–9.

<https://www.science.org/doi/full/10.1126/science.276.5318.1518>

Nathan Ensmenger, "Is chess the drosophila of artificial intelligence? A social history of an algorithm," *Social Studies of Science* 42, no. 1 (2012): 5–30.

NO CLASS Mon. Oct. 23. Watch the documentary [AlphaGo](#) for Wednesday Oct. 25.

15. Weds. Oct. 25: Playing with Systems

Assigned reading:

Samuel Pizelo, "Mathematical Models, Bloodless Abstractions: Games and the Rise of Systems Thinking," forthcoming in *Representations*.

Greg Kohs, [AlphaGo](#) (2017).

16. Mon. Oct. 30: Games as Theory

Assigned reading:

John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior*, sixtieth anniversary ed. (Princeton: Princeton University Press, 2004), sections 4.1 (pp. 31–33) and 5 (pp. 46–48).

J. Huizinga, *Homo Ludens: A Study of the Play-Element in Culture* (New York: Roy Publishers, 1950), 1–13.

UNIT IV. LANGUAGE WORK

17. Weds. Nov 1: Punching Out

Assigned reading:

T. C. Martin, “Counting a Nation by Electricity,” *The Electrical Engineer* 12, no. 184 (11 November 1891): 521–30.

David Runciman, “The End of Work: Which Jobs Will Survive the AI Revolution?” *The Guardian*, 19 August 2023.

18. Mon. Nov. 6: The Age of Information

Assigned reading:

Norbert Wiener, “What Is Cybernetics?” chapter 1 in *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin Company, 1950), 1–19.

19. Weds. Nov. 8: The Birth of “Artificial Intelligence”

Assigned reading:

J. McCarthy, M. L. Minsky, N. Rochester, C. E. Shannon, “A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence,” (1955).

Pamela McCorduck, “The Dartmouth Conference,” chapter 5 in *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence*, 2nd ed. (Natick, MA: A. K. Peters, Ltd., 2004).

20. Mon. Nov. 13: How Humans Do It

Assigned reading:

Stephanie Dick, “Of Models and Machines: Implementing Bounded Rationality,” *Isis* 106, no. 3 (2015): 623–34.

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21. Weds. Nov. 15: Costs of Translation

Assigned reading:

Michael D. Gordin, *Scientific Babel: How Science Was Done Before and After Global English* (Chicago: Chicago University Press, 2015), chapter 8, “The Dostoevsky Machine.”

22. Mon. Nov. 20: Machines and Meaning

Assigned reading:

Xiaochang Li, “The Measure of Meaning: Automatic Speech Recognition and the Human-Computer Imagination,” 341–59 in *Abstractions and Embodiments: New Histories of Computing and Society*, eds. Janet Abbate and Stephanie Dick (Baltimore: Johns Hopkins University Press, 2022).

NO CLASS Weds. Nov. 22

23. Mon. Nov. 27: Making Decisions

Assigned reading:

Matthew L. Jones. “Decision Trees, Random Forests, and the Genealogy of the Black Box.” In: *Algorithmic Modernity*, eds. Morgan G. Ames and Massimo Mazzotti. Oxford: Oxford University Press, 2023.

24. Weds. Nov. 29: Models Get Big

Assigned reading:

Emily M. Bender, Timnit Gebru, Angelina McMillan-Major, and Shmargaret Shmitchell. 2021. “On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? 🦜” 610–23 in *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency (FAccT '21)*. New York: Association for Computing Machinery, 2021.

Anna Wiener, “Infinite Art,” *The New Yorker*, 20 November 2023, 41–47.

UNIT V. WRAPPING UP

25. Mon. Dec. 4: Group Presentations

Assigned reading:

[To be chosen by student presentation groups]

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26. Weds. Dec. 6: Group Presentations

Assigned reading:

[To be chosen by student presentation groups]

27. Mon. Dec. 11: Group Presentations

Assigned reading:

[To be chosen by student presentation groups]