

HTS 1081, Fall 2026
Engineering in History (3 cr)
TuTh 3:30 pm – 4:45 pm; Skiles 270

NOTE: This syllabus will be revised for fall 2026.

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Description. This course examines the history of engineers and the engineering profession. There are three major sections to the course. The first section examines the nature of engineering, technology, and science. The second section deals with the history of the engineering profession and the relationship of engineering to other facets of society. The third section focuses on the ethics of engineering, including examples of engineering failures.

Course Goals and Learning Outcomes. By the end of HTS 1081, students should be able to:

- Define “engineering” as a profession and set of activities;
- Define “technology” with examples;
- Give a broad overview of the history of engineering;
- Explain the ethical implications of engineering practice.

Requirements

Lecture. Attending lectures is necessary if you want to succeed in the course. Many key ideas are presented only in lectures.

Readings. There is a significant reading assignment every week. Most readings are short and easy, but some are challenging. Avoid getting bogged down in details by focusing on the key points in the readings. Use the weekly reading overview on Canvas for guidance.

Discussion. We will devote class time roughly every other week to discussion. Please come prepared to talk. Preparation means doing the readings and thinking about the discussion questions posted on Canvas.

Weekly assessments. Most weeks, we will have a brief assignment or quiz based on the readings and lectures.

Exams. The course has three take-home exams covering each major part of the course. The first two are given at the end of the fifth and tenth weeks of the course. The third essay takes the place of a final exam.

Attendance is required, and counts for 10% of your grade. If you need to be absent, please let me know in advance and I’ll do my best to accommodate you.

Grades. Major exams, 15% each (45% total); weekly quizzes, discussions, and other assignments, 45%, attendance, 10%.

Percentage grades will be converted to letter grades as follows: $100 \geq A \geq 90$; $90 > B \geq 80$; $80 > C \geq 70$; $70 > D \geq 60$; $F < 60$.

Canvas. The website for this course is on Canvas. I will send out reminders and assignments through Canvas.

Course Books and Readings. There is one required book that you will need to get for week 10:

Loren R. Graham, *The Ghost of the Executed Engineer: Technology and the Fall of the Soviet Union* (Cambridge: Harvard University Press, 1996).

All other assigned readings are posted to Canvas.

Academic Integrity. I expect students to maintain the highest ethical standards in this course. Each student is responsible for knowing the Georgia Tech rules on academic misconduct, known as the “Honor Code”: <http://b.gatech.edu/2CjF1Ro>.

Here’s summary for written assignments. Don’t copy stuff without 1) citing the source where you found the ideas, and 2) putting phrases in quotation marks when you use the exact words from your source. For a short guide to avoiding plagiarism, see <https://bit.ly/3Tg9XJE>; for more detail, see <http://unc.live/2CiHag9>. Any student suspected of cheating on a quiz, exam, or assignment will be reported to the Office of Student Integrity.

Also see the Student-Faculty Expectations Agreement (<https://catalog.gatech.edu/rules/21/>).

AI Policy. Generative AI has already transformed higher education, in good ways and bad. A recent MIT study compared students who wrote essays with LLM’s with those who didn’t. The study found that the LLM group had deficits in brain activity compared with the control group, as measured by electroencephalography. See <https://arxiv.org/abs/2506.08872>.

So here are the rules for this course.

- DO NOT use AI to generate your prose. Do not use AI to structure your essays. Do not use AI to come up with your argument.
- DO use AI to clarify or test your ideas. Use Grammarly to polish your prose.
- For all assignments, you MUST list the AI tools you used and what you used them for.
- If you must use AI-generated text, enclose it in quotation marks and cite the AI model using this page for guidance: <https://lib.guides.umd.edu/c.php?g=1340355&p=9896961>.

Here’s a detailed but accessible blog post on best practices for using AI to enhance learning: <https://www.theneuron.ai/explainer-articles/wtf-is-going-on-with-ai-and-education>. I suggest skipping forward to the section: “Here is a 4-step workflow for learning a new skill with AI.”

Use of Electronic Devices During Class. Electronic devices, including phones, tablets, and laptops, are not permitted at any time during class, except for students with accommodations. No exceptions! No peaking at your phones.

Recordings. Classes may not be recorded without the express consent of the instructor, except when an accommodation has been granted by the Office of Disability Services. Materials posted on Canvas are only for students currently enrolled in the course and may not be shared without the instructor’s permission.

Accommodations for Students with Disabilities. If you have a disability that might affect your performance in this course, please contact the Office of Disability Services at (404) 894-2563 or <http://disabilityservices.gatech.edu/> as soon as possible. Also, let me know about your learning needs and I’ll do my best to accommodate you.

Religious Holidays. You can take off any religious holiday you want, as long as you make up the work and inform me in advance, preferably by the second week of class. For more detail see <http://catalog.gatech.edu/rules/4/>, ¶B.5.

Freacking Out. College life often involves a lot of stress. If you feel like things are getting out of hand, either for personal or academic reasons, please let me know. Help is available from the [Center for Mental Health Care](#), Stamps Health Services, and the Dean of Students Office. These offices offer both in-person and virtual appointments. For more information on these and other student services, contact the Dean of Students or the [Division of Student Life](#).

Commitment to Inclusivity. My classroom is a safe space for people of all kinds. If you are feeling excluded for any reason, please let me know.

Boilerplate. The University System of Georgia and the Georgia Institute of Technology require that I include the following bureaucratic prose in this syllabus. I neither endorse nor reject these statements.

This is a Core IMPACTS course that is part of the Social Sciences area.

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help master course content, and support students' broad academic and career goals.

This course should direct students toward a broad Orienting Question: • How do I understand human experiences and connections?

Completion of this course should enable students to meet the following Learning Outcome:

- Students will effectively analyze the complexity of human behavior, and how historical, economic, political, social, or geographic relationships develop, persist, or change.

Course content, activities and exercises in this course should help students develop the following Career-Ready Competencies:

- Intercultural Competence
- Perspective-Taking
- Persuasion

Ethics Attribute Learning Outcomes

HTS 2084 fulfills the Georgia Tech ethics requirement. In this course, students will acquire:

- An ability to recognize ethical and professional responsibilities in real-world contexts.
- An ability to assess actions or decisions based on established ethical principles and theories, or through deliberative processes.
- An ability to consider the implications of actions, both for society as a whole and for individuals.

Course Outline

Section 1: European Origins: Science and Craft

Week 1 (Aug. 18, 20) Introduction – What is Engineering?

- Engineering versus technology
- Engineering as a technological practice
- Engineering as a profession based on expertise

Reading: Carl Mitcham and David Muñoz, “Engineering,” chap. 1 in *Humanitarian Engineering, Synthesis Lectures on Engineers, Technology, & Society* (Springer, 2010), 1-9;
Henry Petroski, “Scientists vs. Engineers,” in *An Engineer’s Alphabet: Gleanings from the Softer Side of a Profession* (Cambridge University Press, 2011), 280-283.

Assignment (due Aug. 25): a short reading response; details to be provided.

Week 2 (Aug. 25, 27) Renaissance Engineering

- Gunpowder revolution and military fortifications
- Symbols of state power – monumental buildings
- Links between artisans and scholars

Reading: Paolo Galluzzi, *Renaissance Engineers: From Brunelleschi to Leonardo Da Vinci* (Florence: Giunti, 1996), 11-24.

Labor Day, no class (Sep. 1)

Week 3 (Sep 3): A Very Short History of the Scientific Revolution

How the idea of modern science emerged, and its links to practical problems.

Reading: Peter Dear, *Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500-1700*, 2nd ed (Princeton University Press, 2009), 47-78.

Weeks 4-5 (Sep. 8, 10, 15, 17) Science and Invention: The Steam Engine

- Newcomen engine as an example of craft invention (pre-engineering)
- Invention versus optimization: James Watt versus John Smeaton
- Science-technology relationship

Reading: D. S. L. Cardwell, *Turning Points in Western Technology* (New York: Science History, 1972), 51-59, 66-72 (read pages 66-72 after the Rolt reading);

L. T. C. Rolt and J. S. Allen, “Thomas Savery and His Pump,” in *The Steam Engine of Thomas Newcomen* (Hartington, Eng: Moorland Pub. Co., 1977), 24-30;

Svante Lindqvist, *Technology on Trial: The Introduction of Steam Power Technology into Sweden, 1715-1736* (Stockholm: Almqvist & Wiksell, 1984), 108-17 (chap. 6).

William Rosen, “Science in His Hands,” chap. 5 in *The Most Powerful Idea in the World: A Story of Steam, Industry, and Invention* (University of Chicago Press, 2012), 90–114.

First take-home exam, due Monday Sep. 22, covering the weeks 1-5 of the course. There will also be a short in-class quiz on the exam on Sep. 22.

Section 2: Engineering in the 19th and 20th Centuries

Week 6 (Sep. 22, 24) Engineering as a Profession in 19th-Century America

- MIT and Georgia Tech
- School culture vs. shop culture

Reading: Terry S. Reynolds, "Overview: The Engineer in 19th-Century America," in *The Engineer in America: A Historical Anthology from Technology and Culture*, ed. Terry S. Reynolds (Chicago: University of Chicago Press, 1991), 7–26;
James E. Brittain and Robert C. McMath, "Engineers and the New South Creed: The Formation and Early Development of Georgia Tech," *Technology and Culture* 18, no. 2 (1977): 175–201.

Week 7 (Sep. 29, Oct. 1) Post-WWII Engineering Education

The rise of science-heavy engineering education under the impact of the Cold War.

Reading: Bruce E. Seely, "The Other Re-Engineering of Engineering Education, 1900–1965," *Journal of Engineering Education* 88, no. 3 (1999): 285–94.

Fall Break (Oct. 6) No Class

Week 8 (Oct. 8) Women in Engineering: Why So Few?

Engineering as a male domain.

Reading: Amy Sue Bix, "From 'Engineeresses' to 'Girl Engineers' to 'Good Engineers': A History of Women's U.S. Engineering Education," *NWSA Journal* 16, (2004): 27–49;
Additional reading TBA.

Week 9 (Oct. 13, 15) Engineers versus Workers: Scientific Management and Fordism

- Engineers and the "labor problem"
- Frederick Winslow Taylor and scientific management
- Henry Ford and mass production

Reading: Thomas P. Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970* (Chicago, U. of Chicago Press, 1989), 184-220;
Henry Ford, selection from "The Terror of the Machine," chap. 7 in *My Life and Work* (Garden City, NY: Doubleday, Page, 1922), 103-111.

Week 10 (Oct. 20, 22) Engineering and Totalitarianism

Engineering in Nazi Germany and the Soviet Union.

Reading: Loren R. Graham, *The Ghost of the Executed Engineer: Technology and the Fall of the Soviet Union*, (Cambridge: Harvard University Press, 1996), entire book.

Second take-home exam, due Oct. 27, covering the weeks 6-10 of the course.

Section 3: Ethics of Engineering

Week 11 (Oct. 27, 29) Engineering Ethics – a Short History

- Business vs. science – the key conflict
- Codes of engineering ethics

Reading: Michael Davis, “Professional Codes of Ethics,” in *The Routledge Handbook of the Philosophy of Engineering* (Routledge, 2020), 580–91.

Week 12 (Nov. 3, 5) Neglecting Safety 1: the Chevrolet Corvair and Ford Pinto

The Chevrolet Corvair and its implications for engineering ethics.

Reading: Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (New York: Grossman, 1965), vii-x, 1-32;

Optional: Mark Dowie, “Pinto Madness,” *Mother Jones*, October/November 1977, 18-32.

Week 13 (Nov. 10, 12) Neglecting Safety 2: Engineering Structural Disasters

Failures in civil engineering. The Quebec Bridge disaster of 1907 as a case study.

Reading: Eda Kranakis, “Fixing the Blame: Organizational Culture and the Quebec Bridge Collapse,” *Technology and Culture* 45, no. 3 (2004): 487–518.

Week 14 (Nov. 17, 19, 24): Neglecting Safety 3: The Boeing 737 Max

When engineers yield to accountants.

Reading: Maureen Tkacik, “Crash Course: How Boeing’s Managerial Revolution Created the 737 Max Disaster,” *New Republic* 250, no. 10 (2019): 12–23.

Video: *Downfall: The Case Against Boeing*, documentary, directed by Rory Kennedy (Netflix, 2022), 1:29, <https://www.netflix.com/watch/81272421>.

Thanksgiving Break (Nov. 26)

Week 15 (Dec. 1) History and the Ethical Engineer

Course wrap-up.

Reading: none.

Take-home final – Wednesday, Dec 10, 5:30 pm

Take-home essay, covering weeks 11-15 of the course. Due at the end of the scheduled final exam period.