



# History of Women in Science and Engineering

Fall 2017, MIT Women's and Gender Studies

## Instructor

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## Email

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## Office Location + Hours

TBD

## General Information

### Description

What are the historic roles of women in scientific and engineering endeavors? What sociocultural obstacles have women in these disciplines faced, and how have their challenges and successes changed over time? This course provides a basic overview of the history of women in science, technology, engineering, and mathematics (STEM). Students will learn about specific contributions of women across a variety of disciplines and will gain a broad perspective on how these contributions played a larger role in the advancement of human knowledge and technological achievement. The class will also grapple with how both historic and modern biases within the STEM disciplines, as well as in representations of women and girls in media and popular culture, can affect outcomes in these areas.

### Expectations and Goals

This is an introductory-level course that assumes no prior knowledge of the history of women in science and engineering. Successful students will read/watch/listen to all of the course materials prior to the class in which they are discussed. Each student will be graded on the following class components: **15% — class participation**, which includes regular attendance, in-class discussion, and group collaboration; **20% — written homework assignments**; **25% — midterm essay (5-7 pages) plus class presentation**, including a 60-second lightning introduction; **10% — new or significantly enhanced Wikipedia article**; **30% — final paper (10-15 pages) or project**. Points will be deducted for late submissions.

## Course Materials

### Required Materials

- Abbate, Janet. *Recoding Gender*. (2012)
- Fine, Cordelia. *Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference*. (2010)
- Johnson, George. *Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe*. (2005)
- Layne, Margaret, ed. *Women in Engineering: Pioneers and Trailblazers*. (2009)
- McGrayne, Sharon. *Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries*. (1993)
- Nolen, Stephanie. *Promised the Moon: The Untold Story of the First Women in the Space Race* (2004)
- Schiebinger, Londa. *The Mind Has No Sex? Women in the Origins of Modern Science*. (1991)
- Shetterly, Margot. *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*. (2016)
- Toole, Betty Alexandra, ed. *Ada: The Enchantress of Numbers*. (1998)

### Optional Materials

Additional reading/viewing/listening materials listed for each class below are highly encouraged. Most will be specifically discussed in class. Some films will be shown in class (these will be noted beforehand).

# Course Schedule

## Week Topic / Materials

1	<p><b>The Matilda Effect</b></p> <p>Course introduction, instructor introduction, student introductions. Who should be remembered in science history? Why are women's histories so often hidden or underplayed? Who are some early pioneering women in science, and how did they help to lay foundations in their respective fields?</p> <hr/> <p>—Rossiter, Margaret. "The Matthew Matilda Effect in Science." (1993)</p> <p>—Schiebinger, Londa. <i>The Mind Has No Sex? Women in the Origins of Modern Science</i>. (1991)</p>
2	<p><b>Intersectionalities</b></p> <p>How do race, ethnicity, and regionalism affect women practicing in science and engineering? What are some examples of how women have dealt with the "double bind"? How can we remove biases when discussing STEM endeavors and their histories?</p> <hr/> <p>—Haynes, Douglas. "Always the Exception: Women and Women of Color Scientists in Historical Perspective." (2014)</p> <p>—Shirley, Malcolm et al. "The Double Bind: The Price of Being a Minority Woman in Science." (1975)</p> <p>—Hammonds, Evelyn and Banu Subramaniam. "A Conversation on Feminist Science Studies." (2003)</p> <p>—Society of Women Engineers. Oral history videos &amp; transcripts: Yvonne Clark and Irene Sharp (2016)</p> <p>—Granville, Evelyn Boyd. "My Life as a Mathematician." (1989)</p>
3	<p><b>Pioneers &amp; Laurels</b></p> <p>Who are some pioneering — and award-winning — STEM women that every historian of science should know? How can we celebrate Marie Curie's accomplishments while avoiding pitfalls of the "hero effect"? How do awards recognize and validate women in the STEM fields? What problems/inequities exist in the way female scientists and engineers are and have been honored?</p> <hr/> <p>—Film: <i>Humanity Needs Dreamers: A Visit With Marie Curie</i>. Jen Myronuk. (2016)</p> <p>—Valiunas, Algis. "The Marvelous Marie Curie." (2012)</p> <p>—McNeil, Maureen. "Making Twentieth-Century Scientific Heroes." <i>Feminist Cultural Studies of Science and Technology</i>. (2008)</p> <p>—McGrayne, Sharon. <i>Nobel Prize Women in Science: Their Lives, Struggles and Momentous Discoveries</i> (1993)</p> <p>—Weinstock, Maia. "Chien-Shiung Wu, Courageous Hero of Physics." <i>A Passion for Science: Stories of Discovery and Invention</i>, edited by Suw Charman-Anderson. (2013)</p>
4	<p><b>Sun Sisters   Field trip to Harvard Observatory</b></p> <p>In what key ways have women contributed to the astronomical sciences? How have women in Massachusetts — and Cambridge in particular — played an outsized role in 19<sup>th</sup> and early 20<sup>th</sup> century astronomy? What is the "harem effect"?</p> <hr/> <p>—Rossiter, Margaret. "Women's Work in Science 1880-1900." (1980)</p> <p>—Johnson, George. <i>Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe</i>. (2005)</p> <p>—Video: "Sisters of the Sun." COSMOS, Episode 8. (2014)</p> <p>—Oral history audio &amp; transcript: Cecilia Payne-Gaposchkin. American Institute of Physics. (1968)</p>
5	<p><b>Engineeresses</b></p> <p>How is the culture of engineering different from that of science? How have women affected the engineering profession and its role in society? Who are some notable women in the development of engineering, and how have their ranks expanded into the many disciplines we see today? How have recent educational trends led to increased visibility of engineering as a profession for women?</p>

- Layne, Margaret, ed. *Women in Engineering: Pioneers and Trailblazers*. (2009)
  - Video: “What is Engineering?” University of Newcastle. (2013)
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**6      Women of NASA and the Manhattan Project**

How have women’s roles in STEM fields changed in times of political crisis (WWII, Space Race, etc.)? What happened after the crises abated? What were early attitudes toward women at NASA? How have women become NASA leaders in the past 30 years? How is NASA recruiting and promoting women today?

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- Howes, Ruth and Caroline Herzenberg. *Their Day in the Sun*. (1999)
  - Kiernan, Denise. *Girls of Atomic City: The Untold Story of the Women Who Helped Win WWII*. (2013)
  - Shetterly, Margot. *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*. (2016)
  - Film: *Hidden Figures*. Fox. (2016)
  - Oral history transcript: Annie Easley. NASA. (2001)
  - McMillan, Robert. “Her Code Got Humans to the Moon — And Invented Software Itself.” (2005)
  - Nolen, Stephanie. *Promised the Moon: The Untold Story of the First Women in the Space Race* (2004)
  - Film: *Women in Space*. MAKERS. (2014)
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**7      Ada Lovelace Day | Student Presentations**

How has ALD affected public perceptions of women in the STEM fields? How have other social media events had a positive effect on cultural awareness of otherwise hidden women in STEM?

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- Gage, Suzi. “Why Ada Lovelace Day Matters.” (2013)
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**8      Women in Computing**

How have women contributed to the development of computer technologies? What factors led to the rise and fall of women in tech in the late 20<sup>th</sup> century?

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- Toole, Betty Alexandra, ed. *Ada: The Enchantress of Numbers*. (1998)
  - Abbate, Janet. *Recoding Gender*. (2012)
  - Film: *Queen of Code*. FiveThirtyEight. (2015)
  - Henn, Steve. “When Women Stopped Coding.” (2014)
  - Cohoon, Joanne and William Aspray. *Women and Information Technology: Research on Underrepresentation*. (2006)
  - Film: “Hear Me Now: The Remarkable Life of Cathy Wolf, Human-Computer Interaction Pioneer.” Maia Weinstock. (2017)
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**9      STEM Women in Media and Consumer Products**

How are women in science and engineering written about and portrayed in popular culture? How have children’s toys and media helped and hindered the encouragement of girls and women in the STEM fields?

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- Aschwanden, Christie. “The Finkbeiner Test.” (2013)
  - Sullivan, Margaret. “Gender Questions Arise in Obituary of Rocket Scientist and Her Beef Stroganoff.” (2013)
  - Smith, Stacy et al. “Gender Roles and Occupations: A Look at Character Attributes and Character-Related Aspirations in Film and Television.” Geena Davis Institute for Gender in Media. (2012)
  - Ottaviani, Jim and Maris Wicks. *Primates: The Fearless Science of Jane Goodall, Dian Fossey, and Birute Galdikas*. (2013)
  - Ottaviani, Jim and Leland Myrick. *Feynman*. (2013)
  - Burleigh, Robert and Raul Colon. *Look Up! Henrietta Leavitt: Pioneering Astronomer*. (2013)
  - Beaty, Andrea and David Roberts. *Ada Twist, Scientist*. (2016)
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## Week Topic / Materials

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—Fine, Cordelia. *Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference*. Chapters 18-21. (2010)

—Weinstock, Maia. “My Dear Lego, You Are Part of the Problem.” (2012)

—Videos: “Lego and Gender.” Feminist Frequency. (2012)

—Weinstock, Maia. “Breaking Brick Stereotypes: Lego Unveils a Female Scientist.” (2013)

—Weinstock, Maia. “It’s Time for More Racial Diversity in STEM Toys.” (2015)

—Weinstock, Maia. “LEGO Adds More Women in STEM to Its Lineup.” (2015)

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### 10 STEM Women in Wikipedia | Edit-a-thon will follow first hour of discussion

What is the representation of women in Wikipedia, both on the pages and in the editorship? How is Wikipedia like a microcosm of the larger tech world in terms of women’s inclusion? Why is representation on Wikipedia so important? What are some efforts attempting to close the gaps in STEM fields?

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—Boboltz, Sara. “Editors are Trying to Fix Wikipedia’s Gender and Racial Bias Problems.” (2015)

—Gardner, Sue. “Nine Reasons Women Don’t Edit Wikipedia (In Their Own Words).” (2011)

—Smith, Michelle. “Women Scientists, Wikipedia Under Microscope in RI.” (2013)

—Bear, Julia and Benjamin Collier. “Where Are the Women in Wikipedia? Understanding the Different Psychological Experiences of Men and Women in Wikipedia.” (2016)

—WikiProject Women Scientists (Wikipedia)

—Women in Red (Wikipedia)

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### 11 Mens et Manus | Possible guest(s)

Who are some of the most notable/influential women to have taught, researched, and studied at MIT?

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—Moore Trescott, Martha. “Women in the Intellectual Development of Engineering.” *Women in Engineering: Pioneers and Trailblazers*. (2009)

—Podcast: “New Bio Chronicles MIT’s First Alumna” (2014)

—Brittain, James. “From Computer to Electrical Engineer: The Remarkable Career of Edith Clarke.” *Women in Engineering: Pioneers and Trailblazers*. (2009)

—Web exhibit: Celebrating 125 Years of Women at MIT (1998)

—Kleiman, Miriam. “Rich, Famous, and Questionably Sane.” (2007)

—Anderson, Mark. “Mildred Dresselhaus: Queen of Carbon.” (2015)

—Video: “Women in Chemistry: Paula Hammond.” Chemical Heritage Foundation. (2012)

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### 12 Then and Now | Guest speaker(s) from MIT (Silbey, Hopkins, Liskov, Gibson, etc.)

How have the scientific and engineering professions changed for women in the past century? Where do problems remain? What can academia and industry improve on in terms of diversity and inclusion?

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—Gornick, Vivian. *Women in Science: Then and Now* (2009 edition)

—“Report on the Status of Women in Science and Engineering at MIT.” (1999 and 2011)

—Summers, Lawrence. “Remarks at NBER Conference on Diversifying the Science and Engineering Workforce.” (2005)

—AAUW. “Why So Few? Women in Science, Technology, Engineering, and Mathematics.” (2015)

—Silbey, Susan et al. “Persistence is Cultural.” (2016)

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### 13 Class Presentations

Students will present their final projects to the class.

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## Required Assignments

Number	Subject
3	Reflective writing assignments (1-2 pages each)
1	Midterm paper (5-7 pages) plus class presentation (10 minutes, including lightning intro)
1	Wikipedia article
1	Final project plus class presentation (10-15 minutes), with format to be approved by instructor

