

## **HIST 385: Women in Computing History**

Illinois Institute of Technology

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*BACKGROUND NOTE: This syllabus is a version of the one used in my class in Fall 2016, extended and annotated in order to be more useful to a wider audience. I'm excited to share this syllabus and I'm both surprised and gratified by the amount of interest the course has generated online. Although I cannot say with complete certainty that this course is unique, from what I can tell it may be the first attempt to construct a history of computing class that explicitly sets out to teach the history of computing through women's experiences. It does this not simply to center women, but to reframe standard narratives of technological progress and question assumptions at work in the historiography of computing. Scholarship on gender, sexuality, race, and class in computing history has grown tremendously over the past decade: even just a few years ago, this class would not have been possible due to lack of sources. Many of the readings on the syllabus have only recently been published, are currently working their way through the publication process, or are still at the conference paper stage.*

*The suggested reading lists on this syllabus may be of interest to graduate students preparing for a preliminary examination in this field, or for people with a general interest in the latest scholarship on history and historiography of computing, especially as it pertains to labor, institutional change, and gender. Under each class I have included a summary of the discussion topics for that week, in order to give an idea of what students cover in class. For more of my syllabi, or to learn more about my work, see [www.mariehicks.net](http://www.mariehicks.net).*

“When did anyone, company or individual, achieve anything worthwhile by pursuing the comfortable option?”

–Stephanie Shirley

“The ENIAC was a sonofabitch to program.”

–Jean Jennings Bartik

### **Course Description**

Programming and even hardware manufacture used to be feminized work. Yet, for decades the history of computing has mostly revolved around "great men" and the machines they designed. From the earliest days of computerization, women have played a major role in computing's history. This course looks at that history, and the reasons why historians have recently begun to write these computer workers back into the main narrative of the history of computing. Today, this new understanding of computing's history is changing what we think we know about technology's past and how we see our own contemporary interactions with it.

In this course, we will look at the history of computing through the eyes of women--some famous, some

ordinary. We will read sections of several biographies and autobiographies in addition to articles and books on the history of computing. The first half of the class will focus on the origins of electronic computing. After the midterm we will transition to talking about more recent—even contemporary—developments. This class will help you better understand where computing has been, where it is going, and why technological change is dependent on social categories as much as it is on technical considerations.

### **Expectations:**

**Readings** must be completed for the day that they are listed. There may be unannounced reading quizzes to ensure that everyone is keeping up. They may be written or oral. In addition to the specific readings listed on the syllabus, the following book list will be of use:

Abbate, *Recoding Gender* (MIT, 2012)  
Bartik, *Pioneer Programmer* (Truman State, 2013)  
Ensmenger, *The Computer Boys Take Over* (MIT, 2010)  
Hicks, *Programmed Inequality* (MIT, 2017)  
Shetterly, *Hidden Figures* (William Morrow, 2016)  
Shirley, *Let IT Go* (AUK, 2012)

You may also wish to consult:

Aspray and Cohoon, *Women and Information Technology* (MIT, 2012)  
Bix, *Girls Coming to Engineering* (MIT, 2012)  
Freeman, *High Tech and High Heels* (Duke, 2000)  
Margolis, *Unlocking The Clubhouse* (MIT, 2003)  
Misa (ed.), *Gender Codes* (Wiley-IEEE, 2010)  
Slaton, *Race, Rigor, and Selectivity in U.S. Engineering* (Harvard, 2010)

Your **course grade** will be broken down as follows:

Attendance and participation: 15%

Reading quizzes, class exercises, homework exercises: 20%

Short papers & other formal writing exercises (including Wikipedia editing exercise): 25%\*

Midterm Exam: 25%

Final Project (in lieu of final exam, due on final exam date): 15%\*

\*If you are taking the course for **graduate credit** I will expect you to perform your work at a higher level than your undergraduate peers. In addition, for certain assignments your assigned tasks may be slightly different and your papers may be slightly longer in required length. We will discuss all of this when assignments are handed out. For the most part, however, you will do the same assignments as the undergrads in the course.

**Resources** that you will be expected to use in this class include the databases linked from Galvin Library's History Research Guide: <http://guides.library.iit.edu/content.php?pid=114040&sid=986140>. A key resource we will be using for class assignments is the Historical London Times Newspaper database. Familiarize yourself with it as soon as possible:

<http://ezproxy.gl.iit.edu/login?url=http://find.galegroup.com/ttda/start.do?userGroupName=chic7029>

Contact Nichole Novak ([nnovak2@iit.edu](mailto:nnovak2@iit.edu)), the humanities librarian, for further help with these resources.

Google is not an academic resource, it is an advertising platform; I do not expect you to use it as a panacea for your class assignments or studies. Same goes for Wikipedia: although we will edit Wikipedia for one of our class exercises, I hope we can all agree that reading an online encyclopedia is not college-level humanities research.

You can get help with improving your writing at the **Humanities Department Writing Center** located in Siegel 232-233. I highly recommend this resource to everyone in the class, regardless of whether or not English is your first language: [http://www.iit.edu/csl/hum/resources/writing\\_center.shtml](http://www.iit.edu/csl/hum/resources/writing_center.shtml)

**Accommodations will be made for students with verified disabilities.** In order to access these resources or get special provisions in class you must register with the Disability Services Office at the **beginning of the semester** and speak with me so we can plan ahead for the needed accommodations.

**Cheating, plagiarism, and academic dishonesty** are serious offenses and will not be tolerated. They will result in a failing grade on the assignment, possibly in the course (at my discretion), and the University will levy sanctions as well. If you are in doubt about what constitutes plagiarism or academic dishonesty, re-read the code of student conduct and sections on academic dishonesty in the student handbook:

[http://www.iit.edu/student\\_affairs/handbook/pdfs/handbook\\_fy13.pdf](http://www.iit.edu/student_affairs/handbook/pdfs/handbook_fy13.pdf) (page 27).

If you are still confused, make an appointment to speak with me during my office hours **before** you pass in an assignment. Remember that it is *never* appropriate to use someone's ideas or words without giving them credit, and that copying text from sources or peers, in addition to being plagiarism and cheating, short-circuits the learning process and is the exact opposite of what I want to see.

### Course Schedule:

#### Class 1

Aug 23 Class introduction: Where Were the Women? (And Why Should We Care?)

Discussion: History, Historiography, and Gender

Exercise: Computer History Scavenger Hunt in London Times

*Definition of terms: history, historiography, and gender. Discussion of how we know what we think we know about the history of computing, and how that's been shaped by the categories of identity of certain practitioners in the field. Why are women important to the main narrative of the history of computing and not just figures we can "add in" without really changing that main narrative? What sorts of assumptions get upset when we look at the process by which this history gets written? What forms of history are most appropriate for writing women's experiences into computing history? Lastly, how do the histories we take for granted inform our understanding of the present day? Why might computing history help us better understand our current interactions with computers, and where that technology is going? Discussion of Joan Scott's "Gender as a Category of Historical Analysis" piece (as needed).*

#### Class 2

Aug 30 **War Machines: Why Electronic Computers Were a Big Deal**

Beyer, *Grace Hopper and the Invention of the Information Age*, pp. 35-72

Hicks, Ch 1 "War Machines" in *Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing* (MIT, forthcoming Jan 2017), approx. 35 pp.

*Discussion: Why do I call early electronic computers "war machines" in the chapter of my book that you read? What was the specific purpose of each of the early electronic computers (and in the case of the Mark I, an electromechanical computer) discussed in the readings and in class? Do "firsts" in computing matter? Why does the fact that the Colossus computers were the first digital electronic computers matter? What were they actually doing for the war effort while the ENIAC was still under construction, and while the Mark I was helping create ballistics tables at Harvard?*

Class 3

Sept 6 **The ENIAC “Girls” (And How They Got That Way)**

Shirley, *Let IT Go*, pp. 1-17

Light, “When Computers Were Women” pp. 455-483, whole article—images at end of article

Bartik, *Pioneer Programmer*, pp. 36-52, 91-106, 113-120

First Paper Assigned

*Discussion of issues of history, biography, and hagiography in the historiography of computing: How have the bad habits of “great man” historical narratives carried over into how we see women pioneers in computing as well, and whom we decide to write about? How have our decisions about which women are important enough to write histories about led to a replication of some of the mistakes of earlier versions of computing history that focused primarily on men and the machines they designed? How is gender a classed category, and what does this mean for how we might write computing history as labor history, rather than a history focused primarily on individuals and technical innovation?*

Class 4

Sept 13 **Swords to Ploughshares: Space Research, Racism, and Intersectionality**

McLennan, “Computing and the Color Line: Race, Gender, and Opportunity in Early Computing at NASA” (read 11 page article and look at the pictures in the accompanying powerpoint file.)

(Note: Although it will not be out in time for our class, there is a book (and major Hollywood film) being released in the next few months on the black women who worked on space program calculations at NASA. See Shetterley, *Hidden Figures* (and film of the same name) if you’re interested.)

Eileen Clancy, “Abacus Computing in the Age of Electronics: Sekiko Yoshida and the Early U.S. Space Program” (read conference paper and look through pictures and diagrams in accompanying powerpoint file)

Beyer, *Grace Hopper and the Invention of the Information Age*, pp. 175-212

Shirley, *Let IT Go*, pp. 39-65

Bartik, *Pioneer Programmer*, 121-129

Abbate, *Recoding Gender*, Ch. 2 “Seeking the Perfect Programmer”

Class Exercise: Constructing a narrative from different sources and perspectives

*Discussion: How does race intersect with the issues of gender and class that we’ve been discussing already? What is similar, and what is different, about how NASA mobilized black women workers as computers for space research projects? How does Yoshida’s nationality play into her ability to integrate, and also remain somewhat apart from, the academic research institution where she does some of her most important work? Why have we never heard of her before now? And, why does Grace Hopper get SO much attention, even more so than the women who programmed the ENIAC and had careers in computing, like Jean Bartik? What does it mean for a technology to have its start as a warfaring technology, and then turn to “peacetime” applications? Why does the Cold War play a major role in this process of “swords to ploughshares” for electronic computing? And why has this narrative (arguably) been submerged by our greater interest in making the development of the PC the cornerstone of how we understand and interpret postwar computing history?*

Class 5

Sept 20 **Computer Love: Gender, Sex, and Computing Before the World Wide Web**

Drucker, “Keying Desire: Alfred Kinsey’s Use of Punched-Card Machines for Sex Research,” 21 pp.

Hicks, “Computer Love: Sex, Social Order, and Technological Matchmaking at the Dawn of the Electronic Age, 1950-1979,” (draft; final version will be published in *Ada: A Journal of Gender, New Media, and Technology*, November 2016)

*Discussion: In the Drucker article, we see a very clear example of how computers construct the categories that go on to define sexuality over the course of the 20<sup>th</sup> century and through to the present day. How is this similar to the point made in the Hicks article about heteronormativity? What does this tell us about the impact of sexuality on the history of computing, and on the shape of computing, even when we aren't talking about computer technologies that have to do explicitly with sex, sexuality, and/or romance? Think back to the other things we've read so far during this semester: how has heteronormativity defined the shape of computing in important ways in other instances? Given this, what can you say about the relative importance of sexuality on the history of computing? What role does it play alongside gender, race, nationality, and class? How does understanding this change our understanding or lead us to surprising new insights?*

## **First Paper Due**

Class 6

### **Sept 27 Making Programming Professional**

Ensmenger, "Making Programming Masculine," in *Gender Codes: Women and Men in the Computing Professions*, Thomas Misa, ed. (Wiley, 2010)

<http://homes.soic.indiana.edu/nensmeng/files/ensmenger-gender.pdf>

Shirley, *Let IT Go*, pp. 66-123

Beyer, *Grace Hopper and the Invention of the Information Age*, pp. 213-261

Optional/Extra Credit: Look at Ensmenger's book, *The Computer Boys Take Over* (MIT, 2010) or his article "'Beards, Sandals, and Other Signs of Rugged Individualism': Masculine Culture within the Computing Professions" [www.journals.uchicago.edu/doi/abs/10.1086/682955?journalCode=osiris](http://www.journals.uchicago.edu/doi/abs/10.1086/682955?journalCode=osiris)

*Discussion: How does professionalization "happen" in computing? Is it a natural, evolutionary process, or a sudden change? Why? How does gender—and sexuality and whiteness—play an important role in this change in the labor force? Why do figures like Grace Hopper seem to skate through relatively unaffected, while other women like Shirley, Bartik, and some of the other former ENIAC women talk about the difficulties of being a woman in a masculinizing field?*

Class 7

### **Oct 4 The Fiction of Meritocracy**

Shirley, *Let IT Go*, pp. 124-137

Hicks, "Only the Clothes Changed" (14 pp.): <http://mariehicks.net/writing/clothes.html>

Slaton, "Meritocracy, Technocracy, Democracy: Understandings of Racial and Gender Equity in American Engineering Education," in S.H. Christensen, C. Didier, et. al. (eds.), *International Perspectives on Engineering Education: Engineering Education and Practice in Context. Vol. 1.* (Springer Science + Business Media B.V. 2014)

Optional:

Abbate, *Recoding Gender*, Ch. 3 "Software Crisis or Identity Crisis"

Hicks, "Against Meritocracy in the History of Computing," in *CORE: The Magazine of the Computer History Museum* (Spring 2016): <http://mariehicks.net/blog/?p=606>

*Discussion: What is meritocracy, and why is it a fiction? How is it specifically problematic—and seductive—in the case of computing and engineering disciplines and fields of work? What do you think about the concept of a "software crisis" or a "programmer labor shortage" in the 1960s? What about today? How is this concept (both then and now) also a kind of fiction?*

Class 8

## Oct 11 **Hidden Histories**

Conway, "Reminiscences of the VLSI Revolution: How a series of failures triggered a paradigm shift in digital design," [http://ai.eecs.umich.edu/people/conway/Memoirs/VLSI/Lynn\\_Conway\\_VLSI\\_Remimscences.pdf](http://ai.eecs.umich.edu/people/conway/Memoirs/VLSI/Lynn_Conway_VLSI_Remimscences.pdf)

Nakamura on Navajo women in hardware manufacturing at Fairchild Semiconductor:

<http://www.computerhistory.org/atcm/indigenous-circuits/>

<https://lnakamur.files.wordpress.com/2011/01/indigenous-circuits-nakamura-aq.pdf>

Shirley, *Let IT Go*, pp. 138-152

*Discussion: This week's readings look at two fairly different sets of workers—Lynn Conway and Stephanie "Steve" Shirley, who were high-status professionals in computing—and the anonymous and almost invisible Navajo workers at the Shiprock plant who manufactured computer hardware for Fairchild Semiconductor. What is instructive about the differences here? And why do you think I paired these readings together? Is there anything similar or any connections that can be made that might give us a better understanding of issues of hiding, passing, being ignored, and the effects of those things on who gets (and keeps) credit for their work in computing?*

## Class 9

### Oct 18 **The Personal Computing "Revolution"**

Nooney, "[A Pedestal, A Table, A Love Letter: Archaeologies of Gender in Video Game History](http://gamestudies.org/1302/articles/nooney)." *Game Studies*. 13(2): <http://gamestudies.org/1302/articles/nooney>

Adele Goldberg Oral history: [http://ethw.org/Oral-History:Adele\\_Goldberg](http://ethw.org/Oral-History:Adele_Goldberg)

Excerpts from Goldberg, ed. *A History of Personal Workstations*. ACM Press History Series (New York: ACM Press, 1988).

Brief Bio of Sophie Wilson: <http://www.computerhistory.org/fellowawards/hall/bios/Sophie,Wilson/>

BBC, "BBC Micro Ignites Memories of a Revolution," <http://news.bbc.co.uk/2/hi/technology/7307636.stm>

Beyer, *Grace Hopper and the Invention of the Information Age*, pp. 277-314

Optional:

Adele Goldberg papers finding aid at the Computer History Museum Archives:

<http://archive.computerhistory.org/resources/access/text/finding-aids/102733960-Goldberg/102733960-Goldberg.pdf>

Sophie Wilson Interview about Acorn: <http://speleotrove.com/acorn/acornWilson.html>

Notes on Nooney's Sierra Online oral history research trip: <http://www.lainenooney.com/research-blog/dissexcerpt>

Brief Midterm Review at end of class

*Discussion: Why do women start to disappear as we get into the era of the "PC revolution" and what does that mean for telling the history of computing in a way that is attentive to women's experiences? Is gender still an important category of analysis here? Why or why not? Also, how does the definition of computing start to change in this era? Explain how Sierra Online is an important part of computing history, and not some other field. Lastly, is the arrival of the PC a "revolution" and what is the agenda of the folks who want to see it as such? What are their unspoken assumptions, biases, and even political beliefs?*

## Class 10

Oct 25

### **MIDTERM EXAM in class**

## Class 11

Nov 1 **Changing the Accepted Narrative**

## Wikistorming exercise—Readings TBA

*Exercise: So far, this class has been about looking at how a small number of historians have started to change the accepted narrative of the history of computing as a field. Now, it's your turn to help. Today we will use the readings we've done so far in the course, along with some extra readings (books and articles I will provide) in order to change the accepted, popular narratives about gender and computing history that are out there on the web. We will start with entries on Wikipedia and try to enhance them in ways that foreground the importance of gender—and women's contributions—without simply reverting to a women's version of "great man" history. In other words, we are going to try to edit articles in a way that draws attention to the great masses of women workers whose work will never be recognized adequately if we continue to focus on individual biography and lionize figures like Grace Hopper to the exclusion of other narratives. We will try to bring insights about class, race, nationality, and intersectionality to bear on this format of historical information dissemination that tends to privilege biography-driven knowledge. Questions to keep in mind: What is Wikipedia's historiographical model and how does that shape its knowledgebase? Is it possible to write the kinds of histories we've been learning about into a format like Wikipedia? How does its structure make that difficult?*

### Class 12

#### Nov 8 **Telecommunications: Global Computing, Global Production**

Nakamura, "Economies of Digital Production in East Asia: iPhone Girls and the Transnational Circuits of Cool," <http://www.mediafieldsjournal.org/economies-of-digital/>

Villa-Nicholas, Ch. 11: The Invisible Information Worker: Latinas in Telecommunications, in *The Intersectional Internet* (pp. 195-214)

*Discussion: As we turn to more contemporary events, what concerns arise that might not have arisen if this were a more "traditional" history of computing class? Are the "iPhone Girls" and Latina telecommunications workers an important part of computer history? Why? How are they similar to other workforces we've learned about from earlier in computing's history? And how is the historiographical context of those earlier workers instructive as we try to think about this week's readings and why they're important?*

### Class 13

#### Nov 15 **Politics and Identity Online**

Tynes, Schuschke, & Noble, Ch. 1: Digital Intersectionality Theory and the #BlackLivesMatter Movement in *The Intersectional Internet* (pp. 21-40)

Losse, "The Male Gazed," <https://modelviewculture.com/pieces/the-male-gazed>

Wenger, "I Look Like an Engineer," <https://medium.com/the-coffeelicious/you-may-have-seen-my-face-on-bart-8b9561003e0f#.q9sqasu13>

Optional:

Losse, *The Boy Kings* (about her time working at Facebook in its early days)

*Discussion: Discourses matter to the material reality of people's lives, sometimes in ways that determine life or death. How do the examples of #blacklivesmatter, #ilooklikeanengineer, and Losse's concept of the male gaze getting embedded in facebook relate to the power that discourse has in the real world to affect people's bodies and lives? How does appearance and assumption not only play into each of these examples, but also earlier examples from the course that show how what we think about women in computing history has a lot to do with visual imagery?*

### Class 14

**Nov 22 Changing the Accepted Narrative**

Wikistorming exercise—Readings TBA

*Exercise: We will continue our exercise in trying to investigate and possibly change how Wikipedia tells the history of computing. We'll start by seeing how many of your edits have been reverted or altered, how many remain, and what this indicates. We'll discuss successes and setbacks and formulate a plan for what to work on as we wikistorm for the rest of this class period. We will also regroup at the end of class to think about the things we've learned about history and historiography from doing this exercise. What would we not have necessarily known from the rest of our classwork and readings? How has this exercise given us a better insight into how history gets written and disseminated in non-classroom contexts?*

Class 15

**Nov 29 Summation: How Do Women's Stories Change What We Think We Know About Computing History?**

Readings TBA

*Discussion: How does gender change the main narrative of the history of computing, and how do we write this history in a way that goes beyond the notion of just "add women and stir" so to speak? What do women's perspectives bring to our understanding of the field's past and present that we wouldn't have known otherwise? And what is a woman, anyway? What categories, other than gender, do we need to be attentive to in order to define what women are in any given historical period and why they are important to our changing understandings of technological "progress"?*

**Final Projects will be due on the date of our Final Exam (as set by the registrar)**

Have a good winter break!