

University of Wisconsin-Madison  
**History of Science 150: The Digital Age** Fall 2021  
<https://canvas.wisc.edu/courses/273130>

<b>Instructor</b>	<b>Teaching Assistant</b>	<b>Teaching Assistant</b>
Prof. Devin Kennedy Department of History, Program in History of Science, Medicine and Technology (he/him) <a href="mailto:dbkennedy@wisc.edu">dbkennedy@wisc.edu</a>	Nicki Day-Lucore Department of History (she/her/hers) <a href="mailto:daylucore@wisc.edu">daylucore@wisc.edu</a>	Bennett McIntosh Program in the History of Science, Medicine and Technology (he/him/his) <a href="mailto:bamcintosh@wisc.edu">bamcintosh@wisc.edu</a>

**Course Meetings:**

**Lectures**

Tuesdays	8:50-9:40am	Birge Hall Room 145
Thursdays	8:50-9:40am	Birge Hall Room 145

**Discussion Sections** (Check your registration)

DIS 301	Thursdays 12:05-12:55pm <i>(with Nicki)</i>	2619 Mosse Humanities
DIS 302	Thursdays 1:20-2:10pm <i>(with Bennett)</i>	2115 Mosse Humanities
DIS 303	Thursdays 5:40-6:30pm <i>(with Bennett)</i>	2631 Mosse Humanities
DIS 304	Fridays 9:55-10:45am <i>(with Bennett)</i>	2631 Mosse Humanities
DIS 305	Fridays 8:50-9:40am <i>(with Nicki)</i>	2125 Mosse Humanities
DIS 306	Fridays 9:55-10:45am <i>(with Nicki)</i>	4004 Vilas Hall
DIS 307	Fridays 11:00-11:50am <i>(with Bennett)</i>	2125 Mosse Humanities
DIS 308	Fridays 12:05PM-12:55pm <i>(with Nicki)</i>	2125 Mosse Humanities

**Office Hours:**

Prof. Kennedy:	Thursdays 11:30-1:30 in 4127 Mosse Humanities Fridays 12-2 in 4127 Mosse Humanities Appointments preferred: <a href="https://calendly.com/devinkennedy/officehours">https://calendly.com/devinkennedy/officehours</a>
Nicki Day-Lucore:	Fridays 2-4 by Zoom (see link on canvas)
Bennett McIntosh:	Mondays 11:30-12:30 on Zoom (see link on canvas); Wednesdays 11:30-12:30 at Memorial Union (see details on canvas)

### **Course Description:**

This course provides an introduction to the history of the computer from the 1940s to the present day. Over the course of the semester, students will become familiar with major developments in computer science and technology in their historical contexts, as well as recent trends in computing and society. We learn about machines, but emphasize the study of people: the institutions, scientists, workers, and social movements that invented, facilitated, and transformed digital technology in the 20<sup>th</sup> and early 21<sup>st</sup> century.

### **Learning Outcomes**

Students, upon successful completion of the course, will be able to:

- Identify key technological developments, periods, and themes in the history of computing
- Engage primary cultural and technical sources from the history of technology in the 20<sup>th</sup> century
- Analyze ongoing developments in computer science and digital technology with historical and critical perspective
- Write and speak conscientiously about digital technology's effects in society
- Recognize a range of factors that contribute to technological change

### **Course Details**

**Prerequisites:** None

**Course Designation:** Breadth - Humanities

**Level:** Elementary

**Credits:** 3

**Modality:** In-person

### **Credit Hour Details**

This class meets for three, 50-minute class periods each week (2 lectures, 1 discussion) over the fall semester and carries the expectation that students will work on course learning activities (reading, writing, watching supplemental video material and responding to quizzes on canvas, working on writing assignments studying for examinations) for about **2 hours out of the classroom for every class period (about 6 hours per week)**.

### **Required Texts**

- Margaret O'Mara, *The Code: Silicon Valley and the Remaking of America* (Penguin, 2019, Paperback 2020) \$20 [Any format]

### **Face Masks:**

In accordance with University Policy, students, faculty, and staff are required to wear a face mask while inside any university building, this will include during lectures, discussion sections, and in office hours. Face coverings must be worn correctly (i.e., covering both your mouth and nose) in the building if you are attending class in person.

Students with disabilities or medical conditions who are unable to wear a face covering should contact the McBurney Disability Resource Center or their Access Consultant if they are already affiliated. Students requesting an accommodation unrelated to disability or medical condition, should contact the Dean of Students Office.

Students not wearing a face covering will be asked to put one on or leave the classroom. Students who refuse to wear face coverings appropriately or adhere to other stated requirements will be reported to the Office of Student Conduct and Community Standards and will not be allowed to return to the classroom until they agree to comply with the face covering policy. An instructor may cancel or suspend a course in-person meeting if a person is in the classroom without an approved face covering in position over their nose and mouth and refuses to immediately comply.

### **Absences due to Covid-19**

Individual students unable to attend in-person lectures for COVID-19-related reasons should contact me, Professor Kennedy to discuss options for access to course materials and activities. If you cannot attend discussion sections, please contact your Teaching Assistant. We are happy to support you in these circumstances so please just do be in touch. Students who must miss multiple class sessions should talk with me and with their academic advisor about the best course of action.

If multiple students in a course section must miss in-person class meetings for COVID-19-related reasons, every effort should be made to avoid a disruption of in-person instruction. Instructors should work with their department, school and college to explore ways to provide students who cannot attend in-person sessions access to course materials and activities. Any interruption of in-person instruction should be temporary and brief.

### **Lecture Materials and Intellectual Property**

Lecture materials including PowerPoint slides and recordings for History of Science 150 are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

## Grade Components

### **Grade Components:**

Canvas Quizzes (15%)

Discussion Section Participation (25%)

Mid-Term (20%) **October 26** in-class

Final Exam (20%)

Writing Project: Op-Ed (20%)\*

### **Canvas Responses (15%)**

Throughout the semester, you are asked to complete a short writing assignment of about a paragraph in length on Canvas in response to the week's lecture or some supplemental material (like a short video or a news article). These responses are released over the weekend and are **due on Wednesday by 11:59PM**. They should take no more than 30 minutes to complete. They are *graded leniently*, and are used to provide supplemental material (clips, short articles) and quick activities (writing a journal about a topic from the week, a response to a video) to reinforce the main themes of the week and to prepare you for discussion sections.

#### **Response Rubric**

**3 Points** Answered the question or completed the task

**1-2 Points** Responded to the prompt, but did not engage the course material requested in the prompt

**0 Points** No attempt made / off-topic response

*You will get two "freebies"—two unpenalized, uncompleted activities.*

*.5 points off for very late responses*

### **Discussion Section Participation and Attendance (25%)**

In discussions, you will discuss course materials from the week (lectures, readings, film content) practice critical skills (how to engage in a classroom discussion, how to analyze a primary source) and perform additional group activities to build your knowledge of course material.

**The discussion sections are a crucial component of this course and you are required to attend.**

#### **Attendance:**

You are permitted two "freebies" (unexcused, unexplained absences) unexcused absences from discussion sections. Additionally, if something comes up (a doctor's visit, family situation) you can be in touch with your TA and Professor Kennedy to request an excused absence, but please try to do so in advance, if possible, to arrange alternative work. **You will lose 5% on your discussion grade for each additional unexcused absence. (e.g. if you finish with a 90% on your participation as**

described in the rubric below, you'll receive an 85% on your discussion grade for the semester).

Additionally, you are graded on your contributions to discussions, **not simply in terms of the amount you speak, but on your productive engagement with your classmates' ideas**. We will be teaching you how to engage respectfully and productively in a diverse discussion-based classroom where you learn from each other. In your first meetings, we will discuss in greater detail expectations for participation, ideas for how to build upon each other's comments, standards of behavior and respect in our classroom community, and the way you will be evaluated.

**Discussion Participation Rubric**

Excellent (90-100)	Good (80-90)	Competent (70-80)	Pass (60-70)	Fail (0-60)
<ul style="list-style-type: none"> <li>- Consistent preparation and regular involvement in discussion</li> <li>- Explores questions rigorously</li> <li>- Comes to class with questions and ideas Draws on material from other weeks in the course</li> <li>- Engages others respectfully, building on and giving credit to students work</li> <li>- Leaves space for other students to speak</li> </ul>	<ul style="list-style-type: none"> <li>- Generally prepared and involved in discussion</li> <li>- Draws on course materials in responding to questions or adding to discussion</li> <li>- Engages others respectfully, building on and giving credit to other students' Comments</li> </ul>	<ul style="list-style-type: none"> <li>- Involved in discussion, but does not demonstrate adequate preparation</li> <li>- Contributes when called upon but not actively engaged in the discussion</li> </ul>	<ul style="list-style-type: none"> <li>- Contributes when called upon but not actively engaged</li> <li>- Responses are on-topic but do not demonstrate awareness of course materials of course</li> </ul>	<ul style="list-style-type: none"> <li>- Uninvolved</li> <li>- Unexcused</li> <li>- Disruptive or disrespectful to peers or teaching assistant</li> </ul>

<b>Examinations:</b>	<b>Mid-term 20%</b>	<b>Final: 20%</b>
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The mid-term and final exam are of the same format. The final is longer (more questions of the same format of the mid-term) and comprehensive. The mid-term covers weeks 1-7, and is in-class in week 8. The final covers weeks 1-15 and is during exam period.

The two exams will have questions of two types: A) multiple-choice questions that focus on the identification and explication of terms, technologies, events, and concepts in a few sentences; and B) short essays (of about 1-3 paragraphs that asks you to bring ideas and themes from course content across several weeks.

The mid-term and final are open-book and open notes. However, they will be time-limited. **We recommend working with your peers to produce a study guide** in advance of the exams with dates, facts, topics, summaries of readings, etc, as you won't have time during the exams to look up every concept or idea. You can use this guide during the exam.

More information will be given about examinations during the semester. In general, although we will not be testing you on your mastery of exact dates (to the year) or detailed knowledge of technical matters (e.g. what metals are used in CMOS technology), or a long list of names, or machines, we do expect you to have

- 1) Some command of a rough timeline of historical developments people, contexts, and events, (e.g. to know that SAGE was developed by IBM during the early Cold War; or that user-oriented computing emerged in the 1960s)
- 2) Familiarity with technologies discussed in lecture in the sense of knowing why they were historically important, including because of the people who made them or how they were influential in social or economic history (e.g. that the programming language COBOL was a very early one, and was developed by a consortium of businesses and the US military in the 1950s to create a standard across the many machines being produced during the period),
- 3) A repository of anecdotes from lecture, course readings and materials, and discussion sections, that you could use in an essay questions (e.g. the story of the ENIAC computers and the history of the 'hidden figures' at NASA to make an argument about the marginalization of women from the history of technology) .

<b>Writing Assignment: Op-Ed Essay (20%) * split into 3 parts</b>
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There is one writing assignment in this course, split up into **three parts** which you will complete over the course of the semester. The assignment is to write an "op-ed" article of about 750-900 words about an issue in digital technology and society today that draws on course material, your own experiences and opinions, and some reading of newspaper and popular interest magazine articles. Detailed rubric and instructions will be provided at each stage of the assignment.

**Part 1: Draft 5%**

First, you'll write a draft of your op-ed, following models and guidelines provided in class and on canvas. You'll get full credit on the first part *if you turn it in on time, and it's of the right length and format.*

**Part 2: Peer-Review Letter 5 %**

Second, you'll read and respond to a peer's op-ed, providing in-line edits and substantive suggestions in the form of a 150 to 200-word letter.

**Part 3: Final Version 10%**

The third part of the assignment is to produce a final version of the essay, drawing on the input of your peer (who will provide edits and brief feedback on your draft).

## **Resources for the Op-Ed**

In addition to the samples and guidelines we will provide on the assignment instructions, we encourage you to take advantage of University resources for developing your draft, especially the History Department History Lab. They are offering **remote appointments**:

<https://history.wisc.edu/undergraduate-program/the-history-lab/>. We also recommend the University Writing Center: <https://writing.wisc.edu/individual/> for developing your skills.

## **Policy on late work:**

Please be in touch with Professor Kennedy if you are having problems meeting deadlines on the quizzes and the writing assignment and keeping the pace of the course.

On **the draft**: one-half percentage point per day late

On the **peer review response**: one-half percentage point per day late

Late submission of the **final op-ed assignment** submission shall be **penalized one letter grade** per day. For example, an “A” Score will score an A- if it is one day late, and a B+ if two days late. No assignment will be accepted more than one week late, except for extraordinary circumstances.

## **Academic Integrity**

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

## **Grading Scale**

A = 93+  
AB = 88-93  
B = 83-88  
BC = 77-83  
C = 71-77  
D = 67-71  
F = 66 or below.

## **Accommodations**

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible

after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

### **Policy on Electronic Devices**

Laptops and other note-taking devices are permitted during lectures, discussion meetings, and for in-class exams (using examination software to-be-provided). Technology offers many benefits to our notetaking, studying, and research practices. But they also have negative effects—multi-tasking can make us less conscientious of our peers when they're speaking, and make it harder to follow lectures in real-time. We expect you to be engaged and present at all times during lecture and class discussion.

### **Institutional statement on diversity:**

“Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>

**Schedule of Classes, Readings and Assignments**

<b>Week 1:</b>	<b>Introduction</b>	September 9 (Half-week)
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*No reading*

Lecture 1 Introduction  
September 9

<b>Unit One: Machinery of State</b>	<b>(Weeks 2-3)</b>
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*We begin the history of computing before digital computers. We examine earlier technologies in the late 19<sup>th</sup> and 20<sup>th</sup> century to see how human computing practices, analog machines, and punched card systems aided governments in the administration of state and colony. We use these histories to understand government supports for the military development of computers as we know them—stored-program, all-digital, electronic devices—in war efforts in World War II and the early Cold War.*

<b>Week 2:</b>	<b>Computing and Population Statistics (1890-1939)</b>	September 13 - 17
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**\*\*\*SECTIONS BEGIN THURSDAY\*\*\***

***Read:***

1. [on canvas] Alma Steingart “Democracy by the Numbers” *LA Review of Books* 2019 <https://lareviewofbooks.org/article/democracy-by-numbers/>
2. [on canvas] Sahil Chinoy “The Racist History Behind Facial Recognition” *The New York Times* 2019 <https://www.nytimes.com/2019/07/10/opinion/facial-recognition-race.html>

***Watch/Listen:***

3. [on canvas] Khalil Gibran Muhammad “Big Data” <https://www.youtube.com/watch?v=2xuo32Z2EMA>

Lecture 2 Three Precursors: Prony’s Tables, Lovelace’s Code, Turing’s ‘Machine’  
September 14

Lecture 3 The Machinery of Government  
September 16

<b>Week 3:</b>	<b>The Military Role in Modern Computing (1940-1970)</b>	September 20 - 24
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**\* Op-Ed Assignment Provided \***

***\*First Reading Response Due on Canvas: due Wednesday 11:59PM\****

***Read:***

1. Margaret O'Mara The Code: Silicon Valley and the Remaking of America  
Introduction: ("The American Revolution"), Chapter 1: ("Endless Frontier"), and Chapter 3 ("Shoot the Moon")

Lecture 4      World War II and the Electronic Computer  
*September 21*

Lecture 5      The Cold War  
*September 23*

<b>Unit Two:</b>	<b>Business Machines (Weeks 4-6)</b>
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*We examine developments in business, technology, labor, and society as computers became a big business after World War II. We'll touch on the history of electronics and programming languages, but focus on social developments: the experiences of engineers and coders, the institutions and capital that supported computing innovations, how computing entered new and old industries, and the early development of lasting patterns of globalized manufacturing and labor.*

<b>Week 4:</b>	<b>The US Government and the Computer Industry (1945-1975)</b>	September 27 - 30
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***\*Response due on Canvas: Wednesday 11:59PM\****

***Read:***

1. O'Mara The Code Chapter 2 ("Golden State"), Chapter 5 ("The Money Men") and Chapter 7 ("The Olympics of Capitalism")
2. [on canvas] Matthew Levin Cold War University: Madison and the New Left in the Sixties  
Chapter 1: "Cold War University: Higher Education after World War II."

Lecture 6      Integrated Circuits and the Military-Industrial Complex  
*September 28*

Lecture 7      Universities and the Cold War  
September 30

<b>Week 5:</b>	<b>The Shaping of a Tech Workforce (1940-1975)</b>	October 4 - October 8
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**\*Response due on Canvas: Wednesday 11:59PM\***

**Read:**

1. [link on canvas] Clive Thompson, “The Secret History of Women in Coding” *The New York Times Magazine* <https://www.nytimes.com/2019/02/13/magazine/women-coding-computer-programming.html>

**Listen**

2. [link on canvas] American Public Media Podcast “Historically Black: NASA’s Human Computers.” <https://www.youtube.com/watch?v=5GEuTRMeepE> .

Lecture 8      “When Computers were Women”  
October 5

Lecture 9      Professionalization, Masculinization, and The Software Crisis  
October 7

<b>Week 6:</b>	<b>Computerization (1955-1975)</b>	October 11 - 15
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**Read:**

1. [on canvas] James Carey and Joseph Beirne, 2 Speeches at the 1955 CIO National Conference on Automation in The Challenge of Automation, 1956
2. [link on canvas] Martin Greenberger “The Computers of Tomorrow” (The Atlantic, 1964)

**Listen:**

3. *99PercentInvisible: Episode Project Cybersyn (Text, Video, and 23minute podcast)* <https://99percentinvisible.org/episode/project-cybersyn/>

Lecture 10      IBM and the Introduction of the Computer to Business  
October 12

Lecture 11      Computers and Economies: Factories, Finance and Project Cybersyn  
October 14

**Unit Three: Coding Community (Weeks 7-11)**

*We explore how technologies developed for largely business and government use became 'personal' machines and tools for collaborating within and connecting communities. We consider technical developments (graphics, input devices, internet infrastructure, web browsers) as they were made and remade by governments, scientists, and activists, from the Vietnam era to the 1990s dot-com boom.*

**Week 7: Rage Against the Machine (1965-1980)**

October 18 - 22

**\*Response due on Canvas: Wednesday 11:59PM\***

**Read:**

1. [on canvas] Fred Turner, "Taking the Whole Earth Digital" [From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism]
2. [on canvas] "Calculus for Conquest" (Science for the People, Mar. 1973)

Lecture 12 Fighting the Machine (with virtual field trip to the UW-Archives)  
October 19

Lecture 13 How Students, Hackers and Teachers made Computing "Personal"  
October 21

**Week 8: The Soul of a New Machine (1968-1984)**

October 25 - 29

**Read [for class after the mid-term]**

1. O'Mara The Code: Chapter 7 ("The Olympics of Capitalism"), Chapter 8 ("Power to the People"), Chapter 12 ("Risky Business"), Chapter 13 ("Storytellers") and Chapter 16 ("Big Brother")

Lecture 14 **\*Mid-Term During Lecture\* (covering content through week 7)**  
October 26

Lecture 15 Selling a Revolution: The Personal Computer Business  
October 28

**Week 9: Going Online (1980-1999)**

November 1 - 4

**\* Op-Ed Assignment (Draft) Due Friday 11:59PM\* on Canvas**

**Read:**

1. [on canvas] J.C.R Licklider and Robert Taylor, “The Computer as Communications Device” (Science and Technology, April 1968)
2. O’Mara The Code Chapter 14 (“California Dreaming”), Chapter 20 (“Suits in the Valley”)

Lecture 16 The Net Before the Internet  
*November 2*

Lecture 17 From ARPAnet to WWW  
*November 4*

<b>Week 10: The Information Society (1980-1999)</b>	November 8 - 12
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**\*Op-Ed Project Part 2 Provided (Peer Review)\***

**\*Response due on Canvas: Wednesday 11:59PM\***

**Read:**

1. [link on canvas] Vannevar Bush “As We May Think” (The Atlantic, 1945)
2. Margaret O’Mara The Code: Silicon Valley and the Remaking of America 2019 Chapter 15 (“Made in Japan”)

Lecture 18 Information Overload  
*November 9*

Lecture 19 Citizens and States in the Information Age of the 1970s  
*November 11*

**No quiz this week**

<b>Week 11: Governing the “Digital Frontier,” (1994-2004)</b>	November 15 - 19
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**\*Response due on Canvas: Wednesday 11:59PM\***

**Read:**

1. O’Mara The Code Chapter 19 (“Information Means Empowerment”), Chapter 21 (“Magna Carta”), and Chapter 22 (“Don’t Be Evil”)
2. [link on canvas] John Perry Barlow “A Declaration of the Independence of Cyberspace” Eff.org 1996.



December 2

**Week 14:     Algorithmic Society**

December 6 – 10

***\*Response due on Canvas: Wednesday 11:59PM\****

***Final Discussion Sections this week***

***Read:***

1. [link on canvas] Angèle Christin “The Mistrials of Algorithmic Sentencing” (LOGIC Issue 3, 2017)
2. [on canvas] Mary L. Gray and Siddharth Suri, Ghost work: How to Stop Silicon Valley from Building a New Global Underclass Chapters 1 and 2

Lecture 25     A Brief History of AI and Amazon Turk  
*December 7*

Lecture 26     Algorithmic Harms and the Tech Workers Movement  
*December 9*

**Week 15:     Digital Planet**

***(2000-Present)***

December 13 - 15

Lecture 27     The Environmental Costs of Digital Life / Wrap up  
*December 14*

***Read:***

1. [link on canvas] Zero Cool [a pseudonym] “Oil is the New Data” (LOGIC Issue 9, 2019)

***Op-Ed Final Version Due Wednesday December 15, 11:59PM***

***\*Final Exam\****

***Wednesday, December 22***

***7:45-9:45am***