

Theory of the Digital
<https://leifweatherby.org/teaching/theory-of-the-digital-spring-2019/>
GRM-UA 210/MCC-UE 1339
TR 3:30-4:45pm, Silver 618/LAB F, 10am-1pm, Bobst 411
Professor Leif Weatherby; TA Tyler Harper

The digital is theoretical to its core. Digital technologies were built on speculative experiments in logic and metaphysics, and the subsequent digitization of our everyday lives confronts us with philosophical question at every turn. This course introduces students to the intertwined histories of philosophy and the digital, from cybernetics and German Idealism to postmodernism, Machine Learning, and the platform economy. We will read Claude Shannon, George Boole, and Immanuel Kant; John von Neumann, Karl Marx, and Ada Lovelace. While the seminar aspect of the course builds this theoretical-historical understanding of the digital, the lab component will serve as competence-oriented illustrations and live engagements with the theoretical materials. To live in the digital world is to engage both practically and theoretically with the processes and effects of ubiquitous computing. This course thematizes both and seeks to cultivate digital citizenry.

This course continues the work of the Digital Theory Lab, convened in fall 2018 as a research initiative and a Humanities Lab at NYU. The statement of the lab is below.

Digital technology challenges the very way we frame our world, the categories we use to explain things to ourselves. Ubiquitous computing puts conceptions of self, society, and even nature into question. Algorithmic data processing is changing taste, labor, and the sense of value itself. These shifts require new cultural theory, but also an appreciation for the deeply intertwined histories of the digital and theory itself. Alan Turing's "machines" were abstract entities, built of symbols as much as silicon. And the computational problems that gave rise to today's digital landscape were intertwined historically with the rise of "theory" in the humanities: structural linguistics, poststructuralism, and contemporary media theory all began in dialogue with emerging forms of digital processing. This lab proceeds from the premise that understanding contemporary digital cultures and concepts requires some theoretical foundation. We seek to synthesize digital methods with a broad-based notion of cultural and critical theory, experimenting concretely with the vast realm of "the digital" with the goal of making more of it visible, following the Greek sense of *theoria* as "seeing." The lab works with historical digital forms, a long and open-ended history of theory, and digital methods of all kinds. We seek to provide both an overview and a series of specific interrogations of digital phenomena. We also understand "theory" as an invitation to venture out from our disciplinary homes into other realms of knowledge. Those ventures include exploring past and current intersections of knowledge and computation that highlight the historicity of the Lab's other keywords, from the "digital" to the "humanities." This approach to theory enables us to work with new fields of knowledge, such as computational emergence and quantum computation.

The lab maintains a nodal bibliography of theoretical work about the digital. The nodes (which include "-ware," "algorithm," "network," "intelligence," and "simulation," among many others) are centered around what we call the computability problem, the basic fact that humans have managed to get material artifacts to carry out immensely complex computation. The nodes – which comprise "digital culture" – are each related to the computability problem and to each other in different ways.

Working groups and collaborative projects draw on and continue to revise the definition and bibliography for each node as they work.

Readings

Each week, one or more texts are marked “main.” You should read this text before the Tuesday session and return to it throughout the week, as we read supplemental texts. Please bring books/reading materials to class on assigned day. You are responsible for changes in the syllabus and extra readings that are announced in class.

Assignments:

The assignments in this course break down into written assignments for seminar, and ongoing exercises in the lab.

The written requirements for the course consist in collective writing assignments during lab, as well as two more traditional papers.

- In Week 1, to be completed on Friday, a collective Google doc listing and annotating the forms of the digital
- Due Monday, March 25, is the first solo writing assignment, a 5-pp essay on the topic, “What is the Digital?”
- In Week 10, we will collectively write a newspaper-style article about algorithms, to be completed by the end of the Lab session on Friday
- On April 26, you will turn in a *formal abstract* in the style of a pitch for your final project
 - That final project is due on May 13

Lab assignments: there will be several experimental or workshop sessions in the Lab, as described below. Throughout the semester, we will work through Zed Shaw’s *Learning Python the Hard Way*.

Texts

All texts will be provided via Classes, with the exception of [Shaw’s *Learning Python the Hard Way*, which you should purchase here](#) (PDF available), and Kim Stanley Robinson’s *2312*, which you should purchase.

Grading:

Grades will be comprised of the following components

Seminar: 10% “forms of the digital”; 15% “What Is A Computer?”; 15% algorithm article; 40% final project; 20% attendance and participation

Lab: 80% Python work; 20% attendance and participation

Attendance:

Attendance is mandatory. You are allowed 2 absences (excused or unexcused) from seminar, and one from the lab); subsequent absences will adversely affect your grade. **If you do not contact me in advance of an absence, it will count against these totals.**

Communication:

You will receive an invitation to join the Slack group digitaltheorygroup.slack.com, and we will carry on a group conversation under the thread #theoryofthedigital. Office hours will be by appointment, since we can take advantage of the Lab sessions for this purpose as well.

SESSIONS and ASSIGNMENTS

Week I *What is the Digital*

- *Main Text:* Benjamin Peters, “Digital,” *Digital Keywords*, 93-109
 - *Jan 29, Session I:* Introduction: George Dyson, “[Childhood’s End](#)” [COLLECTIVE READING]
 - *Jan 31, Session II:* Kate Crawford and Vladan Joler, [Anatomy of an AI System](#)”; Christoph Rosol, Benjamin Steininger, Jürgen Renn & Robert Schögl “[On the Age of Computation in the Epoch of Mankind](#)”
 - *Feb 1, Lab:* [Learn Python the Hard Way](#), “Introduction” and Exercises 0-2; [watch Kate Crawford’s NeurIPS keynote and discuss](#)
 - *Assignment:* collective Google doc: how many forms of the digital do you interact with and how?
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Week II *Computability*

- *Main Text:* Alan Turing, “On Computable Numbers” (first four pages); “Computing Machinery and Intelligence”
 - *Feb 5, Session I:* Chris Bernhardt, *Turing’s Vision* (Chapter 1, 1-15)
 - *Feb 7, Session II:* Chris Bernhardt, *Turing’s Vision* (Chapter 4, 47-69)
 - *Feb 8, Lab:* [Python 3-5](#)
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Week III *Communication*

- *Main Text:* Claude Shannon, “A Symbolic Analysis of Relay and Switching Circuits” (READ pp 1-3, examine charts on p 11 and p 49); Warren Weaver, “Some Aspects of the Mathematical Theory of Communication”
 - *Feb 12, Session I:* *discussion of main texts*
 - *Feb 14, Session II:* [Cliff Siskin VISIT Thursday, Feb 14: Texts:](#) David Deutsch, “Quantum Theory, The Church-Turing Principle and the Universal Quantum Computer” (just the ABSTRACT); David Deutsch, “It from Qubit”; Seth Lloyd, “The Computational Universe”; Oliver Morton, “The Computational Cosmos of David Deutsch”
 - *Feb 15, Lab:* [Python 6-9](#); [Logic Gate Simulator](#)
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Week IV **18 Logics** *Main Text:* George Boole, *Laws of Thought* II

- *Feb 19, Session I:* Gottlob Frege, “Function and Concept”
- *Feb 21, Session II:* C. S. Peirce, “Deduction, Induction, and Hypothesis”; fragments 3.359-364

- Feb 22, Lab: Python 10-12
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Week V Nets

- *Main Text:* Warren McCulloch and Walter Pitts, “A Logical Calculus of the Ideas Immanent in the Nervous System”; Warren McCulloch, “What is Number...”
 - Feb 26, Session I: discussion of main text, also read: Jean-Pierre Dupuy, *Origins of Cognitive Science*, chapter 4
 - Feb 28, Session II: continued
 - March 1, Lab: Python, 13-17; visit from Zach Coble, constructing markov chain bots
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Week VI Cognition

- *Main Text:* Immanuel Kant, “Introduction” to the B edition of the *Critique of Pure Reason*
 - March 5, Session I: discussion of main text
 - March 7, Session II: G.W.F. Hegel, “Introduction” to the *Phenomenology of Spirit*
 - March 8, Lab: Python, 18-21; workshop with Mohamed Zahran from Courant Institute
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Week VII Computer

- *Main Text:* John Von Neumann, “First Draft of a Report on the EDVAC”
 - March 12, Session I: Friedrich Kittler, “There Is No Software”
 - March 14, Session II: Wendy Chun, “On Software”
 - March 15, Lab: Python 22-26
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• Week of March 18 SPRING BREAK

Week VIII Data

- DUE MONDAY: Assignment: What is the Digital? (5 pp)

- *Main Text:* Philip Agre, “Surveillance and Capture”; Shoshonna Zuboff, “Big Other: Surveillance Capitalism and the Prospects of an Information Civilization”
 - *March 26, Session I: discussion of main texts*
 - *March 28, Session II:* Kenneth Cukier and Viktor Mayer-Schönberger, *Big Data* (“Messy,” 32-50, and “Datafication,” 73-98)
 - *March 29, Lab: Python 27-30*
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Week IX Link

- *Main Text:* E. F. Codd, “A Relational Model of Data for Large Shared Data Banks”; Cornelia Vismann, “From the Bureau to Data Protection” and “Files Into Icons”; Ben Thompson, “[Oracle’s Cloudy Future](#)”
 - *April 2, Session I: discussion of main texts*
 - *April 4, Session II:* visit from Lisa Gitelman, texts: Andrew Abbott, “[The Future of Knowing](#)”; Tartleton Gillespie, “[Can An Algorithm Be Wrong?](#)”
 - *April 5, Lab: Python 31-33; Google takeout exercise*
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Week X Algorithm

- *Main Texts:* Robert Kowalski, “Algorithm = Logic + Control”; Anoinette Rouvroy and Thomas Berns, “Algorithmic Governmentality”
 - *April 9 and 11 Sessions:* read this overview bibliography; choose 2 texts for each session, come prepared to discuss: <https://socialmediacollective.org/reading-lists/critical-algorithm-studies/>
 - *April 12, Lab: Python 34-37; collective writing of short newspaper-style article on algorithms*
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Week XI Semiotics

- *Main Text:* C. S. Peirce,; “On a New List of Categories” fragments 3.359-364
 - *April 16, Session I: discussion of main text*
 - *April 18, Session II:* Sybille Krämer, “Writing, Notational Iconicity, Calculus: On Writing as a Cultural Technique”
 - *April 19, Lab: Python 38-40; workshop on Wikipedia*
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Week XII AI

- *Main Text:* Lecun, Bengio, and Hinton, “Deep Learning”; Feifei Li, “[How We’re Teaching Computers to Understand Pictures](#)”
 - *April 23, Session I:* discussion of main texts
 - *April 25, Session II:* [Yann Lecun and Gary Marcus debate](#), video
 - *April 26, Lab:* [Python 45-48](#); [workshop with Claire Song and Sam Kellogg](#)
 - [Assignment: FINAL PROPOSAL DUE](#)
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Week XIII Market

- *Main Text:* Friedrich Hayek, “The Use of Knowledge in Society”; Karl Marx, “Commodities”
 - *April 30, Session I:* discussion of main texts
 - *May 2, Session II:* Baudrillard, “Towards a Critique of the Political Economy of the Sign”
 - *May 3, Lab:* [Python 45-48](#); [report on Wikipedia results](#); [Mechanical Turk exercise](#); [execute and/or purchase 3-5 small jobs](#)
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Week XIV Climate

- *Main Text:* Kim Stanley Robinson, *2312*
- *May 7, Session I:* Tyler Harper, “Engineered Nature, (En)gendered Nature in Kim Stanley Robinson’s *2312*”
 - *May 9, Session II:* Paul Edwards, *A Vast Machine (excerpt)*
 - *May 10, Lab:* [Python, FINISH](#); [climate simulator](#)
 - [FINAL DUE MAY 13](#)