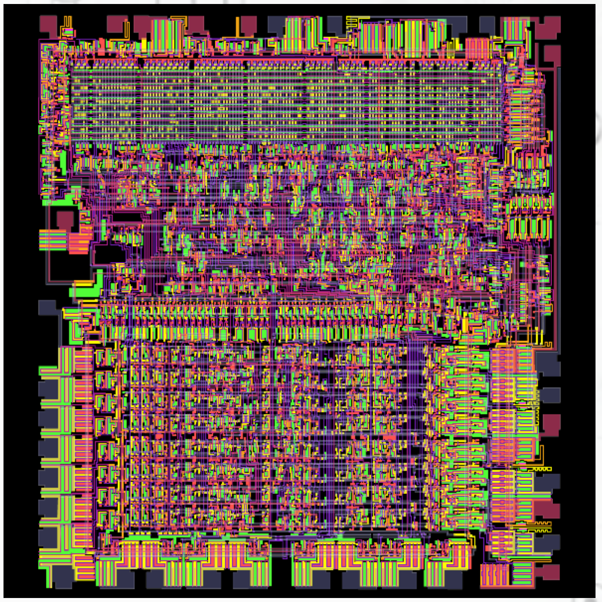
how computers became media

Program in Film and Media Studies
Johns Hopkins University
Spring 2025



Instructor Information
Kyle Stine, PhD
Program in Film and Media Studies

Course Description

Charting a history from when computers were human (and more precisely, women, as Jennifer Light has shown) to our present moment when AI has taken on much of what was once seen as the sole province of the human, this course considers the development of computers as tools of communication, cooperation, creativity, and play. It follows a story of how machines once designed for numerical calculation became media. It relatedly covers how the technologies of twentieth-century media fed into computers: how camera lenses came to be used for silicon electronics, how television screens became computer monitors, how the fundamentals of radio developed into cellular data. Course materials will be drawn broadly from media theory, the history of technology, game studies, literature, films, music albums, and dead and living hardware and software. Central questions will include how computers extended the capabilities of legacy media, as in electronic music, digital film production, and online publishing; how they outmoded or threatened traditional formats, as can be seen with the dwindling of magazine racks and the end-of-cinema debates; and how they enabled entirely novel technologies, from the word processor to the graphical user interface.

Course Objectives

- *History.* Gain an understanding of the accepted lineage of computer history, from mechanical calculators to vacuum tube electronics to microelectronics; from mainframes to minicomputers to personal computers and smartphones; from military to science to business to domestic and mobile uses.
- *Media theory.* Develop a wider perspective on the media ecologies and discourse networks within which computers in this lineage participated, how they were designed and manufactured using media and components already in use in social life.
- *Media archaeology.* Analyze concrete objects from computer history, from hardware to software, to explore how they are they are composed of wide-ranging collective knowledge and social action.
- *Remediation.* Cultivate an appreciation for how computers progressively digitize and transform prior media, becoming universal tools for tasks and communication formerly done on paper, film, vinyl, and other storage and transmission media.

- *Multimedia analysis.* Develop an understanding of the expressive tools of various mediatic forms, including text, image, sound, and video, and an ability to explain aesthetic and rhetorical strategies in these different media and how their histories have been affected by the growth of computer technologies.
- *Multimedia project.* Apply the insights of multimedia analysis and computer history to the creation of a project on an object of computer history, using video or a webpage.

Course Materials

Required books can be found at the Johns Hopkins University Official Bookstore and are available also from the publishers. Additional resources can be found on the course website https://medialities.org/how-computers-became-media/.

Jesper Juul, *Too Much Fun: The Five Lives of the Commodore 64 Computer* (MIT Press, 2024).
Laine Nooney, *The Apple II Age: How the Computer Became Personal* (University of Chicago Press, 2023).
Marc Weidenbaum. *Selected Ambient Works Volume II* (Bloomsbury, 2014).

Assignments

Attendance and Participation (10 points)
Attendance is required for all discussions and in-class screenings, and students earn participation points for attending class and engaging in discussions. The course meets once a week, and students may miss up to one class with no questions asked. A written response about the course materials will be required for any additional class missed, up to a total of two absences for the semester. A reduction of one-third grade from the cumulative course grade will result from each unexcused absence beyond two.

Quizzes (15 points)
Over the course of the semester, there will be five (5) quizzes, worth 3 points each, on the readings and screenings assigned for that day. They will be unannounced, or pop, quizzes and occur randomly.

Discussion Questions (5 points)
To help guide our discussion, students will sign up for a reading between Week 4 and Week 11 and provide 3–5 reading questions on it for class. Questions should be geared toward fostering discussion: exploratory, connective, and open-ended. Please email me your questions the night before class and plan to open the discussion with one of the questions. Sign-up sheet to come.

Presentations on Primary Sources (10 points)
Students will provide additional depth and context by researching a primary document related to the weekly topic. All materials can be found on the schedule. Sign-up sheet to come.

Essay: Reflection on a Year in Computer History, 4 pages (20 points)
Due February 14. More details to come in assignment sheet to be distributed on January 29.

Final Multimedia Project on Object in Computer History (40 points)
Due on the final day of classes for the semester, Wednesday, December 6. More details to come in assignment sheet to be distributed on November 12.

- Topic due March 7 by 5 p.m.
- Annotated bibliography due March 28 by 5 p.m.
- Presentations on April 23.
- Final project due April 28 by 5 p.m.

Note on Films and Videos

The films and videos assigned throughout the semester range from historical documentaries created for public television to informative videos made by museums to narrative feature films produced by major studios. In each case, we will be interested as much in how the films use historical resources and compose multimedia materials as we will be in any information provided or any narrative techniques of the entertainment industry. We are interested in how films represent the history of computing and how they themselves are artifacts of the history of computing, the insights from which will be valuable both for our discussions and your final projects.

Academic Integrity

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. You may consult the associate dean of student conduct (or designee) by calling the Office of the Dean of Students at 410-516-8208 or via email at integrity@jhu.edu. For more information, see the Homewood Student Affairs site on academic ethics: (https://studentaffairs.jhu.edu/student-life/student-conduct/academic-ethics-undergraduates) or the e-catalog entry on the undergraduate academic ethics board: (http://e-catalog.jhu.edu/undergrad-students/student-life-policies/#UAEB).

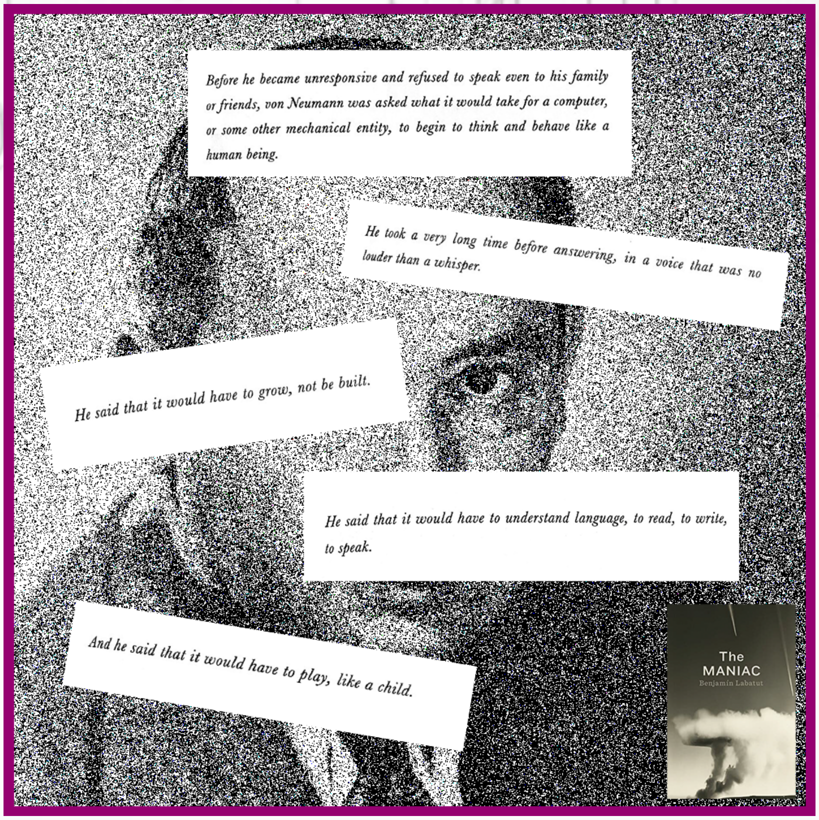
Statement on the Use of AI

Beyond the university's statement on academic integrity, I offer additional guidance for this course to ensure clarity. All assignments you submit in this class should be your own original work. Your writing should express your own ideas, composed by your own power, and should not include passages produced by other students or by AI assistants (ChatGPT, Claude AI, Google Gemini, Grammarly's AI Writing Assistant, etc.), unless these are put in quotation marks and cited with academic rigor. Scholarly citation is a form of human collaboration, and the crediting of others a vital part of community building and important tool in knowledge creation. In that spirit, I am here to help you in any part of your writing process. If you have any questions about how to handle certain materials in your research, please do not hesitate to reach out to me.

Assignments in the class are designed to be largely AI resistant. They require the kind of detailed description and analysis of textual, pictorial, and audiovisual work that generative AI is not yet proficient in creating. Lack of specificity and broad generalization, hallmarks of AI-generated text, will be graded harshly whether or not the paper was crafted using an AI writing service.

Suspicious papers will be submitted to GPTZero or another AI checker, and you can check your own papers using these same services. If your paper is flagged for plagiarism or AI generation in a way that gives you concern, please contact me, and I can help determine whether the report presents an issue or not.

You should be prepared to demonstrate the authenticity of your work. A good practice is to always save a record of your writing process, so that you have it on hand in the event questions arise about the originality of your paper. Whether you compose your draft in Google Docs, Microsoft Word, or a special writing app like Scrivener, the application can provide statistics on the amount of time you worked on the paper, how many editing sessions you had, and the dates when the document was created and edited. If your project is suspected of plagiarism or AI creation, these statistics can help support a case that it is your own work.



SCHEDULE

All required materials can be found on Canvas. Additional materials can be found on the course website (https://medialities.org/how-computers-became-media/).

Week 1 ~ 2025 ~ *A I*

Jan 22	Introduction and course overview; methods of computer history Reading: Benjamín Labatut, "Lee, or: The Delusions of Artificial Intelligence," in *The MANIAC* (Penguin, 2023), 269–354.

Week 2 ~ 1839 ~ *L A B O R*

Jan 29	**Computer in focus:** Analytical Engine **Key topics:** The human work and economic organization of computing **Historical context:** Gabriele Balbi and Paolo Magaudda, "The Computer," *A History of Digital Media: An Intermedia and Global Perspective* (Routledge, 2018), 27–66; Louise Purbrick, "The Dream Machine: Charles Babbage and His Imaginary Computer," *Journal of Design History* 6, no. 1 (1993): 9–23. **Primary document:** Luigi Federico Menabrea, "Sketch of the Analytical Engine Invented by Charles Babbage, Esq." *Scientific Memoirs*, vol. 3, translated and annotated by Ada Lovelace, edited by Richard Taylor, 1843, pp. 666–731. **Recommended:** Ranjodh Singh Dhaliwal, "The Cyber-Homunculus: On Race and Labor in Plans for Computation," *Configurations* 30 (2022), 377–409.
FOR QUIZ	**Reading:** Matteo Pasquinelli, "Babbage and the Mechanisation of Mental Labour," in

The Eye of the Master: A Social History of Artificial Intelligence (Verso, 2023), 51–76; Stephen Monteiro, "Woven Memory," in *The Fabric of Interface: Mobile Media, Design, and Gender* (MIT Press, 2017), 23–58.
Watch: *False Dawn: The Babbage Engine*, Computer History Museum, 2014, 6m, https://youtu.be/XSkGY6LchJs?si=u7PpIV5VLkvsydNF; *Ada Lovelace at the British Library. Letters to Charles Babbage*, British Library, 2021, 14m, https://youtu.be/Q-wl-4WAREY?si=MpSiYaw-CPu5Z2nX.

Week 3 ~ 1945 ~ *MACHINES*

Feb 5

Computer in focus: ENIAC
Key topics: Methods of media archaeology and the physical media of computing
Historical context: Thomas Haigh and Paul Ceruzzi, "Inventing the Computer," in *A New History of Modern Computing* (MIT Press, 2021), 9–28.
Primary documents: Arthur W. Burks and Harry D. Huskey, *Report on the ENIAC*, University of Pennsylvania, Moore School of Engineering, Philadelphia, PA, June 1, 1946, https://library.si.edu/digital-library/book/reportoneniacel1moor.
Arthur W. Burks, Herman H. Goldstine, and John von Neumann, *Preliminary Discussion of the Logical Design of an Electronic Computing Instrument*, Institute for Advanced Study Report, June 28, 1946, https://www.ias.edu/sites/default/files/library/Prelim_Disc_Logical_Design.pdf.
Recommended: Jennnifer S. Light, "When Computers Were Women," *Technology and Culture* 40, no. 3 (1999): 455–483. David Alan Grier, "The ENIAC, the Verb 'to program' and the Emergence of Digital Computers." *IEEE Annals of the History of Computing* 18, no. 1 (1996): 51-55; Paul N. Edwards, "Preface," in *The Closed World: Computers and the Politics of Discourse in Cold War America* (MIT Press, 1996), ix–xv.

FOR QUIZ

Reading: Wendy Hui Kyong Chun, "On Sourcery and Source Codes," in *Programmed Visions: Software and Memory* (MIT Press, 2008), 19–54; Friedrich Kittler, "Number and Numeral," *Theory, Culture & Society* 23, nos. 7–8 (2006): 51–61.
Watch: *Top Secret Rosies: The Female Computers of World War II*, dir. LeAnn Erikson, PBS, UK, 2010, 56m, https://www.kanopy.com/en/jhu/watch/video/122786.

Week 4 ~ 1958 ~ *SYSTEMS*

Feb 12

Computer in focus: SAGE
Key topics: Media ecologies, control systems, and human-computer interaction
Historical context: Alvy Ray Smith, "Shapes of Things to Come," in *A Biography of the Pixel* (MIT Press, 2021), 231–307.
Primary documents: "The Thinking Machine, *Time*, January 23, 1950, 54–61; J. C. R. Licklider, "Man–Computer Symbiosis," *IRE Transactions on Human Factors in Electronics* HFE-1, no. 1 (March 1960): 4–11.
Recommended: Ralph Gerard, "Some of the Problems Concerning Digital Notions in the Central Nervous System," in *Cybernetics: The Macy Conferences, 1946-1953: The Complete Transactions*, ed. Claus Pias (diaphanes, 2016), 171–202

FOR QUIZ

Reading: Bernard Dionysius Geoghegan, "An Ecology of Operations," *Representations* 147 (2019): 59–95. Zabet Patterson, "What Was a Microfilm Plotter?" in *Peripheral Vision: Bell Labs, the S-C 4020, and the Origins of Computer Art* (MIT Press, 2015), 1–23.
Watch: "The Use and Abuse of Vegetational Concepts," Episode 2 of *All Watched Over by Machines of Loving Grace*, dir. Adam Curtis, BBC Two, 2011, 59m. https://archive.org/details/AllWatchedOverByMachinesOfLovingGraceEpisode2The

UseAndAbuseOfVegetationalConcepts; *Simulation of Two-Gyro Gravity-Gradient Attitude Control System*, dir. E. E. Zajac, Bell Labs, 1963, 11m, https://youtu.be/s3zgkKFoI-Y?si=0JdJAXimLW1JKpRO. *A Computer Technique for the Production of Animated Movies*, dir. Kenneth Knowlton, 1964, 16m, https://youtu.be/_Lmi6cmrq0w. *Pixillation*, dir. Lillian Schwartz, 1970, 4m, http://lillian.com/1970-pixillation-4-min/.

Feb 14 **Essay due by 5 p.m.**

Week 5 ~ 1965 ~ *C H I P S*

Feb 19

Computers in focus: From IBM System/360 to Altair 8800

Key topics: Media theories of computational processing, theories of the dimensional abstraction of computing, and visions of the technological future

Historical context: Michael Riordan, "The Silicon Dioxide Solution," *IEEE Spectrum* 44, no. 12 (2007): 51–56; Paul E. Ceruzzi, "Aerospace Needs, Microelectronics, and the Quest for Reliability: 1962–1975," *Proceedings of the IEEE* 105, no. 7 (2017): 1456–1465.

Primary documents: Richard Feynman, "There's Plenty of Room at the Bottom," *Engineering and Science* (February 1960), 22–36; Gordon Moore, "Cramming More Components onto Integrated Circuits," *Electronics* 38, no. 8 (April 19, 1965): 114–117; Willis Ware, "The Computer in Your Future," RAND Corporation report P-3626, Santa Monica, CA, November 1967.

Recommended: Kyle Stine, "Critical Hardware: The Circuit of Image and Data," *Critical Inquiry* 45 (Spring 2019): 762–786

FOR QUIZ

Reading: Philip E. Agre, "Beyond the Mirror World," in *Technology and Privacy: The New Landscape*, ed. Philip E. Agre and Marc Rotenberg (MIT Press, 1997), 29–39; Hartmut Winkler, "Geometry of Time: Media, Spatialization, and Reversibility," 1–14; Friedrich Kittler, "The Computer," in *Optical Media: Berlin Lectures 1999*, trans. Anthony Enns (Polity, 2002), 225–230.

Watch: *A Briefing on Integrated Circuits*, Fairchild Semiconductor, 1967, 30m, https://youtu.be/z47Gv2cdFtA?si=vsRgYO7yfk9r87k9; *A Computer Glossary*, dir. Charles and Ray Eames, 1968, 9m, https://youtu.be/eIgX6sPOqCY?si=sVwBidGvWwrKIhYo; *Microworld*, prod. AT&T, 1980, 15m, https://youtu.be/q2kd1B0Ybto?si=n3UQKZrjKEg0pjW6.

Week 6 ~ 1973 ~ *G R A P H I C S*

Feb 26

Computer in focus: Xerox Alto

Key topics: Computer graphics and graphical user interfaces

Historical context: Alvy Ray Smith, "Shapes of Things to Come," in *A Biography of the Pixel* (MIT Press, 2021), 231–307.

Primary documents: Ivan Sutherland, "Sketchpad: A Man–Machine Graphical Communication System," *Proceedings—Spring Joint Computer Conference 1963*, 329–346; D. C. Engelbart, *Augmenting Human Intellect*, Summary report, Contract AF49(638)-1024, Stanford Research Institute, Menlo Park, CA, October 1962; Douglas Engelbart, "Mother of All Demos," Fall Joint Computer Conference, San Francisco, December 9, 1968, Reel 1, https://archive.org/details/XD300-23_68HighlightsAResearchCntAugHumanIntellect.

Recommended: Malcolm Gladwell, "Creation Myth: Xerox PARC, Apple, and the Truth about Innovation," *New Yorker*, May 16, 2011, 44–52; Alex Soojung-Kim Pang, "The Xerox PARC Visit," Making the Macintosh, Technology and Culture in Silicon Valley, Stanford University, https://web.stanford.edu/dept/SUL/sites/mac/parc.html.

FOR QUIZ	**Reading:** Nooney, "Introduction," 1–18, and Chapter 1 "Prehistories of the Personal," 19–44; Jacob Gaboury, "Object Paradigms: On the Origins of Object Orientation," in *Image Objects: An Archaeology of Computer Graphics* (MIT Press, 2021), 125–145. **Listen:** *99% Invisible*, Episode 149 "Of Mice and Men," 22m. https://99percentinvisible.org/episode/of-mice-and-men/. **Watch:** "Xerox Parc – Office Alto Commercial," Computer History Museum, 1m, https://youtu.be/M0zgj2p7Ww4?si=mx0uNWtGumlPxa-l; "Yesterday's Computer of Tomorrow: The Xerox Alto | Smalltalk-76 Demo," Computer History Museum, 17m, https://www.youtube.com/watch?v=NqKyHEJe9_w.

Week 7 ~ 1977 ~ *S O F T W A R E*

Mar 5

Computer in focus: Apple II
Key topics: Early years of personal computing and productivity software
Primary documents: Robert E. Ramsdell, "Product Review: The Power of VisiCalc," *Byte* 5, no. 11 (November 1980), 190–192, https://archive.org/details/eu_BYTE-1980-11_OCR/page/n251/mode/2up; Dan Fylstra, "Personal Account: The Creation and Destruction of VisiCalc," Computer History Museum, May 2004, https://archive.computerhistory.org/resources/access/text/2017/06/102738286-05-01-acc.pdf.
Recommended: Matthew Kirschenbaum, "Word Processing as a Literary Subject," in *Track Changes: A Literary History of Word Processing* (Harvard University Press, 2016), 14–32.

FOR QUIZ	**Reading:** Nooney, Chapter 2, "Cultivating the Apple II," 45–70, and Chapter 3 "Business: VisiCalc," 71–106. **Watch:** *Pirates of Silicon Valley*, dir. Martyn Burke, 1999, 95m.

Mar 7 **Final project topic due by 5 p.m.**

Week 8 ~ 1983 ~ *G A M E S*

March 12

Computer in focus: Commodore 64
Key topics: Operating systems for personal computers, computer gaming
Primary document: *Electronic Games*, October 1983, https://archive.org/details/Electronic_Games_Volume_02_Number_08_1983-10_Reese_Communications_US/.

FOR QUIZ	**Reading:** Juul, "Introduction: The Five Lives of the Commodore 64," Chapter 1 "The BASIC Computer for Family, Business, and Education," and Chapter 2 "The Arcade Game Machine"; Nooney, Chapter 4 "Games: Mystery House," 107–144. **Watch:** *WarGames*, dir. John Badham, USA, 1983, 114m.

Mar 17–21 **SPRING BREAK**

Week 9 ~ 1984 ~ *M U L T I M E D I A*

Mar 26

Computers in focus: Apple Macintosh and IBM ThinkPad 700
Key topics: Computers become everything machines
Primary documents: Gregg Williams, "The Apple Macintosh Computer," *Byte* 9, no. 2 (February 1984), 30–54, https://archive.org/embed/byte-magazine-1984-02; Anthony Reveaux, "The Mac Goes to the Movies," *MacWorld* (March 1985), 30–35, https://archive.org/embed/MacWorld8503March1985.

	Recommended: Vilém Flusser, "To Abstract," in *Into the Universe of Technical Images* (University of Minnesota Press, 2011), 5–10.
FOR QUIZ	**Reading:** Juul, Chapter 3 "Against Intentions"; Nooney, Chapter 5 "Utilities: *Locksmith*," 145–178, Chapter 6 "Home: Print Shop," 179–218, and Chapter 7 "Education: Snooper Troops," 219–257. **Watch:** "1984" (Apple Macintosh advertisement), dir. Ridley Scott, 1984, https://youtu.be/ErwS24cBZPc?si=iPMChmkF5L8H2vet.

March 28 **Annotated bibliography for final project due by 5 p.m.**

Week 10 ~ 1994 ~ S O U N D

Apr 2	**Computers in focus:** Sinclair ZX 81 and Apple Macintosh **Key topics:** Computer music, digital sampling, generative sound art **Primary documents:** "Mac Mozart's Pop Drum and Bass Album," *Loud* (Japan), December 1996, https://lannerchronicle.wordpress.com/2024/07/19/loud-magazine-december-1996/; "Game Theory," *Paper* (USA), February 1997, https://lannerchronicle.wordpress.com/2024/01/19/paper-magazine-february-1997/. **Recommended:** Lanner Chronicle: An Aphex Twin Resource: "Sinclair ZX81 & Spectrum Computers," https://lannerchronicle.wordpress.com/2024/06/05/sinclair-zx81-spectrum-computers/.
FOR QUIZ	**Reading:** Marc Weidenbaum, *Selected Ambient Works Volume II* (Bloomsbury, 2014). **Listen:** Aphex Twin, *Selected Ambient Works Volume II* (Warp Records, 1994), *The Richard D. James Album* (1996), "Windowlicker" (Warp, 1999).

Week 11 ~ 1995 ~ *V I D E O*

Apr 9	**Computers in focus:** Wintel computers, Windows 95, and Windows Media Player **Key topics:** Remediation, networks, digital art and entertainment **Primary documents:** Cover stories on "Video Computing," *Byte* 18, no. 10 (September 1993), 64–90; Nicholas Negroponte, "Graphical Persona," in *Being Digital* (Hodder and Stoughton, 1995), 103–115.
FOR QUIZ	**Reading:** Juul, "Keeping Up with the Future" and "The Eternal Commodore 64 Style"; Ceruzzi and Haigh, "The Computer Becomes a Universal Media Device," 293–327. **Watch:** *Hackers*, dir. Iain Softley, USA, 1995, 107m; Intel advertisements for i486 and Pentium chips, 1993–1995, https://youtube.com/playlist?list=PLDYVmxFmSAvH3wpCVwNGF7U4saJy_nBeK&si=tYKfD0hUnS-Kbihl.

Week 12 ~ 1998 ~ *U N C O M P U T A B L E S*

Apr 16	**Computer in focus:** iMac **Key topics:** The limits of computing, art and nostalgia of the analog
FOR QUIZ	**Reading:** Alexander Galloway, "Introduction," 1–6, and "Black Box Function," 222–228, in *Uncomputable: Play and Politics in the Long Digital Age* (Verso, 2021); Nooney, "Inconclusions," 259–264, and "Epilogue: On the Consignment Floor," 265–274. **Watch:** *Pi*, dir. Darren Aronofsky, USA, 1998, 84m.

Week 13 ~ 2025 ~ *P R O J E C T S*

Apr 23	Final project presentations
Apr 28	**Final project due by 5 p.m.**