

SCI199Y Great Ideas in Computing Fall 2026

Very ambitious list (not in any order) of possible topics:

- The genius of Alan Turing; A precise mathematical definition of computable functions. The concept of interpreters. Theorem: There exists non computable functions.
- What is a computer? The von Neumann sequential architecture. Digital vs analogue. What were the alternatives? What else is possible?
- Quantum Computers
- AI, ML, LLMs
Computers vs Human Intelligence: The Turing Test
What if anything is the limitation of ML and LLMs?
- A local great idea: Geoff Hinton and Deep neural nets and backward propagation vs SVMs and other machine learning approaches.
- A local great idea: Steve Cook and the P vs NP question. What is and what is not *efficiently* computable.
- How did computers and computing become a commodity?
- Fortran, the first commercial source level language and compiler. John Backus vs the prevailing view that compiled code would be too slow compared to machine code.
- The internet; packet routing. TCP/IP.
- Search engines. The evolution of search engines.
- Complexity based cryptography; public key cryptography; digital signatures.
- HCI (human computer interaction). Graphical interfaces, the mouse, menus, click, paste and drag. Portable output formats: PDF, Word, Powerpoint, Excel. Visualization.
- Operating systems; Virtualization.
- Information theory: the genius of Claude Shannon. Error correcting codes; compression.
- Social networks and the spread of information (and mis-information, conspiracies, etc). Targetting information to different communities. (What is a social network community?)
- Open Source. Wikipedia
- Linear programming; dynamic programming and combinatorial optimization.