Syllabus + Links

Lecture 1. Due diligence for the course + Overview.

- Hour of Code
- Computer Science Unplugged
- This Is MEGA-Mathematics!


- Antikythera Mechanism (youtube) (wiring diagram of gears)
- Napier's bones (simulator)
- Jacquard Loom
- Babbage's machine (Video series episode 1 through 4)
- History of Computers
- History of Computer Science
  - from J Shallit (Waterloo, CS 134)
  - from J Kopplin
- The Enigma, a biography of A Turing (The Imitation Game, movie)
- Turing Award Winners

Lecture 3. Modern Information Technology.

- Workplace transformations: Google Drive + Forms + Doodle + Trello + HipChat.
- Multidimensional on-line personalities: from websites to integrated social media and mobile computing.
- Internet of Things: IFTTT and NEST technologies. (wiki)

Lecture 4. Fundamentals. How computer science often uses simple, abstract, elegant models that allow us to see the main issues: the Turing Machine, a surprisingly powerful model of computing.

- Definition of a Turing machine (Cambridge University)
- Turing machine simulator

Lecture 5. What “discrete” means to a computer scientist. Bits, circuits, logic.

Lecture 6. The Central Dogma of Computer Science: Input -> Algorithms -> Output. And how this is made concrete: programs, variables, assignment, operations.

- Code: Blocks and JavaScript
- Interactive Java Interpreter
Lecture 7. *Instructing computers to react to their environment*: Conditional execution.

- Stackoverflow


- Bachmanity


- Pied Piper Inc.
- Compression
- CS Unplugged – Compression
- Scratch
- Scratch version of exercises


- This Is MEGA-Mathematics!

Lecture 12. *Computational Complexity*. Coloring maps with two colors versus coloring maps with three (or more colors). Tractable versus intractable problems.

- This Is MEGA-Mathematics!


- Size of Software Systems
- GIT
- Github
- Google Code

Lecture 14. *Web and mobile applications*. Building a smart phone app for voting

- Code
- App Lab


- Silicon Valley, s03.e9 minute: 5:50
- Amazon Web Services.

Lecture 16. *Databases*. Building them and querying them. SQL.
SQL Fiddle

Lecture 17. **How to train your computer.** Determining the next song you will listen too. APIs and Spotify.

- Spotify
- Spotify API

Lecture 18. **The Singularity and what it means for you.** Neural networks and deep learning.

- Where will you be in 2040?
- Book: The singularity is near; R Kurzwell
- Ted talk: A university for the coming singularity
- Stephen Hawking in The Independent. *We aren’t taking artificial intelligence seriously enough.*
- Centre for the Study of Existential Risk, Cambridge University.
- The dreams from Google’s Artificial Intelligence

Lecture 19. **Social Networks.** Graph and network representation. Information flow.


- Introduction to Hacking
- The Peruvian Coin Flip
- Public Key Encryption

Lecture 21. **Robotics.** An excuse for us all to play with Lego Mindstorm.

- Introduction to Mindstorm and programming software.

Lecture 22. **Bioinformatics.** Using computers to understand noisy, imprecise, illogical, irreproducible, dirty, non-discrete, and generally badly behaving biological systems like bacteria, fungi and humans.