CS151 Computer Science Fundamentals for Non-Majors

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Ver 1.0. Send corrections to mfricke@unm.edu.

Today:

- Why we are here…
- Me trying to convince you computer science is important…
- Course Syllabus…
- What is computer science…

Why this course exists

- In US society computers are used in almost every aspect of our lives.
- Every purchase you make today will involve a computer somewhere.
- If you used a car*, bus, train, or airplane to get to class today you used several computers.
- All your health care is handled and analyzed by computers. One reason your Dr can only spend a few minutes with you and is constantly rushed is that she has to click through dozens of computer alerts between patients.
- Almost all of us carry computers with us all the time. They are small but very powerful.
- Computation is as important to our lives now as reading and writing…

*cars started using computers in 1968.

Why this course exists

- There are about 25 million people in the world who know how computers work (i.e. coders)
- Sounds like a lot – and it is definitely up from the world total of 1 in 1940.

- But out of a world population of almost 8 billion that means about 3 people in every thousand understand how a computer works.

- Imagine if only 3 people in a thousand could read and write.*

*86% of the worlds population is literate

Liberal Education vs Professional Training

Liberal Education: a broad understanding of the world and society in which you live

Computers have a huge influence on the world around us.*

*Pilot program to allow voting by smart phone just announced. Do we understand the consequences?

Professional Training

Computer science skills increase your earning potential and therefore help grow the economy

In this course…

- You will learn a skill you can put on your resume to increase your earning potential.
- You will develop an understanding of how one of the most important parts of the world around you actually works.
- And many of you will find programming a computer a lot of fun!

- My job:
  - To teach you how to program computers
    (my obligation to you)

  - To check whether you are able to program a computer
    (my obligation to the University and anyone that reads your transcript)

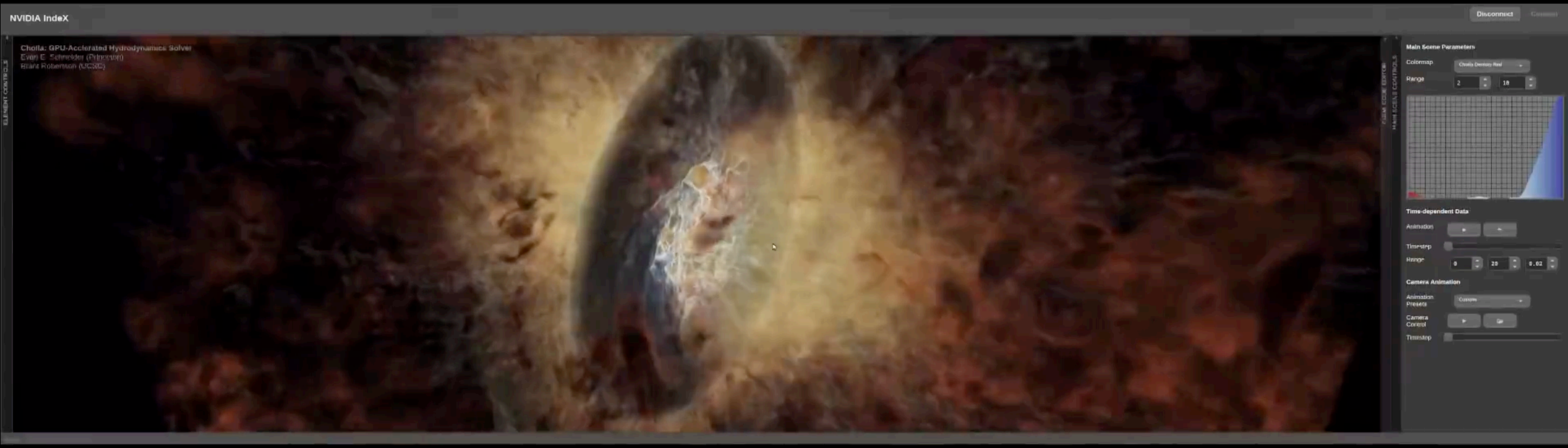
- Your job
  - To learn how to program computers
    (because you want the knowledge)

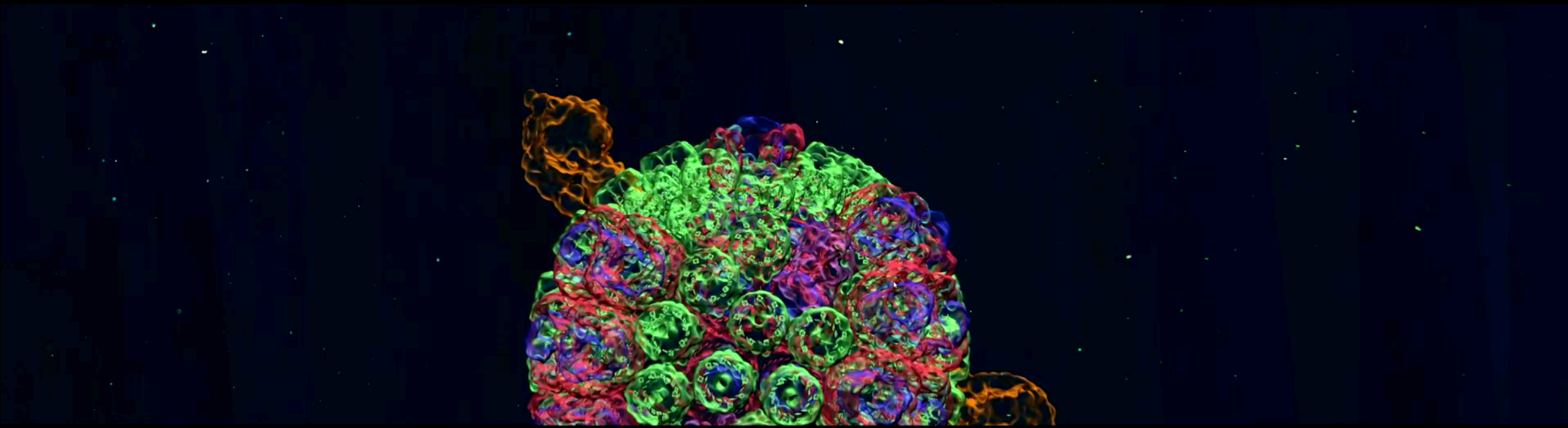
  - Demonstrate that you learned the material
    (because you want the degree and the pay raise)

- My job:
  - To teach you how to program computers
    - Determining what will be most useful for you to learn
    - Assigning programs so you can practice writing
    - Finding excellent student teaching assistants to help you
  - To check whether you are able to program a computer
    - Exams and Quizzes

- Your job
  - To learn how to program computers
    - Read the assigned material and do the homeworks
    - Go to lab to get help
    - Go to my office hours or the teaching assistants office hours to get help
    - Form study groups to help each other
    - Use the Computer Science tutors to get help
    - Practice writing programs!

      Like everything else in life doing is really the only way to learn
  - Demonstrate that you learned the material
    - Do well on the exams, quizzes, and doing the readings and homeworks (on time).


NVIDIA IndeX
Disconnect
Cholla: GPU-Accelerated Hydrodynamics Solver
Evan E. Schneider (Princeton)
Brant Robertson (UCSC)
Main Scene Parameters
Colormap
Range
Time-dependent Data
Animation
Timestep
Range
Camera Animation
Animation Presets
Camera Control
Timestep

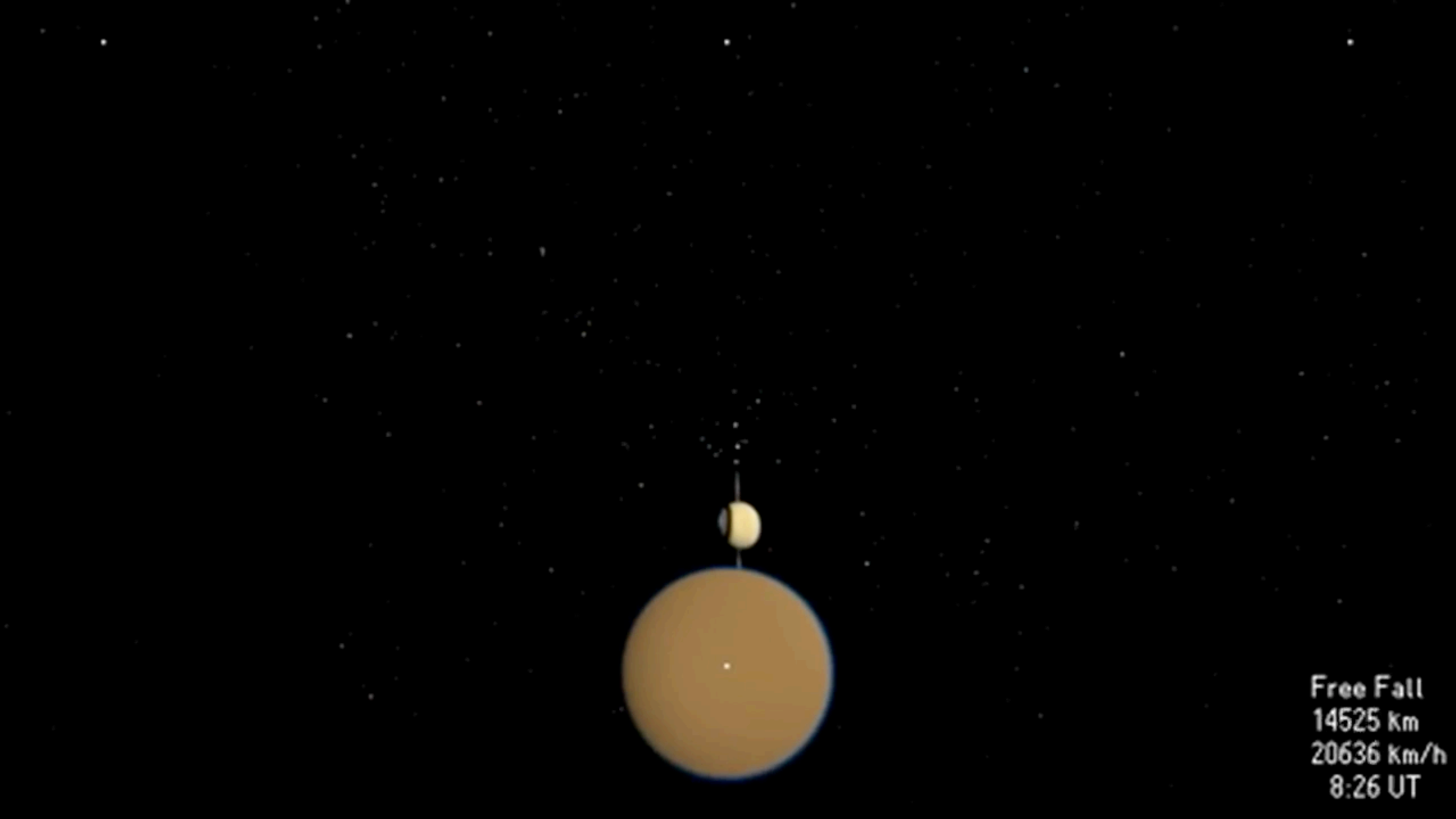


Volcano Drones

Sampling Gasses to Predict Eruptions and Understand Global Warming

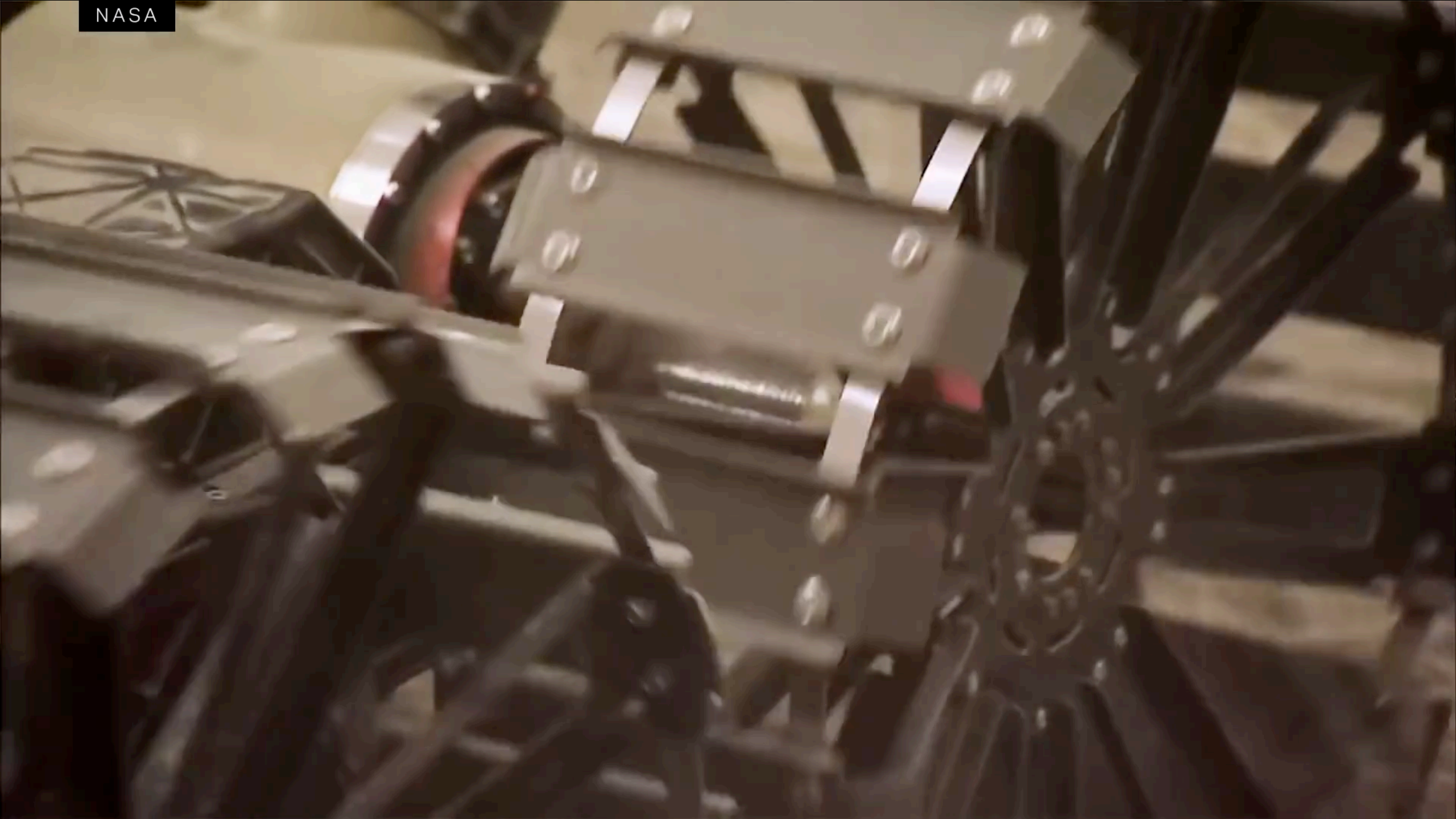
Astrobiology Life Detection

Analysing Samples from other Worlds


Free Fall
14525 km
20636 km/h
8:26 UT

Lunar Colonization

NASA Robot Space Challenge Phase 2


NASA

Everything I have shown you used the Python programming language

Syllabus

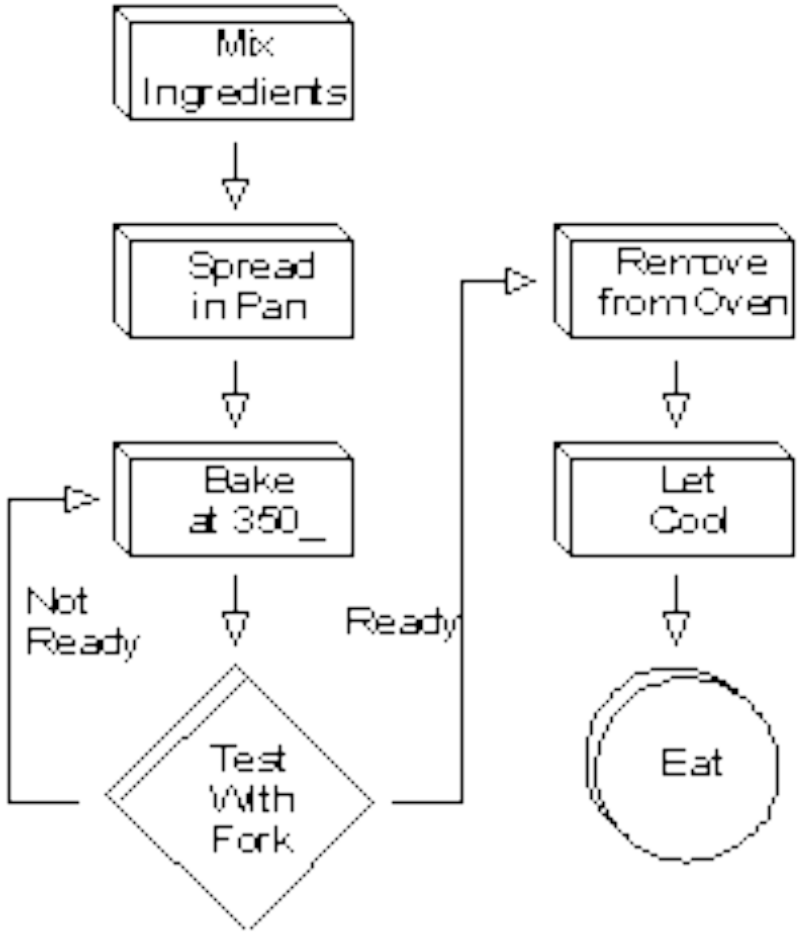
http://fricke.co.uk/Teaching/CS151_2020/CS151_Syllabus.pdf

Current Assignments

- Your first homework is available in ZyBooks due Wednesday, January 29th
- Lab instructors will help you login to ZyBooks but try to get a head start.
- The first lab quiz is next week. The lab assignment and homework will prepare you.

Programs and Algorithms

- Algorithm: a series of abstract steps that solve a particular problem
  - Mathematics
  - Food Recipes
  - Textile Weaving

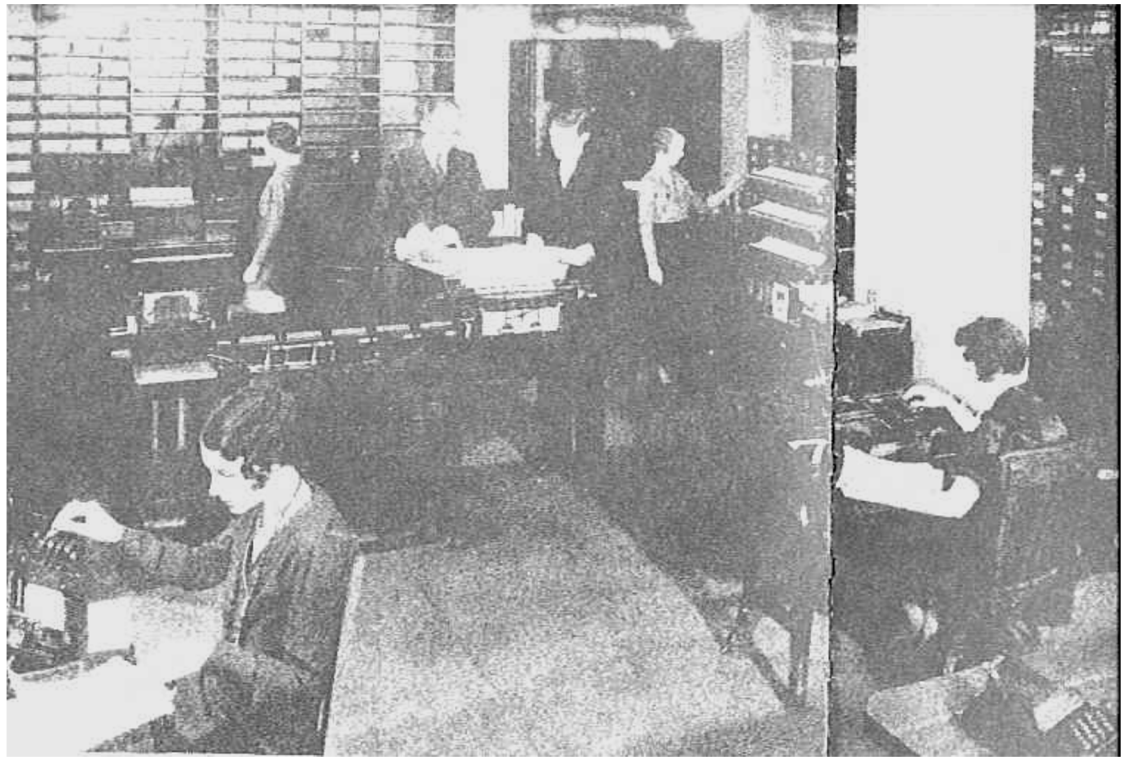


Programs and Algorithms

- Computer (idealized definition): anything capable of following the steps of an algorithm
- Universal computer: a computer capable of following the steps of all possible algorithms
- Program: the encoding of an algorithm so that a computer can follow the steps

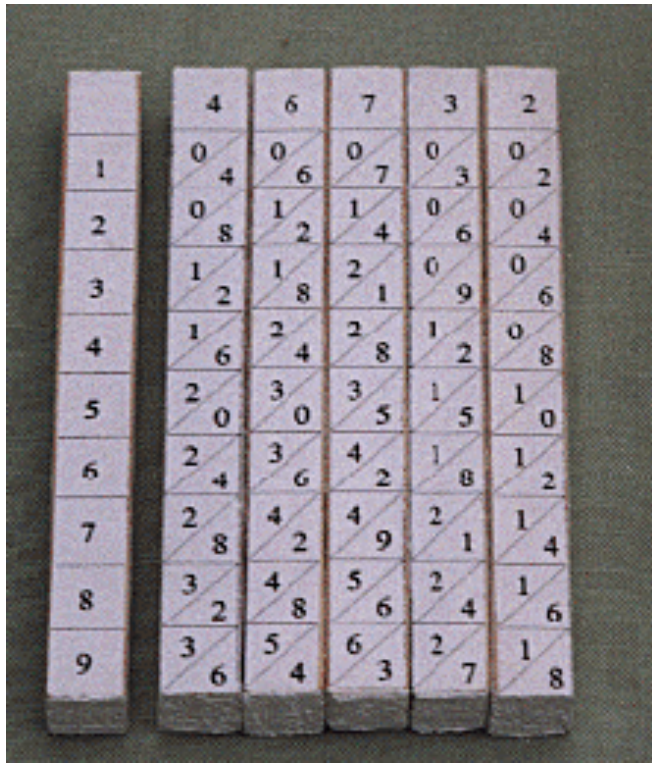
The First Computers

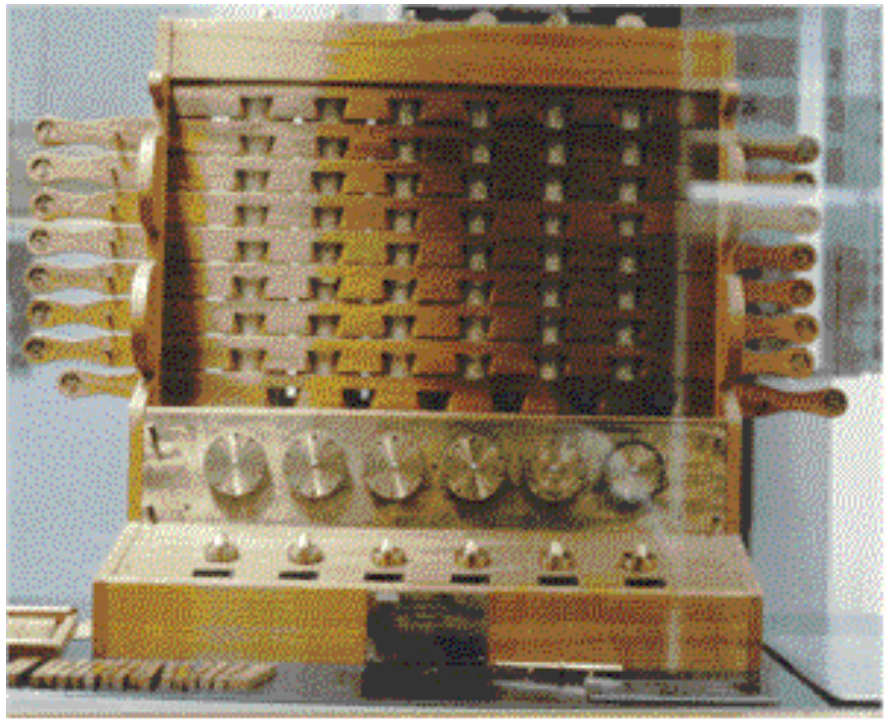
14th Century
Counting Tables

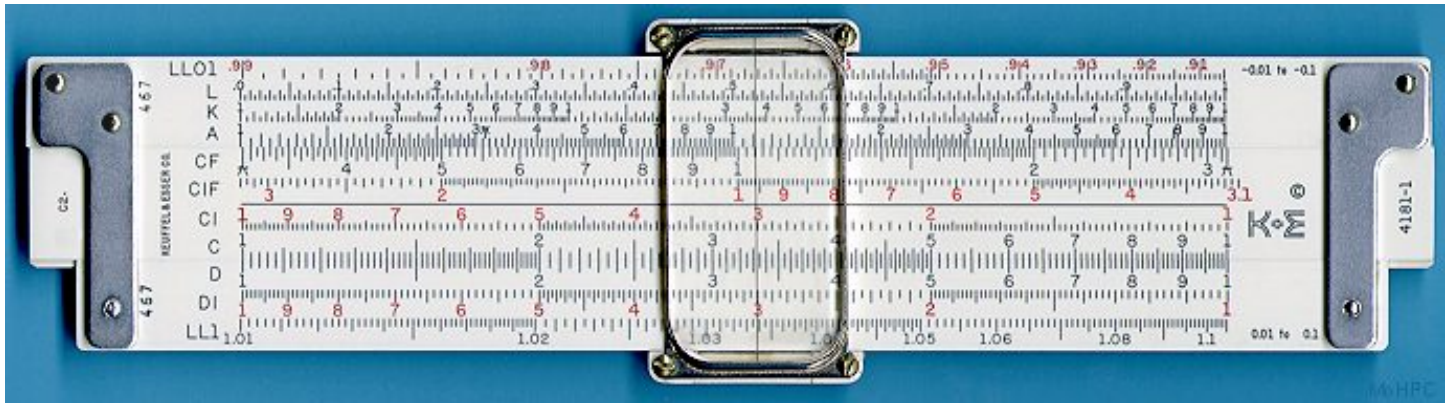


A 20th Century Computer
Center

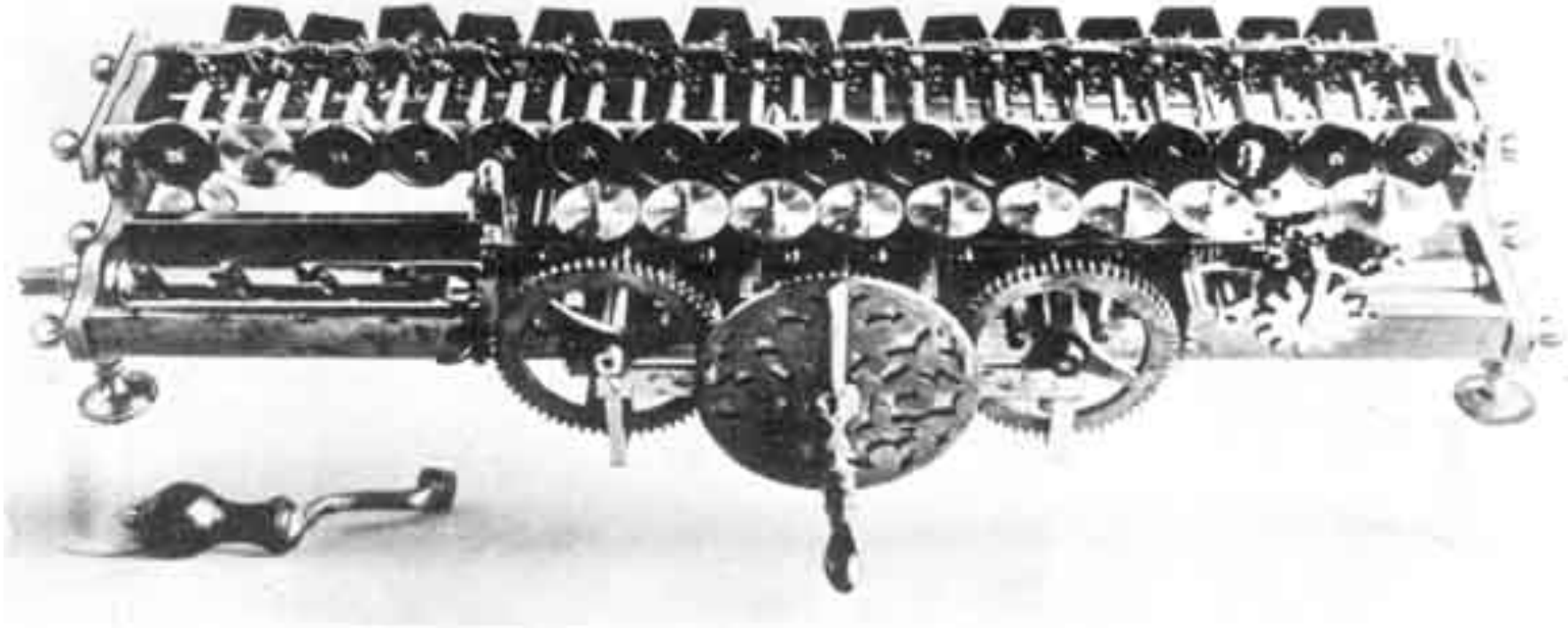
Napier’s Bones and the Calculating Clock



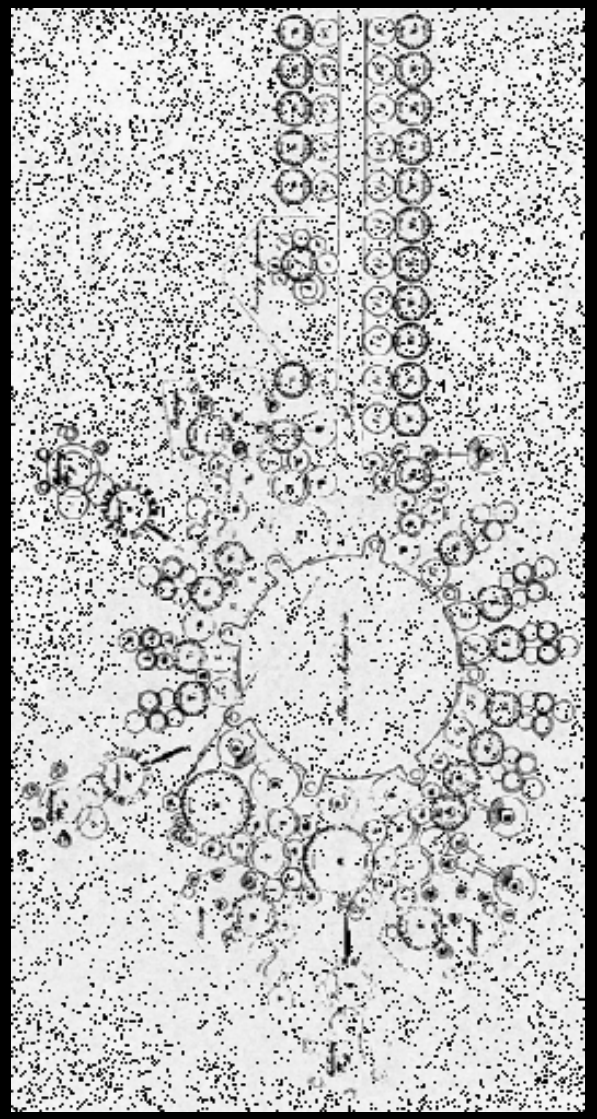


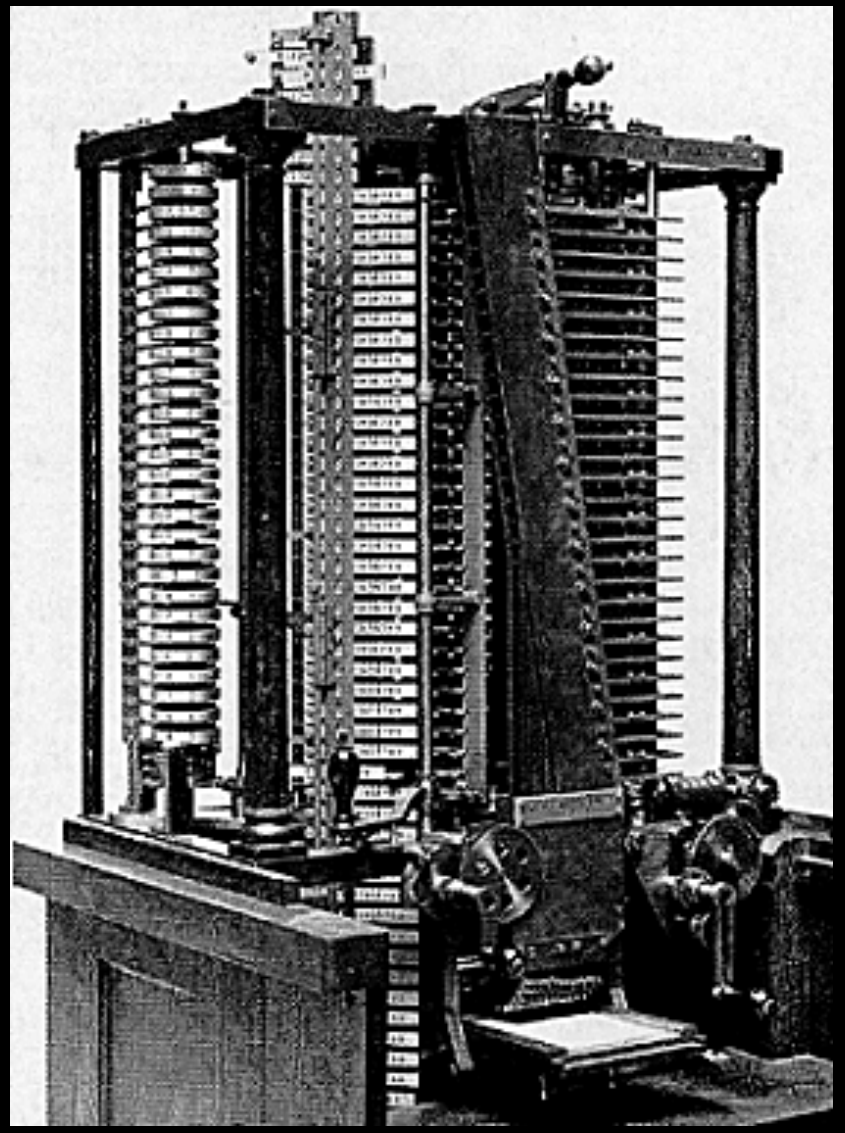


Baron Gottlieb Leibniz
The “Step Reckoner,” 1671

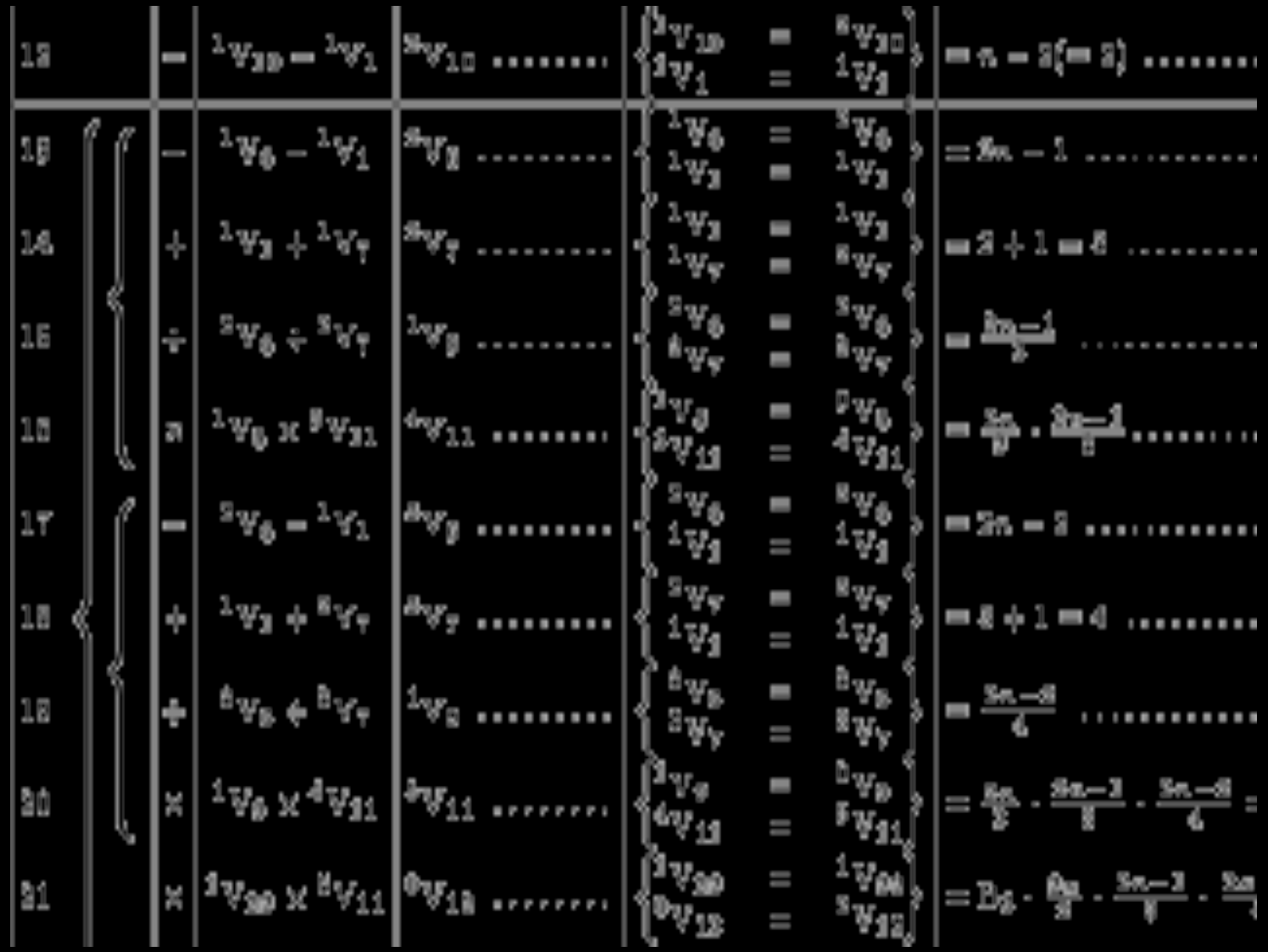


Charles Babbage's Analytical Steam Engine
Designed in the 1830s, not built until 1906





Countess Ada Lovelace
Program for generating Bernoulli Numbers (1842)



Next time: The Universal Computer