Welcome to CS@Caltech!
What is CS@Caltech?

You’ve (hopefully) already had CS9!

What to expect over the next 3 years?

This talk...
The requirements
Course planning? Double majoring?
Project courses? Senior thesis?

Beyond the requirements
Summers? Research? Grad school vs industry?
Lunch Bunch? SURFs? Internships?

Questions?
Philosophy of the major:
Students should have the flexibility to follow their passion.

Strengths of the major:
Mathematical foundations of CS & connections to other disciplines.
quantum computing, DNA computing, biological connections to vision/learning, economics of networks, ...
The Requirements

**CS Fundamentals:**
CS1, Intro to Computer Programming *(don’t need any prior CS experience)*
CS2, Intro to Programming Methods
CS4, Fundamentals of Computer Programming *(Intro to Functional Programming)*
CS11, Computer Language Shop

**Intermediate CS:**
CS21, Decidability and Tractability *(Intro to Complexity Theory)*
CS24, Intro to Computing Systems
CS 38, Intro to Algorithms

**Mathematical fundamentals:** Ma2, Ma3, Ma/CS6a or Ma121a

**Scientific fundamentals:** 18 units from Bi8, Bi9, Ch21abc, Ch24, Ch25, Ch41abc, Ph2abc, Ph12abc, or a 100+ course in Bi, Ch, Ph
The Requirements

**CS Fundamentals:**
- CS1
- CS2
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Typically finished by the end of sophomore year
The Requirements

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**Project Requirement:**
Complete a project sequence or senior thesis

**Project sequences:**
- Databases
- VLSI
- Networking & Distributed Systems
- Learning & Vision
- Graphics
- Self-defined (CS81)

**Senior thesis:** 80abc

Typically finished during junior year
The Requirements

**CS Fundamentals:**
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Complete a project sequence or senior thesis

**Project sequences:**
- Databases
- Self-defined (CS81)

**Senior thesis:** 80abc

We attempt to offer each project sequence every year, but the “version” offered will vary.
# The Requirements

**CS Fundamentals:**
- CS1
- CS2
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**Intermediate CS:**
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**Mathematical fundamentals:** Ma2, Ma3, Ma/CS6a or Ma121a

**Scientific fundamentals:** 18 units from Bi8, Bi9, Ch21abc, Ch24, Ch25, Ch41abc, Ph2abc, Ph12abc, or a 100+ course in Bi, Ch, Ph

**Project Requirement:**
Complete a project sequence or senior thesis

**Advanced CS:**
63 units of advanced CS

**Breadth:**
- 36 units of CS/Ma/ACM
- 17 units of EAS/Ma

Typically finished during junior & senior years
Planning your schedule

By the end of sophomore year:
CS1, CS2, CS4, Ma/CS 6a or Ma 121a, CS11, CS21, CS24, CS 38

During your junior year:
Start $\geq 2$ project sequences

During your senior year:
Finish your CS/Ma/ACM/EAS electives and consider doing a senior thesis

You have a lot of control to follow your interests, especially for projects...
So, you’re a ??????? person
So, you’re a theory person

- Take CS21 & CS38 as early as possible.
- Take any special topics course offered by Umans, Schulman, Ligett
- Think about an ACM or Ma double major
- Try out quantum computing (a caltech strength)
- Try out algorithmic economics (a caltech strength)
- Consider a senior thesis for your project sequence
So, you’re a systems person

- Take CS24 & CS3 as early as possible.
- Take both the Databases and Networking project sequences
- Take lots of CS11s
- Look out for special topics courses from Chandy, Low, Wierman
- Contribute to an open source project or topcoder in your spare time

*(companies pay a lot of attention to this)*
So, you’re a learning person

- Take ACM 116 as early as possible
- Take the Learning & Vision project sequence as early as possible
- Consider taking the robotics & vision courses
- Look out for special topics courses from Perona, Abu-Mostafa, Burdick
- Take lots of CS11s
- Contribute to an open source project or topcoder in your spare time
  (companies pay a lot of attention to this)
So, you’re a graphics person

- Take the graphic project sequence as early as possible.
- Take any special topics course offered by Schroeder, Desbrun, Barr
- Think about an ACM double major
- Don’t ignore your physics!
So, you like matter-computes

- Take lots of Bio/Chem/Physics/CNS courses.
- Take any course offered by Kitaev, Winfree, Preskill
- Get involved with research early (SURFs and during the term)
- Don’t ignore your CS theory!
Tips for along the way

Take CS 11s every year
...they’re a unique and valuable opportunity

If need be, create your own courses
...If we don’t offer something, use CS 90 (Undergraduate Reading) to learn it

Plan ahead for project sequences
...the courses vary year to year, especially for the Learning & Vision sequence

Attend Lunch Bunch
...Tuesday’s 12-1 in Annenberg 105
Most importantly

Take advantage of the connections with other disciplines

This is what makes Caltech special.

...quantum computing
...molecular programming
...biological underpinnings of learning and vision
...interaction between economics and networks
...scientific computing
...and many others
Double majoring in CS

Students interested in simultaneously pursuing a degree in a second option must fulfill all the requirements of the computer science option. Courses may be used to simultaneously fulfill requirements in both options. However, it is required that students have at least 63 units of computer science courses numbered 80abc, 81abc, or 114 and above that are not simultaneously used for fulfilling a requirement of the second option, i.e., requirement 4 in computer science must be fulfilled using courses that are not simultaneously used for fulfilling a requirement of the second option. To enroll in the program, the student should meet and discuss his/her plans with the option representative. In general, approval is contingent on good academic performance by the student and demonstrated ability for handling the heavier course load.
Double majoring in CS

**CS Fundamentals:**
- CS1
- CS2
- CS4
- CS11

**Intermediate CS:**
- CS21
- CS24
- CS38

**Mathematical fundamentals:** Ma2, Ma3, Ma/CS6a or Ma121a

**Scientific fundamentals:** 18 units from Bi8, Bi9, Ch21abc, Ch24, Ch25, Ch41abc, Ph2abc, Ph12abc, or a 100+ course in Bi, Ch, Ph

**Project Requirement:** Complete a project sequence or senior thesis

**Advanced CS:**
- 63 units of advanced CS

**Breadth:**
- 36 units of CS/Ma/ACM
- 17 units of EAS/Ma

*Can't be double counted*
Double majoring in CS

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Stats: 20-25% of CS students double major, depending on the year
Common double majors (in order): BEM > Math > Mech E ~ CNS ~ Physics ~ Chem E ...
Minoring in CS

**CS Fundamentals:**
- CS1
- CS2
- CS11

**Intermediate CS:**
- CS21
- CS24
- CS 38

**Project Requirement:**
- Complete a project sequence or senior thesis

**Advanced CS:**
- 9 units of advanced CS

**Breadth:**
- 36 units of CS/Ma/ACM
- 17 units of EAS/Ma

**Mathematical fundamentals:**
- Ma2, Ma3, Ma/CS6a or Ma121a

**Scientific fundamentals:**
- 18 units from Bi8, Bi9, Ch21abc, Ch24, Ch25, Ch41abc, Ph2abc, Ph12abc, or a 100+ course in Bi, Ch, Ph

*Can’t be double counted*

*It’s still new, so spread the word!* Common Minors: ME, EE, Physics
The requirements
Course planning? Double majoring?
Project courses? Senior thesis?

Beyond the requirements
Summers? Research? Grad school vs industry?
SURFs? Internships?

Questions?
Internships vs. Research

...For most people it’s good to try both (but it depends on your goals)
...The best year for research is after junior year

Research

...SURFs can be great, but be careful when choosing.
...some people look list CS SURFs that are purely coding.
...there are also great research programs outside of Caltech (Look for NSF REUs)

Internships

...plan your courses to prepare you for interviews
...startup vs. big company can lead to very different experiences
The big question: Grad school vs. Industry

Why consider grad school?
- it gives you lots of freedom
- you work for yourself
- you get to work on the hardest problems
- you **LOVE** doing research

Why avoid grad school?
- you aren’t sure about research
- it is extremely unstructured
- it can take a long time
- the opportunity cost is **VERY HIGH**

My advice: Don’t view go to grad school as a means to an end. The experience should be the goal in and of itself.
The big question: **Grad school vs. Industry**

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>Caltech</th>
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</thead>
<tbody>
<tr>
<td>Grad school</td>
<td>~33%</td>
<td>~50%</td>
</tr>
<tr>
<td>Startups</td>
<td>~33%</td>
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</tr>
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Many CS students take industry jobs and come back grad school later, so the percentage rises.
The big question: **Grad school vs. Industry**

The answer determines lots about your next 3 years...

- **Grad School**
  - attend lunch bunches & seminars
    (they will give research examples)
  - do summer research with multiple people
    (be careful of “programming-only” SURFs)
    (consider combining SURF with CS81 during the term)
    (consider both SURFs and REUs at other schools)
  - consider a senior thesis
  - attend the IEEE “How to apply to grad school” this year!

- **Industry**

- **Not sure**
The big question: **Grad school vs. Industry**

The answer determines lots about your next 3 years...

Grad School | Industry | Not sure
--- | --- | ---
- find your internships early (try out both big companies and small startups)
- take CS11s & CS3 to help prep for interviews (the more CS11s the better)
- contribute open source project or topcoder (companies pay a lot of attention to this)
The big question: **Grad school vs. Industry**

The answer determines lots about your next 3 years...

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- attend lunch bunches  
  (they will give you examples of both)
- try out both during the summers  
  (consider doing an intern before doing a SURF)
- talk to your faculty adviser about it  
  (do this early and often)
- attend the IEEE “How to apply to grad school” talk
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Project courses? Senior thesis?

Beyond the requirements
Summers? Research? Grad school vs industry?
Lunch Bunch? SURFs? Internships?

Questions?