Computer Science
Upper Division Pathways

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TPSE Partner’s Meeting
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Enrollment Growth in CS!

Enrollment Growth in Numbers and Percentages

![Diagram showing enrollment growth in computer science majors from 2006 to 2015. The average number of CS majors per unit is shown, with a peak in 2015. The data is sourced from the CRA Taulbee Survey.]

*Figure B.1: Average number of CS majors per unit since 2006.*

Introductory CompSci at Duke
CompSci 101, Python

• 2007 – 40 students, 2017 – 340 students
• How do you manage that?
  • 40 undergrad TA’s – 3 are head UTAs
  • 2 grad TA’s, professional TA
  • UTA’s training on Monday, Tuesday nights
    • Two run lab on Wednesday or Thursday night
  • Head UTAs – run training each week, organize and adjust evening consulting hours
• Similar support for large upperlevel courses.
Computer Science Curriculum at Duke

• BA and BS degrees
• Interdepartmental majors
• Minor in computer science
• Minor in computational biology
CompSci BA Major — 10 years ago, To attract students, made flexible

• CS 1, CS 2 — programming
• Four Core courses — 2 theory, 2 systems
• 3 Electives
  • One CompSci course
  • Two CompSci, Math, Stats, ECE, Independent Study or DUS-approved
  • *DUS-approved means course that contains either 200-level math, stats or CS*
CompSci BS Major – 10 years ago, To attract students, made flexible

- CS 1, CS 2 – programming
- Four Core courses – 2 theory, 2 systems
- **Math** (linear algebra), **Stats** (probability)
- 5 Electives
  - Three CompSci course
  - Two CompSci, Math, Stats, ECE, Independent Study or DUS-approved
  - *DUS-approved means course that contains either 200-level math, stats or CS*
Interdepartmental Major (IDM)
Half of Each of Two majors

- 7 courses each of two majors
- CompSci
  - CS 1, CS 2
  - One CS Theory, One CS Systems
  - 3 CompSci Electives
    - One could be math or stats

- Becoming More popular (1-3/yr to 30/yr)
- CS + X
  - CompSci almost always one of the majors
Defined IDMs

• Data Science – CompSci/Stats
  • Includes courses in data science, database, machine learning.

• Computational and Mathematical Modeling IDM – CompSci/Math
  • Includes CompSci Theory courses

• Both of these, skip our Discrete Math course in place of two math or two stats courses
Concentrations in the BS major

- The five electives would focus on a specific area of computer science
  - Software Systems
  - Data Science
  - Computational Biology
  - Computational Economics
  - etc
Minors in Computer Science

• Minor in computer science
  • Five CompSci courses – two specific

• Minor in Computational Biology
  • Three CompSci courses and Two biology courses

• Minor in Computational Economics
  • Never finished, growthspurt hit us
Project Based Courses

• Software Engineering
  • Work on teams from 3 to size 10 on projects

• Delivering Software: From Concept to Client
  • Real clients, meet with them once/week

• Machine Learning Competition

• Algorithms in the Real World

• Mathematical Foundations
  • Automata, Grammars – write small interpreter
Academic Year Research Programs at Duke

• Bass Connections
  • One year – two courses
  • Interdisciplinary research problem
  • Teams of undergrads, grads, postdoc, faculty
  • Example Themes:
    • Gerrymandering, Math Professor Mattingly
    • Data and Technology for Fact Checking
    • Developing Data Tool for Natural Disasters

• Students can count as CS Elective for major if course is Compsci related
• Independent Study Course for major
Summer Research Programs At Duke

• Data+
  • Small interdisciplinary teams focus on research problems – math, compsci, statistics
  • Students, grad students, postdoc, faculty
  • 10 weeks full time
  • 60 students
  • Speakers weekly
  • Poster session at the end

• CS Research – just CompSci students

• Code+ - Duke Tech center, project based
Lots of Experience Events: not part of the curriculum

- Hackathons
  - One large one in Fall, about 600 students
  - Organized by students
  - Smaller ones throughout the year
  - Duke Basketball Hackathon

- Datafest – run by stats department
  - Given large amount of data
  - Insights on the data
Other Interesting Courses
Not part of curriculum

• Programming Contest Course
  • One day a week, prepare for international programming contest

• UTA Training course
  • One day a week

• House courses taught by undergraduates
  • CompSci courses popular – build an App, blockchain, machine learning
Questions?