Course Delivery as a Software Problem

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CS 61A Historical Enrollment

End of Term Enrollment by Calendar Year

- Summer
- Other
- Letters & Sciences
- Engineering

37% Female (923 students)
Top photo by Sumukh Sridhara; Bottom photo by Josh Hug
Seats in the Auditorium?

No problem... most students switch to video by lecture 3
Lecturing to a Laptop

YouTube Analytics

(Demo)
The Fall 2016 Course Staff

<table>
<thead>
<tr>
<th>Activities</th>
<th>Hours / Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head UGSIs</td>
<td>20</td>
</tr>
<tr>
<td>UGSIs</td>
<td>8</td>
</tr>
<tr>
<td>Tutors</td>
<td>8</td>
</tr>
</tbody>
</table>

How manageable is your teaching requirement?

1 2 3 4 5

How positive are your interactions with other members of the staff?

1 2 3 4 5

Overall, are you satisfied with your teaching position on the course staff?

1 2 3 4 5
Drop-In Office Hours

When you attended office hours, did you receive the help you expected?

Fall 2015 students who claimed to attend 1+ office hours each week on average.

What are your comments/suggestions about office hours?

"The additional office hour staff and expanded hours during [the final project] was great! I remember having to wait 2–3 hours and not being able to receive help for projects and assignments at the beginning of the school year because office hours were so packed and there wasn't really an orderly way to identify students who needed help."

"GREAT. Saved my life multiple times."

"I do not envy you the task of attempting to organize such pandemonium." (Demo)
Office Hours Wait Times

Fall 2016 week 8: Homework 7 due Tuesday & Project 3 due Friday

Cumulative Proportion of Wait Times Under 1 Hour

(Demo)

750 requests for help
Course Projects

(Demo)
Test Unlocking Evaluation

How helpful was unlocking tests?

Questions asked on Piazza

Soumya Basu et al., Learning @ Scale 2014
8.3M backups across all semesters

(Github)

(OK)

(Metabase)
The Notorious Play Function
### Test Suite Design

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Targeted test</th>
<th>Comprehensive test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolate one issue</td>
<td></td>
<td>Test whole input space</td>
</tr>
<tr>
<td>Effect</td>
<td>Guide student attention</td>
<td>Encourage revision</td>
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<td></td>
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</tbody>
</table>
48% of students passed all targeted tests, but failed the fuzz test.
Fuzz Test Sequence

Each student receives the same sequence of random inputs

Generated Inputs

- Staff Solution
- Correct Program
- Incorrect Program
- Incorrect Program
- Incorrect Program

Program Outputs

- ✔
- ❌
- ❌
- ❌
- ❌

Sumukh Sridhara et al., Learning @ Scale 2015
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Sumukh Sridhara et al., Learning @ Scale 2015
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Sumukh Sridhara et al., Learning @ Scale 2015
Test Accuracy Increases with More Inputs

![Graph showing test accuracy increases with more inputs.](image)
UCOP is funding development of online versions of CS 61A & 61B
• Students from other UC campuses can enroll starting in 2017-18
• Course credit, as well as possible major/requirement credit
• Materials & infrastructure can be used for public MOOCs

Components of an online course:
- Lecture videos
- Assignment distribution
- Reading materials
- Course forum
- Online discussions
- Online lab sections
- Online office hours
- Working with remotely (Demo)