

THE UNDERGRADUATE THESIS AT HARVARD



COMPUTER SCIENCE AND APPLIED MATHEMATICS

HARVARD UNIVERSITY

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OUTLINE

- ❖ The purpose and joy of the undergraduate thesis
- ❖ Timeline
- ❖ Logistics
- ❖ Some starting tips

THE MAIN QUESTION

Why Write a Thesis?

THE PURPOSE AND JOY OF THE UNDERGRADUATE THESIS

WHAT IS A THESIS?

- ❖ A document that describes your research
 - ❖ Typically supervised by a Harvard faculty member
 - ❖ Not typically a narrative of how you did the research
- ❖ See <https://harvardcs.info/research/thesis-guide/>
 - ❖ Some examples of prior theses
 - ❖ Plus additional info
- ❖ No minimum page length
 - ❖ Long enough to tell the right story
 - ❖ (and a good thesis is no longer!)
- ❖ ~~How much research?~~ What is research?

WHY WRITE A THESIS?

- ❖ The thesis is a vehicle for research
- ❖ New learning experience for you
 - ❖ Different from classes! self-driven 6+ month project!
- ❖ Valuable experience for graduate careers
- ❖ Valuable experience for industry
- ❖ Creation of something beautiful (at least to you)
- ❖ Building or strengthening mentoring relationships with faculty
- ❖ Please your parents

WHY WRITE A THESIS?

❖ English (i.e., departmental) honors

❖ CS

- ❖ See <https://harvardcs.info/concentration/requirements/honors/>
- ❖ *“Ordinarily honors in Computer Science requires a concentration GPA of at least 3.5 in the courses on the student's Computer Science study plan; high honors in Computer Science requires a concentration GPA of at least 3.75 and an excellent thesis; and highest honors in Computer Science requires a concentration GPA of at least 3.85 and an outstanding thesis.”*
- ❖ Some Latin (i.e., College) honors require English honors

❖ AM

- ❖ Honors requires GPA of 3.5 and satisfying Honors requirement (AM91r with modeling paper option, or AM115) or requires an excellent thesis
- ❖ High honors requires GPA above 3.5 and an excellent thesis
- ❖ Highest honors requires GPA above 3.5 and an outstanding thesis

❖ **But don't write a thesis just for honors!**

WHAT IS RESEARCH?

- ❖ Creation (and communication) of novel valuable generalizable knowledge
 - ❖ Novel: i.e., ask question, hardest part
 - ❖ Valuable: validation
 - ❖ Generalizable: impact
- ❖ Good research can be risky, not certain of success.
- ❖ Can be hard: lot of time spent without breakthroughs, insights, ...

HOW DO I GET INVOLVED?

- ❖ Approach faculty members who are working in areas you are excited about!
 - ❖ <https://harvardcs.info/research/>
 - ❖ Research opportunities vary
 - ❖ Ask what research opportunities they have available, ask what preparation you need to do research
- ❖ Take grad classes that have research projects
 - ❖ Good way to get to know potential advisors, start working on research

TIMELINE

- ❖ Senior Fall (or earlier!): find an advisor, start research
- ❖ October / November: start writing
- ❖ **December: Commit to Office of Academic Programs (and have an advisor)**
- ❖ **Mid-January: A tentative thesis title approved by the thesis supervisor should be submitted to the Office of Academic Programs.**
- ❖ **February: provide the name and contact information to the SAO for the readers.**
- ❖ Mid February: chapter outlines of thesis
- ❖ Mid March: submit first draft to advisor
- ❖ **Late March/Early April: Thesis due.**
 - ❖ (This AY: March 29, 2019, 4:00 pm.)
- ❖ **Late May: reader's comments and honors recommendations.**

NOTES

- ❖ Look out for emails from Kathy Lovell in SEAS Office of Academic Programs!
- ❖ Never too early to start research!
 - ❖ Some rising seniors spend the summer doing research at Harvard
 - ❖ Keep an eye on deadlines for PRISE, PRIMO, etc.
 - ❖ <https://uraf.harvard.edu/summer-residential-research-programs>
- ❖ Few formal deadlines
 - ❖ Your advisor may give you milestones
 - ❖ You should impose more structure!
 - ❖ Outlines, drafts of chapters, intermediate research goals, ...

LOGISTICS

CS91R / AM91R / ECON985

- ❖ Many Senior Thesis writers take CS91r/AM91r in Senior Fall or Spring
 - ❖ Provides time to work on Senior Thesis
 - ❖ NOT required for a senior thesis
- ❖ Thesis writers with an economics focus can take Econ985
 - ❖ Full year course; provides milestones and support for the thesis process
- ❖ CS91r and AM 91r Supervised Reading and Research, are letter-graded courses.
 - ❖ “r” means can be taken more than once
 - ❖ Counts at most once for concentration credit, at most twice for academic credit

CS91R / AM91R / ECON985

❖ CS91r

- ❖ Any CS faculty member can be the supervisor
- ❖ Some non-CS faculty can be a supervisor, but come and chat with CS DUSes
- ❖ Must fill and send form: <https://harvardcs.info/research/cs91r/>

❖ AM91r

- ❖ Any faculty member can be supervisor
- ❖ Must fill out proposal form and meet with an (A)DUS:
<https://www.seas.harvard.edu/programs/applied-mathematics/advising-forms>

CS SENIOR THESIS RESEARCH SEMINAR

- ❖ Goal: get most out of senior thesis experience

- ❖ Useful info, tips
- ❖ Practice communicate your research story
- ❖ Provide a bit more structure
- ❖ Support group
 - ❖ reading/writing groups, etc.

- ❖ Not required, no academic credit

- ❖ Low effort!

- ❖ Schedule for Fall 2018

(5:30pm to 7pm (ish) in MD 323, dinner provided)

- ❖ Thu 19 Oct: How to write a thesis
- ❖ Thu 2 Nov: Technical writing tips
- ❖ Thu 30 Nov: Work-shopping your thesis story

READERS

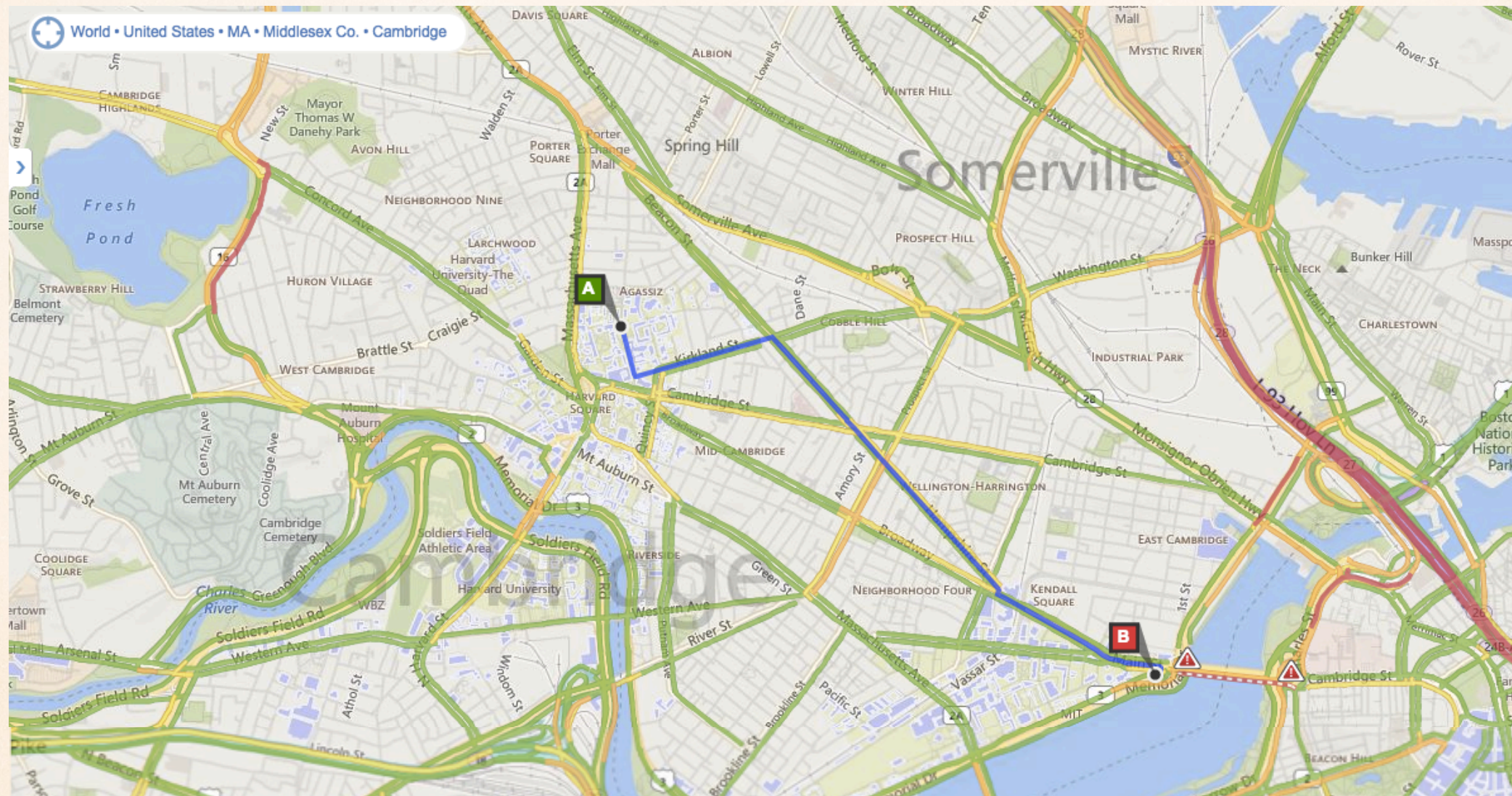
- ❖ CS: total of three readers required
 - ❖ One is your thesis advisor
 - ❖ You will need to identify two other readers of your thesis
 - ❖ Ordinarily, **at least one reader must be CS Faculty**
 - ❖ Your advisor will be happy to suggest readers
 - ❖ (Number of readers may be reduced to 2; stay posted)
- ❖ AM: total of two readers required
 - ❖ For Econ theses, Econ Dept will assign 2nd reader
 - ❖ Other areas: work with your advisor to identify 2nd reader

LATEX

- ❖ If you resisted LaTeX until now, you can succumb now
- ❖ LaTeX for Mac:
 - ❖ <http://www.tug.org/mactex/>
- ❖ LaTeX editor:
 - ❖ <http://pages.uoregon.edu/koch/texshop/>

ASKING FOR HELP

HOW TO DRIVE TO MIT



ASKING FOR HELP

- ❖ Faculty will help you move research along
- ❖ You will need help with Latex, data analysis, installing programs, running experiments on clusters, motivation, etc.
- ❖ Peer support!!!

QUESTIONS?

More info at <https://harvardcs.info/research/thesis-guide/>