

CS 399 - Senior Thesis Seminar

Information and Deadlines for Faculty

2020 - 2021

Course Information

Faculty may find it useful to add the class Google Calendar to keep track of student deadlines. It is available on the course website: <http://www.cs.haverford.edu/courses/cmssc399>

Main Expectations of Faculty

- Meet weekly with each advisee for at least 30 minutes.
- Work with your advisees to set clear goals each week.
- Respond promptly, ideally within 24 hours, to communication (e.g., via email, slack, etc.) from your thesis advisees.
- Do a detailed full read-through of each advisee's thesis 1) during fall break, 2) during Thanksgiving break week, and 3) at the end of the semester. In the spring, you will do full read-throughs 1) during spring break and 2) in the last two weeks of the semester. Provide both written and in-person comments to your advisees after each of these read-throughs.
- Give regular feedback (on a timeline of your choosing) on smaller excerpts of your advisees' theses.
- Provide regular topic and content guidance, including suggesting papers, research directions, etc.
- Serve as a second reader for as many theses as you have advisees. In this capacity, you will do a read through at the fall break and end of semester checkpoints (but not during Thanksgiving week). In the spring you will do a read through at spring break and at the end of the semester (the last two weeks of the semester).

Main Student Checkpoints

Fall semester

- Second week: faculty advisors assigned.
- **Friday, Oct 16th by 5pm:** first draft of literature review completed. Any papers or sections that are incomplete should be fully outlined. You should expect to hand in about 10 pages of writing at this checkpoint - the exact number of pages may differ based on thesis topic / field, so double-check with your advisor if you are unsure.
- **Friday, Nov 20th by 11:59pm** before thanksgiving break: first *full* draft of literature review completed. You should expect to hand in 15-20 pages of writing at this checkpoint.
- Last day of classes: virtual poster presentation during class.
- Last day of exam period: finished literature review due. You should expect your final literature review to be 20 - 30 pages.

Spring semester

- First week: weekly meeting time set. You should meet with your advisor individually each week for at least 30 minutes.
- **Friday, March 26th**: first draft of full thesis completed. Any sections (e.g., experiments) that are incomplete should be fully outlined. Extended onto your fall literature review, you should expect your thesis to be 40-50 pages at this checkpoint
- **Monday, April 30th** - two weeks before classes end: **final version due**. Your final thesis should be 40 - 60 pages.
- **Monday, May 17th** - Monday after classes end: thesis presentations.

Fall literature review expectations

All theses should present an in-depth exploration of a topic in computer science. The paper should demonstrate the student's ability to apply, in a new context, the fundamental themes that connect all CS classes, such as:

- separating the problem definition from its solution
- describing clearly a proposed solution (typically with examples)
- understanding the correctness and applicability of a proposed solution
- comparing several proposed solutions in terms of clarity, resource requirements, etc.

It is common for the paper to center on a particular algorithm or computing system, and present the correctness and/or computational complexity thereof. However, this is not required; the one core requirement is that the student demonstrate the ability to think deeply and communicate clearly about a computer science topic.

In order to satisfy the requirements for graduation with a computer science major, students must write a literature review by the end of the fall semester that satisfies the below rubric for earning a 2.0 by writing a non-trivial literature review/exposition of existing graduate-level published work.

Rubric for a 2.0

For the introductory material, is it:

- readable by someone who has understood only the core CS undergrad material (e.g. programming languages, hardware, theory, algorithms, and at least one intensive systems course such as compilers or O.S.)
- detailed enough to be clear to someone within the field

For the discussion of related work, does it:

- include all the important related/foundational work
- clearly identify what problem is being addressed by each work (possibly one statement of this for many/all the works)
- clearly state the basic approach being taken
- explain how each paper supports/evaluates its own results (proof/empirical-study/ad-hoc argument)
- make clear how this work relates to the thesis itself
- in at least one case, really address the nuts and bolts of how the approach works (possibly several such discussions will be needed to address the point above)

Spring thesis expectations

Rubric for a 4.0

A substantial written contribution that demonstrates original thinking / insight about a research area inside computer science, under the supervision of a faculty member. This should include a full literature review, appropriate replication of existing work, and either:

- A clear hypothesis (model), validation (proof / experiments), and analysis; OR
- Original expository work, including the extension of a proof, or a new proof of an existing theorem.

Since such theses include original material, they may constitute part of a publication (typically a joint publication with the advisor). However, publication is not required to receive a 4.0.

An original insight, as would be found in a thesis at the 4.0 level, is by definition not previously discussed in the published literature. Such insights thus constitute contributions to the primary source material of the field, and are often suitable elements of an article at the level of a reputable workshop for faculty, e.g., CCCG or LCPC. Note that Haverford's CS department views the significance of a contribution in the terms used broadly in the natural sciences and mathematics, i.e., as a contribution to our understanding of a topic (many subfields of CS have an engineering sensibility, and consider a contribution significant only if it allows us to achieve some result in a better way). For example, a 4.0 thesis could be based on a new proof of a known fact, or on a well-conducted experiment that demonstrates that a given system or approach does not provide an expected benefit and sheds light onto why.

Rubric for a 3.0

A confirmation and reiteration of existing work with an incremental contribution. Specifically, this includes a full literature review and either:

- A good and complete confirmation of an existing experiment on new data, including a good analysis. OR
- An exposition of non-trivial graduate-level published work, including an existing proof or deep explanation of its extension / applicability (or its lack of extension) to other related concepts.

Grading

Grades for senior thesis will be determined based on two components:

1. 25%: attendance, participation, and meeting deadlines
2. 75%: assessment of the written thesis

The first component includes:

- a) attendance at each class meeting,
- b) participation in class,
- c) presenting at the poster presentation (fall) or thesis presentation (spring),
- d) attending at least one computer science (or related) talk on campus,
- e) meeting with your advisor regularly,
- f) and meeting all deadlines.

The second component is determined based on your first reader (advisor) and second reader's assessment of the quality of your written thesis as well as its demonstration of your understanding of the material (see rubric above).

Top Publication Venues

In order to ensure that students are learning about top cutting-edge research in computer science, we require that each student's literature review includes detailed descriptions of at least **2** papers published **within the last 10 years** at one of the below venues. The full list of accepted venues, generated via a community reputation survey process, can be found at <http://csranks.org>. Relevant excerpted fields are listed below.

- Human-Computer Interaction: CHI, UbiComp, UIST
- Machine Learning: NeurIPS, ICML, KDD, AAAI
- Theory and Algorithms: STOC, FOCS, SODA, CAV, LICS
- Programming Languages: PLDI, POPL
- High-performance Computing: HPDC, ICS, SC
- Computational Linguistics: ACL, EMNLP, NAACL
- Computational Biology: ISMB, RECOMB

Week-by-week Faculty Deadlines

Spring of junior year

Exam Week. Presentations by CS faculty on possible thesis topics, including links to further reading.

Summer before senior year

Summer. Meet or email with potential advisees as needed.

Fall semester

Week 1. Week of Sept 7th.

Faculty Tasks:

- a) Meet with potential advisees as needed.

Week 2. Week of Sept 14th.

Faculty Tasks:

- a) Per topic you plan to advise theses on, develop (or update) a “canon” list of a small number of papers that are core to the discipline that any student working on that topic should read. Be sure to add any of your recent work to that list that it is likely current advisees will build on (including strong previous student theses). If you also have ideas about specific topics your advisees will be researching, make a list of the more specific papers those students should additionally read.
- b) Ensure that the list of papers you plan to assign to your advisees (both your canon list and any additional more specific topic papers) includes at last two papers from top computer science conferences *within the last 10 years*. Valid top conference publication venues are listed above. Please ensure that the papers were published in the main research track of the conference and not at an associated workshop.
- c) During departmental faculty meeting: use student preferences to run the stable matching algorithm and determine thesis advisees. There may be a few students who need to meet with possible advisors to finalize their assignment after this week.

- d) After faculty meeting: email your advisees and include their initial “canon” reading list.

Week 3. Week of Sept 21st.

Faculty Tasks:

- a) Set up a weekly individual meeting time with each of your advisees. You should meet with each advisee *individually* at a regular time for at least 30 minutes each week. You may also find it useful to set aside additional flexible time each week in case a second meeting is needed and/or additional joint lab meeting times.
- b) Hold your first meeting with each of your advisees.
 - i. Assign your “canon” reading list(s).
 - ii. Discuss more specific thesis topic ideas.
 - iii. Assign any additional papers as appropriate based on the topic.
 - iv. Help your advisees prioritize which 1—3 papers to focus on to start with.
- c) Let your advisees know how to contact you between meetings, e.g., email, slack, or some other method.
- d) **Each weekly advisee meeting:**
 - i. Check in about both positive and negative progress from the past week.
 - ii. Discuss and plan ideas and next steps.
 - iii. Set clear assignments for what the student should do before your meeting in the following week.
- e) **Weekly, between meetings:** Respond to queries from your advisees promptly (ideally within 24 hours).

Week 4. Week of Sept 28th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Discuss the goals of a literature review.
- c) Help your advisees pick 3 papers to start writing about for their literature review.

Week 5. Week of Oct 5th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Help your advisees pick 1 paper to write about in depth (e.g., fully describe as a key algorithm) for their literature review draft.
- c) In department meeting: determine second reader assignments.

Student Deadlines to Note: Students will be bringing drafts of their literature review so far for a peer review with their classmates on Friday.

Week 6. Week of Oct 12th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Make sure your advisees have planned to include at least the following in their literature review drafts:

- i. A short introduction to the topic
- ii. Descriptions of at least 3 papers
- iii. An in-depth description of at least 1 paper
- iv. A short description of the proposed project
- v. A detailed outline of any papers or sections not yet fully written
- vi. A bibliography with all references included or planned fully cited

The goal of this draft is that you should be able to use it to determine if there are any large topics or important papers that are missing for a full literature review on this topic and for the proposed project.

- c) By default, expect that students will hand in their literature review via an emailed pdf.
- d) Make sure you've received drafts to read from all of your advisees *and* from all the students for whom you are the second reader.

Student Deadlines to Note: Draft literature review and project proposal due Friday.

Week 7. Week of Oct 19th. Reading drafts.

Faculty Tasks:

- a) Read and write comments on all theses (both your advisees' and those for which you are the second reader).
- b) Second reader responsibilities at this checkpoint:
 - i. Confirm that the topic is appropriate for a computer science senior thesis. This should include ensuring that the topic falls within the discipline and is of the right difficulty level for a senior thesis (both not too hard and not too easy).
 - ii. Confirm that the papers written about (and not just in the bibliography) include computer science papers from top venues (enumerated above).
 - iii. Confirm that enough papers to satisfy a full literature review are included in the bibliography. This should be at least 10 and likely more.
 - iv. Confirm that if the student completes any outlined sections the literature review would receive a grade of at least a 2.0.
 - v. Write general comments reflecting the above as well as any other notes for the students and email those notes to the advisors and the students.

Week 8. Week of Oct 26th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Return literature review feedback to all advisees and discuss suggested changes and additions.
- c) Continue discussing and fleshing out the proposed problem idea.

Week 9. Week of Nov 2nd.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Discuss potential plans for continuing the thesis work in the spring, including in detail, what the proposed research contribution would be and what the experience of doing this type of research would be (e.g., heavily coding, etc.).

Week 10. Week of Nov 9th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Discuss the introduction of the literature review with your advisees and make sure they have an appropriate high-level of context and can write an introduction that is readable by non-experts.
- c) Make sure that a basic idea for the proposed work is in place.
- d) Finalize the decision with your advisees about whether they will continue to work on their thesis in the spring.
- e) Help your advisees make sure that they have written text for all sections of the literature review so that they can get feedback from their classmates on Friday.

Student Deadlines to Note: Deadline to register for the spring semester of thesis (CMSC 399 B) is Friday. Peer reading of drafts in class on Friday.

Week 11. Week of Nov 16th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Any students who are continuing thesis in the spring should start working on their proposed research this week, simultaneously with finishing the literature review.

Student Deadlines to Note: Friday night deadline to hand in literature review draft based on revisions from peers.

Week 12. — **Thanksgiving break** —

Faculty Tasks:

- a) Read through and write comments on all of your advisees latest thesis drafts.
- b) Students continuing in the spring should continue to work on the proposed research.

Week 13. Week of Nov 30th.

Faculty Tasks:

- a) Continue weekly meetings with your advisees.
- b) Give back and discuss feedback on their Thanksgiving draft.
- c) Discuss what should go on their poster. Note that they'll be encouraged to follow the suggestions of **#betterposter** described in this video <https://www.youtube.com/watch?v=1RwJbhkCA58> and will be given corresponding templates.
- d) Give prompt feedback on at least one poster draft (via email, slack, etc.).
- e) Students continuing in the spring should continue to work on the proposed research as well as the poster and literature review.

Week 14. Week of Dec 7th.

Faculty Tasks:

- a) Attend the virtual senior thesis poster presentations: **Friday, December 11th from 1 - 4pm virtually.**

- b) Continue weekly meetings with your advisees. This will be your last weekly meeting of this semester. Discuss concrete goals for winter break with any students continuing on to the spring semester. Any students planning an implementation as part of their research work should be encouraged to make substantial progress, if not complete it, during winter break.

Student Deadlines to Note: Students will be working on their posters before the Friday poster presentation.

Week 15. Exam period.

Faculty Tasks:

- a) No need to meet with advisees, but **do** respond promptly to any queries from them.

Student Deadlines to Note: Literature reviews are due at the end of the exam period and should be emailed in pdf format to the advisor, course instructor, and second reader.

Week 16. After exam period.

Faculty Tasks:

- a) Read the final versions of the students' literature reviews for both your advisees and the students for whom you are second reader.

- b) First reader responsibilities:

- i. Do a detailed read-through and make sure that any concerns that you previously mentioned were addressed. For students continuing into the spring semester, make sure to give detailed comments (whether repeat comments that went unaddressed or new comments). Those students will make further revisions to this document in the spring semester.
- ii. Give students continuing to the spring semester detailed comments focusing on their proposed work, along with suggestions for how to make progress on this proposal during winter break. Remain in contact with these students during winter break as needed.
- iii. Determine your opinion about the grade your students should receive. Recall the rubric for a 2.0 given above. Coordinate with the senior thesis instructor and the second reader for your advisees to determine a final grade.
- iv. Send all your advisees final comments on their submitted literature review. These should incorporate any comments from the second reader (who will not be sending separate comments).

- c) Second reader responsibilities:

- i. Do a detailed read-through and make sure that any concerns that you previously mentioned were addressed.
- ii. Re-confirm that the topic is appropriate for a computer science thesis and that appropriate papers, published at the selected top venues, are included and described in sufficient detail.
- iii. Determine your opinion about the grade your students should receive. Communicate that opinion to the senior thesis instructor and first reader. Coordinate with them to determine a final grade.
- iv. Pass on any comments about the thesis to the first reader to communicate to the student.

- d) **Due:** You should complete your read-throughs of all theses (both first and second reader obligations) by **January 1st**. Grades are due to the registrar on January 3rd. Please **be available by email on January 2nd and 3rd** to allow for fast discussion about the final literature review grades with the other reader and the course instructor.

Winter break

If you have advisees continuing on in the spring who have a large implementation portion of their thesis, you should expect to answer emails / slack messages from those advisees and help them remotely if they get stuck. Please respond to any queries promptly.

Spring semester

- Week 1. Week of Feb. 15th. **Due:** You should have set a weekly individual meeting with each of your advisees.
- Week 2. Week of Feb. 22nd. Ongoing meetings with your advisees.
- Week 3. Week of Mar. 1st. Ongoing meetings with your advisor.
- Week 4. Week of Mar. 8th. **Student deadline to note:** Any implementation work required for your thesis should be done or essentially done by this date.
- Week 5. Week of Mar. 15th. **Student deadline to note:** Peer Review in class.
- Week 6. Week of Mar. 22nd. **Student deadline to note:** The full rough draft of your thesis.
- Week 7. Week of Mar. 29th. — Spring pause. —
- Week 8. Week of Apr. 5th. Note to students: The next few weeks will be devoted to extensive textual revision, in consultation with your advisor. The full draft should be the first of several iterations during this period; you and your advisor should exchange as many drafts as possible. Remember that it may take your advisor up to a week to read your draft carefully.
- Week 9. Week of Apr. 12th. Ongoing meetings with your advisees.
- Week 10. Week of Apr. 19th. **Student deadline to note:** Peer Review in class.
- Week 11. Week of Apr. 26th. **Student deadline to note: Friday, April 30th: your completed thesis.**
- Week 12. Week of May 3rd. Practice thesis presentations (please talk to your advisees about how to do a thesis presentation on their topic).
- Week 13. Week of May 10th. Practice thesis presentations.
- Week 14. **Monday, May 17th:** thesis presentations