

EARS Senior Thesis Guidelines and Procedures **Last revised 6/23**

PLANNING A THESIS

So you think you might want to do a senior thesis or Honors thesis in Earth Sciences? The beginning of your junior year is not too early to begin thinking about one! Read on to find out how to go about deciding a topic, getting academic credit, getting funding, and completing the thesis.

Honors thesis or senior thesis? All Earth Sciences majors are encouraged to do a senior thesis. Doing one is one way of fulfilling the culminating experience requirement for a Dartmouth undergraduate degree, although you may also fulfill this requirement via EARS 87 (1 term independent project) or EARS 88 (Senior Seminar). Doing a thesis may also make you eligible to graduate with Honors or High Honors in Earth Sciences.

To fulfill the culminating experience requirement by doing a senior thesis, you must:

- Enroll in and complete EARS 89 (You may also take EARS 90 in a second term, though these will count only for course credit). During this time, you may design your chosen thesis topic and carry out the research.
- Complete a research project and present it orally (15 minute conference-type talk), as a poster (Wetterhahn Science Symposium), and in writing (thesis).
- Attend weekly Earth Sciences research seminars/Geolunch during winter and spring terms of your senior year.

For your thesis to be an Honors thesis, in addition to the above you must:

- By the beginning of senior year: have a grade point average of 3.0 (B) in the major and 3.0 (B) overall (College requirement).
- By the end of senior year: have a 3.3 (B+) average in the 8 courses constituting the major.

On the basis of overall academic performance, grade point average, and quality of the completed written thesis and thesis presentation, the department decides at the end of the spring term whether eligible students should receive Honors or High Honors.

Planning your thesis. Start thinking about potential topics during your junior year. Talk to faculty members with whom you might want to work and ask them about possible projects and timetables for doing them. Depending on whether the project involves field work or travel, you may have to commit as early as winter or spring of your junior year; other projects may be flexible enough that you can commit later. The earlier you start to think about a thesis, the more choice you have as to advisor and project and the greater your chance of receiving funding.

Thesis proposal. You are required to submit a senior thesis proposal to the department. A thesis proposal is essential, for two reasons. First and most important, it forces you to know the background of the scientific problem, to have a clear understanding of the question, and to think through the methodology, so that you know what you are doing and why it's worthwhile. Second, virtually all sources of funding, including those at the College, require a proposal (versions of your proposal will likely be submitted to several places). Your advisor will help you prepare your proposal. **The latest you may submit a proposal to the department is the end of**

fall term, although you are strongly advised to have completed it by the beginning of fall term or even earlier.

The proposal should be titled and should describe the aims, scope, strategy, key references, timing of specific tasks, and (if appropriate) a budget for your thesis research. This document should be *no more* than 10 pages (less is OK!) single-spaced, in Times 12 font. In addition, please include a separate page that includes the thesis title and signature(s) of your primary thesis advisor(s), indicating that your advisor has reviewed and approved the proposal. This signed page should be scanned and saved as a pdf file. Both proposal and cover page should be submitted electronically to the department chair (currently Meredith Kelly) and undergraduate advisor (currently Leslie Sonder) and a hard copy delivered to Phyllis in the department office.

A proposal usually starts with an abstract (< 1 page, usually 1 paragraph) summarizing the project. The body of the proposal should state what the project is (what is the question or hypothesis?), explain why the research objectives are scientifically important, and describe procedures and logistics. If you include figures and tables, they should be numbered, referred to in the text, and have explanatory captions. The proposal should be fully referenced. You must attach an itemized budget and justify each item. Copies of old thesis proposals, which you can use as examples, can be obtained from your advisor or the department office.

The requested funds in your budget should be used to directly support the research. You can request funds for equipment or supplies, for airfare, car rental, or other travel, and for accommodations if you need to do fieldwork or lab work off campus. The Department does not cover expenses for food. Other funding sources (e.g., Dartmouth Undergraduate Advising and Research grants, <https://students.dartmouth.edu/ugar/research/programs>) have different policies regarding reasonable expenses.

A thesis proposal should be written before beginning the research. Departmental funding will not be provided until the proposal is submitted. The Earth Sciences department will automatically grant \$500 towards your research when you submit a proposal to the Department. (This doesn't come to you as a check, but rather this means you can be reimbursed for up to \$500, according to your thesis proposal budget and upon presentation of a receipt(s) for the expense. Phyllis, the EARS department administrator, can help you with this process.) Even if your budget is \$0, you should still submit a proposal to the department, so that we know you are pursuing a thesis, and more importantly, so that you have gone through the process of thinking and planning for your project. If you will need more than \$500, you must submit your proposal externally (to other offices in the College or outside the College) and should write your budget to split costs between the offices you submit to (you should list \$500 as already having been granted from the Earth Sciences Department). If you do not receive enough from the external offices, you may subsequently request an additional \$1000 from the department for a total of \$1500. For those rare cases when you might be ineligible for other College funding, upon request (with justification) the department will consider funding you for more than the initial \$500. Also, once in a while the department has provided funding above the \$1500 limit, but in such cases it must be very clear that all possible external funding options have been attempted, no other funding is available, and the project cannot be scaled back without jeopardizing its scientific value.

There are several Dartmouth offices that provide senior thesis funding. These include:

- Undergraduate Advising and Research (<https://students.dartmouth.edu/ugar/research/programs>)
- the Office of Residential Life (<http://www.dartmouth.edu/~orl/life-in-res/spec-pgms/senior.html>)

- the Outdoor Programs Office (<https://outdoors.dartmouth.edu/doc/funding/>)
- the Dickey Center (http://www.dartmouth.edu/~dickey/thesis_ind_study.html)
- the Rockefeller Center
(<http://rockefeller.dartmouth.edu/students/funding/index.html>)
- The Irving Institute (<https://irving.dartmouth.edu/research/funding-students>)

There are also research grants for undergraduates available from the Northeastern Section of the Geological Society of America (<http://www.geosociety.org/grants/negrant.htm#research>). More sources of funding are listed on the EARS department website (<https://earthsciences.dartmouth.edu/undergraduate/honors>).

Note that many of these offices have proposal submission deadlines *early in the term before you wish to use the funds* (and in the case of the Geological Society, even earlier, in February of your junior year), so you may need to work on your proposal long before you plan to begin your actual research.

If you are planning to pursue senior thesis research the summer after junior year that will require financial support, but you are not yet ready to submit a full proposal, the department can accommodate this. We require a one-page statement outlining the key aims and approach of your anticipated summer work and a brief justification of the amount requested for the summer, as well as one-page budget indicating the line items of requested funds. This summer-research pre-proposal document should be submitted to the administrator (Phyllis Ford) by email by 1 May, and your full proposal is expected to be submitted early in fall term. Any funds awarded for summer support of senior thesis research will be drawn from the total you are eligible to receive from the department in support of your thesis work. You are strongly encouraged to also seek support from outside of the department for this summer term research.

Thesis proposal deadlines. Regardless of whether or not you are applying for funding, the department needs to receive a written proposal approved by your advisor(s) *before the end of the Fall term of your Senior year*. If you require summer funding for field work, requests should be submitted to the department by May 1 of your junior year.

COMPLETING YOUR THESIS

Successful completion of EARS 89 requires submission of a written thesis and oral presentation of the thesis. The format of the written thesis should be similar to that of graduate theses; consult your advisor(s), the graduate thesis guidelines, and previous theses for further information. Your thesis should properly introduce the research topic, provide justification for the research, explain the experiments or procedures that were performed, present the data in a concise form, and interpret the data. The work should be fully referenced. You may also include appendices containing a complete dataset, additional data that was collected but not analyzed, computer codes, or other supplementary information.

Thesis drafts. You will submit 3 successive drafts of your thesis:

1. A *first public draft* of your thesis is due to your advisor by May 9 (this and dates below were for 2021; expect similar dates in subsequent years.) Please also submit a version of this to the department office, for interested parties to skim through. This should not be a first draft, but

rather a more-or-less complete version of your thesis, though perhaps lacking formatting, acknowledgements, or the like. In other words, it should be *much* closer to the final version than to a first draft. Your advisor will return this draft to you by May 14 with comments.

2. A *second draft* is due May 17. This will be read by two readers: your advisor and a 2nd faculty reader chosen by mutual agreement between you and your advisor. It should be returned to you by May 22.

3. The *final draft* is due to your advisor and to the general faculty by May 29. This is essentially the final version, barring any changes you may decide to make based on discussion at the Wetterhahn Symposium or Senior Thesis night. These should be deposited electronically to a Dropbox folder (URL to be provided).

4. The *final version* must be submitted to a printer for binding NO LATER than June 3 (last day of final exams). See below for important specifications about printers and payment.

Thesis format. The format of the written thesis should be similar to that of graduate theses; consult your advisor(s), the graduate thesis guidelines, and previous theses for more details. Your thesis should include an abstract. The body of the thesis should properly introduce the research topic, provide justification for the research, explain the experiments or procedures that were performed, present the data in a concise form, and interpret the data. Your acknowledgment section should mention all funding sources and individuals who have helped you complete your work. You should include a complete and correctly formatted list of references cited in the body of the thesis. You may also include appendices containing a complete dataset, additional data, computer codes, or other supplementary information. All figures and tables should have captions and be numbered in the order they are referenced in the text.

Thesis presentations. You must present your work orally in the spring of your senior year. The Earth Sciences Department requires two presentations:

- a poster presentation at the Karen Wetterhahn Science Symposium (<http://www.dartmouth.edu/~wisp/wetterhahn>) which generally takes place on the 3rd or 4th Wednesday in May, and
- a scientific conference-style talk at the Earth Sciences Department's Senior Thesis Night, usually the Tuesday after Memorial Day.

Although the details may vary from year to year, the instructions below describe the general format of Senior Thesis night.

A few days before, the faculty and staff will arrange the order of presentations.

You should have your PowerPoint presentations already loaded on to the computer in the classroom used for presentations, and you should have checked that all the graphics display correctly.

Your advisor will briefly introduce you before you present.

The style of presentations is similar to those for oral presentations at national scientific meetings. Each presentation should last 12 minutes, followed by 2 minutes for questions and 1 minute for

changing over to the next speaker. There will be a laptop running a timer whose screen color changes according to the time schedule below, so that you can easily gauge the time remaining.

Green: 0- 10 min

Yellow: 10 -12 min

Red: 12 min (starts blinking at 14 minutes).

Although we will not cut you off if you go over time, keep in mind that your audience will become increasingly uncomfortable and incapable of listening the longer you go. So please, practice your talk so that it fits within the time limits!

Do not forget to acknowledge funding sources in your talk!

And please stay for food and congratulations after the talks!

Thesis final versions. Final bound copies are due by June 3. You must print AND BIND at least two copies of your thesis (one for Rauner Library special collections, and one for each of your advisors). You can either hand these to the undergraduate advisor or deliver them personally to the library and advisor.

You may use either the College Printing and Mailing Center (<http://www.dartmouth.edu/~dpms/>) or Gnomon Copy (<https://gnomoncopy.net/>). You may be able to send them your thesis file as a pdf via email – check the printers' websites for more information. BE ADVISED THAT GNOMON COPY MAY TAKE UP TO A MONTH TO BIND, so be sure to make arrangements for delivery if you will leave town after commencement.

Cloth binding with card stock covers is fine. The cover does not have to be white. Color copying is allowed, because many theses require it (e.g. those with photos). You are urged to use double sided to save paper and library shelf space.

The department will pay for bound copies of your thesis for the library, your advisor(s), and one for yourself, but you will have to pay for any additional copies. If you have external funding (e.g. Dean of Faculty money), it should be used to cover printing and binding; otherwise charge to the department. If you use the College printing services, give them this chart string: 20.469.645114.396057.0000.xxxx. If you use Gnomon, you will need to use a purchasing card, check with your advisor, Phyllis, or Leslie about this. **YOU MUST (!!!) GIVE THE RECEIPT TO THE PURCHASING CARD OWNER.**

You can pick up the bound copies yourself or have them delivered to Phyllis' office, Fairchild 228.