GUIDELINES FOR INDEPENDENT STUDY PROJECTS

Department of Geological Sciences
Brown University

Introduction

The Department of Geological Sciences has several goals in requiring ScB concentrators to take an independent study course (GEOL 1970). These courses provide an opportunity for the student to gain some idea of what research is actually like in this discipline; to learn how to ask a well-defined, significant, and answerable question; to choose the methods of data collection and analysis and to actually carry out the work; and finally to interpret the results and address their broader implications. These goals are best fulfilled by actual experience; they cannot be learned passively in the classroom. A second and related goal is to provide a course in which the student must take primary responsibility for his or her own education. A third goal is to provide the possibility for exploring new areas not covered in previous courses, as well as the possibility for an integrative experience. Finally, the experience may prove helpful in getting to know a few professors, staff, and grad students better than is possible in the usual academic course, and it might help you to decide whether or not to consider a career which involves research.

AB concentrators are strongly encouraged to take a GEOL 1970 (independent study course) if they desire; all that is required is the agreement of a faculty member to serve as the advisor. AB concentrators who wish to graduate with Honors (see http://www.geo.brown.edu/UnderGrad/Honors.htm) must take GEOL 1970.

Choosing a topic and advisor:

Most often students choose a ‘traditional’ research topic for their GEOL 1970, working on an aspect of a professor’s research project. There are several advantages to such a choice: because the overall questions and methods are already reasonably well defined, it is easier to make significant progress in the course of a single semester. In addition, there are usually other people (undergrads, grad students, post docs) working on related aspects of the question, making for a supportive working environment.

How should you choose what area or professor to do your GEOL 1970 in? There are a number of possible ways to think about this.

• Maybe you already have been working in a professor’s lab during the year, or in a previous summer, and now would like to dig deeper and actually do some research of your own. If so, talk to the professor in the spring of your junior year and ask him or her to outline one or two possible (do-able!) research projects for you to think about.

• Maybe you have no previous geo work or research experience, but have one or two courses or professors you have especially enjoyed, and would like to explore whether actual research in that area might interest you; this experience could influence what types of graduate programs you might apply to, for example. Feel free to talk to these
professors, and ask them to outline one or two possible research projects they can think of that would be feasible as a senior thesis.

• Maybe you are interested in a certain topic or area of the geosciences **not** represented by any course (or professor’s research) in our department, such as geomorphology, and you wish to explore this topic to fill in your background and/or to help you decide whether you might like to pursue that area further in a job or grad school. If so, talk to the professor who you think is closest to that area of expertise, or to your concentration advisor, to get advice on whether such a project would be feasible. The main question will be whether you can identify an advisor who is willing to take enough time to meet regularly (say once a week) with you during your GEOL 1970 semester to discuss your approach and progress.

• Maybe you have already decided you are (at some point) going to grad school and will **not** want to do experimental research (for example), but nonetheless you might wish to take advantage of our department’s strength in experimental approaches, and gain a bit of experience with that while you are here.

• Most geo concentrators end up working directly with a faculty member in this department. However, it is possible to work with a faculty member in another closely related department, such as EEB or Anthropology, or even someone at another university (such as dinosaur expert Dave Fastovsky at URI). If you wish to explore or pursue this option, check with your concentration advisor. In such cases you also will need to identify a faculty member in the geo department as co-advisor. This faculty member will also read your thesis and (in consultation with your main advisor) assign the grade.

• In some cases a student may choose to work most closely with scientists at a nearby lab such as the USGS Hydrology Office in Providence, or the EPA lab in Kingston RI. Again you should check this option out with your concentration advisor, and identify a faculty member in the geo department to serve as your co-advisor.

We would like to emphasize that it is fine to ‘think outside the box’, and to define and pursue a project that especially interests you, even if it is not traditional basic research.

• If you are very interested in teaching, you might like to develop some teaching modules. You might work with someone at the Providence Children’s Museum on ideas for an interactive exhibit; you might develop modules for use in Vartan Gregorian school (where funding for science has recently been eliminated!); or with some one at Rogers Williams Park Natural History Museum for an exhibit on RI geology; or with someone at Wheeler School or Moses Brown school on a module on some aspect of Earth science; or with someone at RI Audubon Society on a geologic guide to one of their preserves.

• If you are interested in film you might try developing a virtual geology field trip. A number of classic outcrops in RI are increasingly degraded with graffiti or covered with other debris; it would be wonderful to get records of important geologic features preserved on video footage. One could even imagine a more major production on “RI Geology - The Movie”, with shots of all the major geologic units in the state.

• If you are interested in science writing or science journalism, you could research one or several topics, perhaps with the goal of submitting one or more of them to magazines such as Catalyst, BAM, Geotimes, or the Geo Dept annual alum newsletter.
• It might be satisfying, and useful to the department, to collect samples of some RI rock units from special places such as Purgatory Chasm and to make a suite of thin sections (and explanations) that could be used in labs in our undergrad courses.

• It might be satisfying to build a model or two that could be used in one or more of our undergrad courses - for example a stream table, or new diapir models.

Maybe you have other ideas - we encourage you to be creative in defining a project that will be of most interest and satisfaction to you!

**Note:** A list of the titles (and student names) of all independent study projects for the past ~15 years, for each faculty sponsor, is available in GC028. Also in this room there are copies of most of these senior theses for you to actually look through.

**Procedures:**

• The research for your GEOL 1970 course cannot be work that you did previously over the summer or on a semester off, nor can it be work that you have been paid to do here at Brown. It must be your own work that you actually do during the semester you sign up for the course. However, it is fine to get a head start on your research and do some field or lab work during the summer, or some library investigations or sample collection, etc.

• The independent study project should result in a written paper following the format and style of regular scientific journals, to be prepared by the end of the term (date to be approved by the faculty advisor). The writing of a scientific paper is really an integral part of doing the research; you may discover gaps in the data or completely new connections in the course of writing. It is important to allow enough time at the end of the semester to turn in a draft of the paper, have the faculty advisor read and comment on it, and then prepare a revised version.

• One semester or two? It is unfortunately but understandably true that many students who sign up for GEOL 1970 do not complete all the work by the end of the first semester and so take an Incomplete. This leads some to inquire about the possibility (or advisability) of also signing up another GEOL 1970 (which will have a different CRN #) in the second semester. There is no formal departmental policy on this question, but a few guidelines can be offered. First, it is obviously not fair to sign up for GEOL 1970 in order to finish work that was not completed in the first semester because you did not put in an adequate amount of time (i.e. at least the same time per week as is devoted to other upper level concentration courses). Beyond that fundamental criterion, there are several factors to be considered. If you are definitely going on to graduate school in the next year or so, you are probably better off getting another math or supporting science course under your belt, rather than a second semester of research, since you will be doing mainly research when you get to graduate school anyway. If you will definitely be looking for a job when you graduate, it might be an advantage to have a more ambitious independent research paper to show potential employers, as long as you already have a strong sequence of math and supporting science courses, perhaps including somewhat more “practical” courses such GEOL 0580 or 1330 or 1370. Finally, in reality it is extremely difficult to complete an independent research project in one semester. In part this situation results because one
cannot force the pace of research - you may have to wait for a piece of equipment to be delivered or repaired, for a computer program to be debugged, for certain samples to be sent by a colleague, etc. Especially if it is important to you that your GEOL 1970 project be done in a single semester, so that you can take 4 other courses in your last semester, make sure to talk to your faculty research advisor to ensure that your project is significantly well-defined that it will be possible to finish in one semester.

• There are several reasons why it is better to take GEOL 1970 during the first semester rather than in the second. First, it takes some of the time pressure off (that is, if you do not get everything done during the academic semester, you can finish during January break or early in second semester). Second, you will get to know a faculty member well in time for him or her to write you a detailed letter of recommendation for grad schools or jobs.

Procedural Rules:

• Students should identify a topic and faculty advisor prior to the semester in which they propose to do the research, because proper registration for this course requires the professor's name, and it is not fair to the professor to wait until the last minute. Juniors should notify Jan Tullis as to which professor they are going to work with before leaving campus for the summer.

• At the beginning of the semester in which you are taking the research course, and by the end of the first week of classes, you must submit to the faculty advisor a one page (typed) proposal defining the problem, the approach to be taken, and the goals to be accomplished. The faculty advisor may wish to suggest changes in the proposal, in terms of the scope of the project undertaken, or the specific approach, which will result in a new draft to which both the student and faculty agree. It is important that both the student and the faculty advisor have a clear understanding at the beginning of the semester of the frequency and nature of meetings they will have during the course of the semester (one regularly scheduled meeting per week is strongly advised), of various deadlines for timely completion of various portions of the work, etc.

Advice:

• It is important to start thinking about a possible project before you leave campus the spring of your junior year, and to talk to several faculty. If you can identify a project and a faculty advisor, you might be able to get started on your research, or at least some background reading, over the summer; this will give you a flying start in the fall. Also in the spring of your junior year, talk to present seniors while they are still around to give you helpful advice about general strategies; this could be one of the more valuable things you do to prepare for your project.

• If you will be spending spring semester of your junior year at another university, perhaps abroad, then make sure to talk to your concentration advisor about the independent study project before you go. If you are a semester out of synch and will
complete your degree in December, it probably makes sense for you to take GEOL 1970 in your last semester.

- It is almost always true that students taking GEOL 1970 start off very slowly, not sure what to do and feeling as though there is all the time in the world; then things pile up and they have too much left to do at the end of the semester, when the work load from other courses is also more severe. This is not conducive to thoughtful critical analysis, or to good writing (including several drafts). Therefore, make out a weekly 'assignment' sheet for yourself at the beginning of the semester, and stick to it (or keep revising it as you learn what is realistic and feasible). Work backward from the absolute time deadlines at the end of the semester, allowing adequate time for writing, and you will be surprised at how little time is actually available for data gathering. (Remember that you should spend at least as much time per week on this course as you do on your most difficult upper level concentration courses.)

- Some projects may involve expenses, such as travel or supplies. If your project is an aspect of some professor's research, then his or her grant may be able to cover the costs. However, if you are working on a project not directly related to the professor's research, then you can obtain modest funds from the department. Consult your faculty advisor and concentration advisor.

- Some projects will require you to use specialized instruments or equipment. Presumably most of these will be in the research lab of your faculty advisor, and he or she will arrange for instruction. If you need to use a departmental facility such as the electron probe, this should probably be handled by your advisor making a request to the Chairman. If you need to learn how to make thin sections, see Bill Collins.

- Finally – have fun! It is a completely different kind of learning experience to gather and interpret your own data, compared to reading about results and conclusions of others (in textbooks or published articles).