Chapter 1

Academics
CHAPTER 1. ACADEMICS

The purpose of this book is to help you get started as a graduate student at Cornell and to serve as a reference for resources available at Cornell and in the Ithaca area. This chapter addresses issues related to academic life as a graduate student in Engineering. The chapter contains a description of the degrees offered in engineering, advice on choosing an advisor and a committee, information on graduate school forms, and some other topics. Our purpose here is to help you know what you need to do and when.

We hope you find the information here helpful, but do not rely upon it solely for making decisions. The official sources of information on these topics are the Graduate School, the Guide to Graduate Study, and the Director of Graduate Studies (DGS) or the Director of the M.Eng. Program in your field.

1.1 Degrees

If you are reading this handbook, you are probably pursuing a Master of Engineering (M.Eng.), Master of Science (M.S.), or Doctor of Philosophy (Ph.D.) degree. The M.Eng. is a professional degree, which means it is designed for those who expect to find jobs in industry; the other two are generally considered more academic. This has been changing in recent years, though, as engineering practice requires ever more specialized knowledge.

The M.Eng. degree requires 30 credits of technical classes, including four to eight credits of work on a Master of Engineering project. This typically takes one academic year and sometimes extends into the following summer. Cornell undergraduates frequently get a head start on a M.Eng. degree during the last semester of their senior year; for them in particular, the M.Eng. degree is like a fifth year of undergraduate work. Unlike many undergraduate programs, however, the M.Eng. degree incorporates intense coursework with a large independent or group project. An M.Eng. student has an advisor, whom must be picked promptly if one wishes to begin the project the first semester. This can be worthwhile because serious work on an M.Eng. project can be a valuable asset come job interview time in February and March, but starting so soon doesn’t permit much time to adapt to Cornell.

The M.S. and Ph.D. degrees are far more flexible; in many of the graduate fields, these degrees have no written requirements whatsoever. The M.S. degree is usually a stepping-stone on the way to the Ph.D. Many departments do not usually admit students to an M.S. program that expect to stop after the Master’s. Some departments expect Ph.D. students to get a full Master’s along the way, others are content with a “Special Master’s,” and others don’t expect any at all. The differences between these are described briefly here, but check with your advisor, or other students in your field, to find out what will be expected of you.

Students pursuing a Master’s degree have two committee members: an advisor and one minor committee member. The student usually picks a collection of courses to take, but consult your advisor to see if there are courses he or she feels particularly strongly about. The total time to earn the degree varies, but about two years is typical. The first couple of semesters consist largely of coursework, choosing an advisor, becoming familiar with the research lab, and picking a research project. During the remaining semesters, the emphasis is reversed: you might take a couple of courses, but most of the time is spent on research and writing the Master’s thesis. In many ways, the thesis is practice for the Ph.D. dissertation. Often you can see what is expected by watching more advanced students; otherwise, look at theses in the Engineering Library written by previous students in the same research group. The degree ends with a Master’s defense: an oral exam where you present your thesis work in a talk, and answer questions asked by the committee members.

Some fields and some advisors feel that writing a Master’s thesis requires time that is better spent in other ways and eliminate that step of the process for a Ph.D. They may preserve the Master’s defense, in which case one earns a Special Master’s; others do away with the Master’s entirely and students work directly for the Ph.D.

For a Ph.D., at least one to two years of research are expected beyond a Master’s degree. That means that after a Bachelor’s degree, the Ph.D. takes about five years. Some students finish in as few as three, though for others the Ph.D. program can drag on indefinitely. Those who enter Cornell with a Master’s
from another school may need to take some additional coursework, and thus may still need three and a half to four years for the Ph.D. degree alone.

There are three exams on the way to the Ph.D., known as the Qualifying or Q exam, Admission to Candidacy or A exam, and the Final or B exam. The Q exam certifies that one is ready to begin Ph.D. work. It is taken early, and one is not required to have a minor field committee member for it. Policies on Q examinations vary widely between departments, however. You should check with your DGS to find out how things are done in your department. The A exam certifies that one has finished with coursework, and may also serve as a proposal of the Ph.D. research project. Both the Q and A exams involve a certain amount of “grilling” by the committee members to verify familiarity with coursework. If they find a significant deficiency, they may recommend taking an appropriate course. Before 1998, one was eligible for reduced tuition upon completion of the A exam, giving it a fiscal importance, but that is no longer the case. At the end of the road is the B exam, which is the dissertation defense. It is a presentation of the dissertation results; if the dissertation work is solid, there is generally nothing to worry about. After a few dissertation corrections, which the committee will invariably require, it’s cap and gown time!

1.2 Course Registration and Selection

This section is divided into two parts. First, we will explain the process of registering as a Cornell student and enrolling in courses. After that, we’ll give you some advice on deciding on what courses you want to take. Be cautious, however. The registration process is subject to change. For the latest information, as well as the dates and deadlines for registration, see the Graduate Field Assistant in your field/department or visit the Graduate School in Caldwell Hall (DE4).

1.2.1 Registration and Course Enrollment

The first thing you need to understand about choosing courses at Cornell is that registration and course enrollment are separate processes. First, you register to be a student at Cornell for a given semester. After that, you enroll for courses. The processes are slightly different depending on whether you are a new or a returning student, so we’ll look at them both.

New Students

You must participate in a walk-through registration process for your first main semester (Fall or Spring) at Cornell. If you come in the fall (or in the Summer), then you should attend a day in mid-August set aside for registration. This registration event is held in the Field House (E5, just up Campus Road from the Engineering Quad) and allows you to complete many required tasks at one time. Be prepared to battle the crowds — it can take a few hours to do everything you need to do. In addition to registering, you can also pick up your Cornell ID or have one made, apply for a parking permit, apply for a Cornell computing account, and apply for a Social Security Number if you are an international student (see chapter 5). If you miss the registration day in the Field House, you can still register by visiting Day Hall (C5) on other designated days — see your Graduate Field Assistant or visit Caldwell Hall (DE4) for details. If your first major semester is the Spring semester, then you should visit the Graduate School offices in Caldwell Hall to register; you may have to wander all over campus to complete the other tasks mentioned above, however.

To sign up for the courses you want to take, you must submit a course enrollment form. This form is generally due to Caldwell Hall (DE4) by the end of the third week of classes, but check to be sure on the exact date. Cornell allows you to shop around for courses during the first couple of weeks of classes before you make a final decision, but you should begin attending classes that you may want to take on the very first day! Your course enrollment form must be signed by your Chairperson (see below) and approved
by the departments of the courses in which you are enrolling, so don’t wait until the last minute. If your
course enrollment form is not turned in on time, you may have to pay a fee to register for your courses.

As mentioned in the previous paragraph, you need the chairperson of your special committee to sign
your course enrollment form. As a result, you need a chairperson. Special committees are discussed in
more detail in section 1.4, but if you haven’t yet decided on your chairperson then many graduate fields
and departments will allow you to use the Director of Graduate Studies or another faculty member in your
department as a temporary chair. In any case, you should submit a Special Committee selection form (see
section 1.5) to the Graduate School by the time you submit your course enrollment form.

If you show up at the beginning of the summer to start your graduate work, then the situation is
slightly different. You will still have to go through the registration process in the fall, but you also need
to be registered for the Summer. Visit the Graduate School in Caldwell Hall (DE4) to get started. In
the past, new students who begin graduate work in the summer were required pay a registration fee; we
believe that this fee has been eliminated.

Continuing Students

After your first semester, the registration process is considerably easier. Provided that you pay your bills
on time and return your library books, registration for fall and spring is completely automatic. Using Bear
Access (Cornell’s computer system) you can check a program called “Just the Facts” to be sure that you
have been registered for the semester. If you owe money to Cornell or have any other obligations that you
haven’t cleared, then Just the Facts will tell you what they are. After you clear up these holds with the
department that placed them, you may have to go to Caldwell Hall (DE4) or Day Hall (C5) to register.

For continuing students, summer registration still requires a trip to Caldwell Hall (DE4). If you do
not go to Caldwell Hall to register for the summer, then various taxes from which graduate students are
usually exempt will be withheld from your pay.

Continuing students have two choices for Course Enrollment. They can either submit a Course En-
rollment form during the first three weeks of class, just like new students, or they can pre-register with
Just the Facts. Despite the fact that Cornell continues to move towards all-electronic course enrollment,
many graduate students never pre-register. By waiting until the start of classes and filling out a Course
Enrollment form, students can sample classes before they sign up. In the past, the Course Enrollment Form
required fewer approvals than a Drop/Add form, providing another incentive for graduate students to avoid
preregistration; this difference has been largely eliminated, however. Both the Course Enrollment Form
and the Drop/Add Form now require your advisor’s signature and the approval of the department offering
the relevant courses. If you are reasonably sure about the courses that you will be taking, pre-registering
can save you some time and trouble because pre-registration does not generally require departmental ap-
provals. You must first obtain a registration code from your chairperson. Using this code, you can select
your courses in Just the Facts at any time during the pre-registration period for each semester. If you
make a mistake, you can still change your courses during the first three weeks of classes, but you will have
to fill out a Drop/Add form. In addition, pre-registration can guarantee your seat in popular courses not
related to your major.

1.2.2 Choosing Courses

There are lots of factors to consider when choosing a course. Which classes am I interested in? Will this
course help me with my research? Will this course help me get the job I want? These are all important
questions to ask, but they are not the only things to consider when choosing a course.

As was mentioned in our discussion of the course enrollment process, Cornell does not require you to
choose your courses until several weeks into the semester. You can take advantage of this opportunity to
attend several classes to see the professor’s teaching style and find out the content and structure of the
class. These can’t be looked up in a course catalog, of course, and they play a big role in how much you
get out of the course. You’ll want to decide quickly which classes you’ll actually take, though, or you’ll end up trying to do homework in seven classes, and you’ll be behind in all your classes before you’ve even decided which ones to take.

If you haven’t yet decided on a chair for your special committee, then who is teaching the course may be just as important as the subject being taught. Taking classes is often a good way to get to know faculty and let them get to know you.

Each Cornell course is assigned a particular number of credits. The number of credits assigned to a course is generally equal to the number of hours spent in lecture each week. It does not include the number of hours required for homework and study. This number is often estimated at 2–3 times the number of lecture hours for undergraduate courses; for some graduate courses, however, it can be much higher. It is always a good idea to ask other graduate students about specific courses you are considering; they can give you an idea of the workload as well as information on course content and teaching style.

For M.S. and Ph.D. students, 3 courses of 3–4 credits each is considered a workload that will keep you busy. If you are also a teaching assistant for the semester, you may have almost no time left for research. On the other hand, there are exceptional cases in which students have taken 12–13 credits of course-work along with TA responsibilities. Before finalizing your courses, it is a good idea to discuss your time commitments with your committee chair (if you have chosen one) so that both of you know how much time you will be expected to spend on research.

Note that many graduate fields want their M.S. and Ph.D. students to register for additional credits of “Thesis Research” to bring their total credits to 15 each semester. You should check with chairperson of your committee as to whether they would like you to register for Letter or S/U grade for research credits. Various fields have different policies about it and different faculty members may have their own styles.

If you are in the M.Eng. program you are required to take 30 credits of technical classes over two semesters, but that includes 4 to 8 credits of work on your M.Eng. project. So, M.Eng. students are probably looking at 11–13 credits of non-project coursework and 2–4 credits of work on a project each semester. If you are extending your M.Eng. degree work into the summer, then your schedule may be more flexible.

If you have selected a chairperson for your special committee, then it is very important that you discuss the courses you will take with that person. If you are in the M.S./Ph.D. program, then the special committee is usually the ultimate authority on which courses you must take in order to graduate. If you haven’t selected a chairperson yet, then talk to the Director of Graduate Studies in your department and consider meeting with several professors that you are interested in working with to ask for course selection advise.

1.2.3 Residence Units

One semester of full-time study at Cornell counts as one-residence unit. Master’s degrees require at least two residence units, and a Ph.D. requires at least six, two of them after the A exam. Registration during summers can count towards residence units, but there are limitations. See the Cornell Guide to Graduate Study.

1.3 The Graduate Minor

Most fields require M.S./Ph.D. students to complete one or two minors. Usually each minor is a series of 3–6 graduate courses in a field other than the one in which your degree will be granted. Some fields expect the minor(s) to be in a closely related area to your thesis research, and others allow more latitude when choosing a minor. Sometimes the field has no preference, and approval of the minor is entirely up to the chair of the special committee. In many cases, a M.S. degree requires and allows only one minor; Ph.D. programs may require one or two minors. Be sure to check with your Director of Graduate Studies
and your faculty advisor regarding the particular requirements in your area. The list of possible minors is almost endless; some engineering graduate students have been known to minor in modern dance or Russian literature. These are exceptions, however. Your best resource for advice on this is graduate students in your research group or field and the chairperson of your committee.

M.Eng. students generally do not complete minors, but may choose to complete a “program option” which is similar to a minor. Most of the available program options require three courses, and the requirements for each option are fairly specific. If you have any questions about completing a program option, see the director of the M.Eng. program in your department.

1.4 Special Committees

In the Graduate School at Cornell, a graduate student’s “Special Committee” has ultimate power over his/her progress and degree.

Different fields have different requirements and expectations concerning special committees. The graduate school requires that you have an advisor (who also serves as your special committee chair) within three weeks of first registering in the graduate school. In some cases, this may just be a temporary advisor. Some departments assign their Director of Graduate Studies to be every first-year student’s advisor, for example. Then, when you decide whom you want to work with, you can easily change your advisor by filling out the appropriate form. The Graduate School insists that a full committee must be formed by the end of the third semester of graduate study. If you do not form the committee by the end of third semester, your registration for the fourth semester will be put on hold. You will not be able to add or drop courses unless you are registered. Also, if you delay it too much, a fine may also be imposed on you by the Graduate School.

It’s a good idea to start by choosing the chair of your special committee (your advisor) and then get his or her advice before choosing the other members of the committee. For more information on choosing your advisor, see section 1.12.2.

The composition of special committees varies widely. While your committee chair is usually the faculty member you do your research under, there are different ways to select your other committee members. Two models are presented here, but these are not the only options. Every graduate student at Cornell may have slightly different criteria when forming a special committee.

1. Traditional Model

- Chair & Faculty Advisor
- 2nd Member: Faculty member who is familiar with your research area and can offer technical advice and guidance.
- 3rd Member: Minor advisor

2. Professional Development Model

- Chair & Research Advisor
- 2nd Member: Professional Development Mentor (A faculty member, perhaps in your field, who agrees to help with career and professional development not directly related to scientific research.)
- 3rd Member: Minor advisor
- 4th Member: (optional) Faculty member who is familiar with your research area and can offer technical advice and guidance.
In some departments, there may be a requirement of two minors and so, both the other members of the
committee would be representing minors. In this case, you may add one more member for help on career
and professional development and/or for technical guidance.

The special committee is responsible to ensure that the requirements of the field are being fulfilled.
These requirements could be course, minor, or grade requirements. The Graduate School does have some
regulations but it does not have any specific course or other similar requirements. The primary objective
of the special committee is to make sure that the candidate attains the desired level of independence in
scholarship.

Even though there is no such obligation, you should try to arrange regular meetings of the whole
committee from time to time. Such meetings ensure proper and timely communication. If you have more
than one faculty member in your committee who can understand the technical details of your work, then
such meetings may generate new ideas or may warn you of certain overlooked aspects. Such meetings can
also ensure than your current project(s) and activities are commensurate with your professional goals.

The Graduate School is very flexible about the reconstitution of the special committee. So, if you are
not satisfied with it, you can reconstitute your committee any time. However, after your A exam if you
decide to replace a non-chair person in your committee, you will have to petition the Graduate School.
Normally, such permissions are granted. For Masters’ students, a petition is required for committee changes
less than 3 months prior to the thesis defense.

Changing your chair is more complicated. You may have to start your work from scratch on an
altogether new topic, especially if no other faculty member is interested in working on the same topic. In
particular, if you are in an advanced stage of your program, try seriously to sort your differences with the
chair person before you finally decide upon the change. Read Section 1.12.2 for more information about
the factors you should consider before you decide to change advisors.

If a member of your committee leaves Cornell, he/she can still remain as member for at least one more
year. You need to petition the Graduate School for longer durations. If the chair decides to leave Cornell
or goes on a sabbatical, you may decide to accompany him/her. To do this, you may need to take a “leave
of absentia” from the Graduate School. To take a leave of absentia, the Graduate School requires you to
have spent at least two residence terms at Cornell for a Ph.D. student and at least one term for the M.S.
Students. The duration of “leave of absentia” should be less than two residence units. In both the above
cases, as usual, exceptions are permissible but require petitioning the Graduate School. Other possible
options could be to take a “leave of absentia” and do work outside or stay and work here and take the
guidance of another faculty member.

In some departments, the field appoints a member to committees. Ph.D. students can choose three
other members (and Masters two other members) to complete the committee. If the student so desires, a
field appointed member can be the third member in his committee. It is the prerogative of the student to
decide whether the field appointed member serves on the committee throughout the program or just sits
for the exams.

### 1.5 Graduate School Forms

As you probably expect, you will need to fill out forms during your time in graduate school, but the number
and details of the forms will depend on your degree program and the path you take to get your degree.
This section provides general information about some of these forms, and is divided by type of degree
program. For more information, go to the Graduate Records office in 150 Caldwell Hall (DE4) or check
out the graduate school website at [http://www.gradschool.cornell.edu](http://www.gradschool.cornell.edu). In addition, read through the
Guide to Graduate Study (a small red booklet put out by the Graduate School) for printed documentation.
Finally, you might also want to attend one of the sessions (held in October and June by the Graduate
School Thesis Advisor) which discuss the forms and formatting needed for theses and dissertations.
CHAPTER 1. ACADEMICS

Note: There is a good chance the forms you need to fill out will change (the graduate school does update them from time to time), so make sure you have the most recent version of each form. All forms can be obtained from the Graduate Records office in 150 Caldwell Hall (DE4) or downloaded in .pdf format from the website listed above. If you find a blank form lying around in your office, don’t just assume that it is the current version, since it may be out of date. In addition, if you have questions about forms at any time, check with the graduate school. You can save yourself lots of wasted time if you check with them first before filling out the form incorrectly or filling out the wrong form entirely!

1.5.1 All Graduate Students

All graduate students must fill out a Special Committee Form within the first three weeks of their first semester in the graduate school, listing at least a Committee Chairperson or temporary advisor. If necessary, this advisor can easily be changed later with the submission of a new committee form. It is important to realize, however, that the first version of this form must be filled out shortly after you start at Cornell. If you forget to fill out your form, you’ll be contacted by the Graduate School! Furthermore, the Graduate School will not process your first semester course enrollment form until your Special Committee Form has been received. In filling out the Special Committee Form, you should consult the list of “Fields of Study, Subjects, and Concentrations,” available in 150 Caldwell Hall (DE4) or from your Graduate Field Assistant.

To maintain student status for a given semester, you must be registered for that semester. As a registered student, you will pay tuition (or have it paid for you) and you will be granted access to University facilities, such as the library system. As explained in Section 1.2.1, you will need to register in person your first semester at Cornell, but will be automatically registered for the subsequent semesters if you have paid your Bursar bills and have no “holds” on your registration. You must, however, register in person each summer that you want to maintain student status. This involves filling out a Summer Graduate Registration Form in 150 Caldwell Hall (DE4). If you are not planning to register for a given semester, you need to file a Leave of Absence Form. Check with the Graduate Records Office in 150 Caldwell Hall if you have any questions about leaves of absence.

1.5.2 M.Eng. Students

In addition to the Special Committee Form, M.Eng. students must fill out a Degree Information Card. It’s not complicated to fill out, but the catch is that it must be typed, so make sure you find a typewriter. Many departments have typewriters available for this and other such purposes, and the Graduate Records office in 150 Caldwell Hall (DE4) has several as well.

1.5.3 M.S. Students

The Special Committee for M.S. students requires at least two committee members and must be finalized by the end of the second semester. This means that by that time you need to have chosen at least a chairperson and a minor member (representing your chosen minor field). You can make changes to the Special Committee Form as necessary until the end of the second semester, but every time you make a change, you must file an entirely new form, with all new signatures. You may also have more than two committee members on your committee if you want.

When you are ready for your final master’s defense, you can obtain a Final Defense Packet from the Graduate Records Office in 150 Caldwell Hall (DE4); just ask them for the M.S. Final Defense information. This yellow folder contains all the necessary paperwork you need for your defense. You will need to fill out a Schedule of Examination Form at least seven days before the exam is to be held, in addition to a typed Degree Information Card. You should bring a copy of the Results of Examination Form to the exam itself.
so that your committee members can sign off on the results. Don’t forget to submit this form (with all the required signatures) to the Graduate School no more than three working days after the exam. Note that your entire Special Committee (consisting of all members that were listed on the special committee form) needs to be present at your master’s defense; if any member cannot attend, you must obtain a proxy (from the same graduate field) to attend instead. If you have questions about proxies, consult the _Guide to Graduate Study_ or ask at the Graduate Records office.

### 1.5.4 Ph.D. Students

The Special Committee for Ph.D. students requires at least three committee members and must be finalized by the end of the third semester. In other words, by this time you need to have chosen at least a chairperson and two minor members; you may have additional committee members if you choose. You can make changes to this form without a petition until you have taken your A Exam, but each time you make a change, you need to fill out a new form and obtain all new signatures. You do NOT need the signature of an outgoing committee member to make this change, only the signatures of all members of your new committee. If you need to make any changes after you’ve taken your A Exam, you should consult the Graduate Records Office (150 Caldwell Hall (DE4)) to see if you need to file a petition.

To take and pass your A Exam, you will need to fill out a Schedule of Examination Form at least seven days before the exam is to be held. To the exam, you should bring a copy of the Results of Examination Form so that your committee members can sign off on the results. Don’t forget to submit this form (with all the required signatures) to the graduate school no more than three working days after the exam. Note that all the members of your Special Committee must be present (or represented) at your A Exam (minimum of 3 graduate faculty present); if any member cannot attend, you must obtain a proxy from the same graduate field to attend instead. For questions about proxies, consult the _Guide to Graduate Study_ or ask at the Graduate Records office. If you are awarded a Special Masters at your A Exam, you will also need to fill out a Degree Information Card, which must be typed.

Before scheduling your B Exam, pick up a Final Defense Packet from the Graduate Records office in 150 Caldwell Hall (DE4); just ask for the Ph.D. Final Defense information. As for the A Exam, you will need to file a Schedule of Examination Form at least seven days before the exam as well as a Results of Examination Form within three days after the exam. You will also need to fill out (i.e. type) a Degree Information Card, and submit it along with the Schedule of Examination Form. All these, plus additional information, are included in the Ph.D. Final Defense packet.

### 1.6 Teaching Assistantships

Many graduate students at Cornell are supported through teaching assistantships. With a teaching assistantship, you are expected to perform duties associated with the teaching of one or more university courses. These duties may include grading, teaching one or more recitation sections, or teaching laboratory sections.

Cornell offers variety of opportunities to get formal training in teaching and has resources dedicated to educational issues and research on campus. The following programs offer excellent professional development opportunities and we think everyone — whether you are interested in teaching as a career or not — should review what these programs have to offer.

#### 1.6.1 Engineering TA Development Program

A teaching assistantship (TA) is an invaluable experience in graduate life. It is not only a first stepping stone for those interested in making a career in academia but also acts as a platform for the development of a variety of skills such as public speaking, presentation techniques, and diversity awareness which are greatly sought by today’s industry. With this in mind, the College of Engineering offers a TA development
program that encompasses different aspects of being a TA. This program is offered in both the fall and the spring.

Chances are, if you are going to be a TA, your department will require you to participate in the TA development program. If, however, you are not a TA your first year and become one later, or are simply interested in this material, contact Patricia Spencer (ps54@eng.cornell.edu) to enroll in the next available session. Her office is in 167 Olin Hall (C5–6).

If you have any other questions and/or concerns about teaching, feel free to contact the Center for Learning and Teaching. Direct your questions to either Dr. Virleen Carlson (vmc3@cornell.edu, 255-8427) or the TA fellows from the development program.

For more details of this program and for useful hints and educational material on teaching please visit the website of the Engineering TA Development program at <http://www.engineering.cornell.edu/GradTAdev>.

History and Goals

Over the past ten years, the College of Engineering teaching development program has evolved from an optional lecture series run by faculty members to mandatory workshops facilitated by experienced engineering teaching assistants. All new TAs must complete the College of Engineering TA development Program and/or the International Teaching Assistant (ITA) Program as a condition for receiving their salary. TAs can get credit for their successful participation in this program by registering for a one credit Teaching Seminar (ENG 678). Currently, 150–200 TAs are certified each year. The training programs are conducted twice a year — once each in the fall and spring semesters. This workshop series was initiated in 1987 in response to numerous complaints received by the Engineering Office of Undergraduate Programs. The goals of the program have evolved over the years to include not only training TAs for their specific duties but also giving them time management skills, an understanding of University policies, and a broader perspective on teaching. The program has been geared to achieve two key objectives: 1) improvement of quality of Teaching Assistants so as to improve overall quality of Engineering education that undergraduate students at Cornell receive and 2) enrichment of the graduate life experience by formal training in various facets of teaching and highlighting what TAs can gain from teaching experience. The program is structured and conducted in such a manner that the TAs develop a sense of community among themselves and with the training staff and thus have a valuable resource to draw upon as they gain teaching experience.

Program Administration

In its current form, the program is a joint effort of three entities across Cornell. The program is housed in the Office of Instructional and Research Support (OI&RS) in the College of Engineering and is headed by the Lisa Schneider. The program seeks valuable input and relies on expertise in the area of education by interacting closely with the Center for Learning and Teaching at Cornell University. Dr. Virleen Carlson (Assistant Director of Instructional Support in the University-wide Center for Learning and Teaching) brings her vast experience in the field of education and a broader perspective well beyond engineering. The third entity is a group of 8 TA fellows selected by the College of Engineering. One of them is selected as a Head TA Fellow (generally one of the returning fellows). These TA fellows bring their first hand experiences as TAs from the classrooms at Cornell.

1.6.2 University TA Development Workshops

In addition to the College of Engineering TA development program, University-wide TA development workshops are also available to all graduate students. These are one-day workshops offered by the Center for Learning and Teaching in both the fall and spring semesters. Some topics of past workshops are managing stress and time, creating a teaching portfolio, constructing a classroom presence, and facilitating
discussions. With sufficient experience, you may even get the chance to be a volunteer facilitator for these workshops. Workshops often include free lunch and more importantly a great chance to meet people interested in teaching from all across the campus.

Direct your questions about this program to Dr. Virleen Carlson (vmc3@cornell.edu, 255-8427), Assistant Director of the Office of Instructional Support. Her office is in room 415 at the Computing and Communications Center (D4).

The Office of Instructional Support also publishes a handbook for teaching assistants at Cornell, which is free when you sign up for a TA development workshop (engineering or university-wide), or can be purchased for $1.50.

1.6.3 Course on Effective College Teaching

If you are considering a career as an instructor, you may be interested in taking Effective College Teaching, EDU 548, a course taught by the Education Department at Cornell. This course is offered for 1–3 credits in the spring and as an intense one-week course over the summer as well (typically in the second or third week of June). The course focuses on helping you improve your teaching via reflection upon teaching/learning styles, motivations, and techniques. You will learn how to design a course, plan a class session, and create a portfolio of your teaching experiences.

1.7 Research Assistantships

A research assistantship (RA) is another important form of financial support available to graduate students in the College of Engineering.

Research Assistants normally work on projects under the guidance of a Principal Investigator. This person is typically a professor in the College of Engineering; graduate students usually work for their thesis advisors. Each student should discuss his or her duties as an RA with the advisor.

The projects on which research assistants work are typically funded through external agencies like NSF, DARPA, and a variety of industries. Many times the nature of duties can depend on what the funding agency expects and in what timeframe. One should get all the necessary details before accepting such a position. Generally, the appointments of RAs are for a semester or an academic year. Students should discuss issues related to the exact duration of an appointment and associated vacation during the period of appointment with their advisor. As a University policy, the average workload for such an appointment is 15–20 hours a week.

In most cases, graduate students are appointed as RAs on a research project the results of which go into their thesis and thus contribute towards their Ph.D. In such cases it seems realistic to expect that such graduate students should work more than 20 hours a week. This is especially true in case of graduate students in advanced stages of their Ph.D. (e.g. after passing their A exam). Keep in touch with your advisor regarding the progress in your research. If you feel you are overworked, you should talk to your advisor to try to identify the most important issues your research should address. Many times overwork is a result of different perspectives and lack of communication between the two parties involved — the graduate student and the advisor. A typical research project demands quantifiable results in a definite timeframe and periodic reports; you are as responsible for these as your advisor is.

Under no circumstances can any Research Assistant be expected to do personal work for their advisor or project leader. It is inappropriate for the person in charge to even ask for it. If you feel you are doing “non-research” related work for someone else, first try discussing it with the person. If the problem cannot be resolved amicably, take it to your advisor or other committee members if you can, and then to the DGS. Beyond that, see section 3.7 for further pointers.

A “Research Assistantship” is sometimes known as a “Graduate Research Assistantship.” The nomenclature seems to differ between departments. Both, however, are substantially different from a “Graduate
Assistantship” (GA). In general, a GA is a part time job on the Cornell Campus that may or may not have any relation to your department and/or field of study. For example, various offices on campus need technically qualified students for certain administrative work; specifically, Cornell Information Technologies might need consultants for their “Help Desk.” Also, some departments have “Graduate Assistantships” which are scholarships without any expected work in return. These are offered to first year students in some departments so that first year graduate students can concentrate on course work and don’t have any additional responsibilities (like teaching). However, these differ from some fellowships in that tax is withheld from GA stipends.

1.8 Fellowships

The final way in which many graduate students are supported is through a fellowship. A fellowship differs from an assistantship in that students who hold a fellowship are only obligated to complete coursework and research related to obtaining their degrees. Many fellowships do have strict rules regarding the amount of outside work which a fellow may undertake. In addition, depending on the funding agency, fellows may be required to make periodic progress reports. To get more information about what fellowships are available (both university funded and externally funded) the grad school has a nice webpage at <http://www.gradschool.cornell.edu/grad/financialaid.html>.

Although taxes are not withheld from fellowships paid to some U.S. students, fellowship stipends are taxable income! Consult IRS publications and Cornell’s payroll office for more information.

1.9 Career Planning

1.9.1 Career Services

The College of Engineering has its own “Engineering Career Services” whose office is located in Carpenter Hall. When we contacted the director, Mark Savage, he told us the following:

“The main thing I want graduate students to know is that they are welcome to use the services of the Engineering Career Services Office, including advising, resume critiques, job search/interview strategies, offer negotiations, and on-campus recruiting interviews. There is a rumor out there that graduate students (especially Ph.D.s) cannot use these services and they are more or less on their own, and that is incorrect.... [Our] office has traditionally had grad students on the order of nearly 50% of our registrants. We don’t get a lot of opportunities for those who do pursue academic careers, but we get some and can email those to students registered in our database.”

A summary of some of the services offered by this office is given below.

- A resume book is prepared by Career Services each summer. If one plans to graduate by August 2004, one must submit a resume to the office by July 15th 2003 for publication in the 02–03 resume book. The book is made available to hundreds of employers every year. For specific information about preparing a resume for inclusion in the resume book, contact Career Services.

- Every year a University-wide career fair is attended by more than 200 employers. This fair is generally scheduled around the middle of September.

- “Orientation to On Campus Recruiting” is a program which occurs several times during the first two days of the Fall Semester; graduating students are encouraged to attend this event to register for on campus recruiting opportunities. All services are electronically web-based. Students must sign on to
1.10. GRADUATION

InterviewTRAK to learn about interview opportunities on campus. Two thirds of all job interviews occur during the Fall Semester.

• The Engineering Career Services Office is willing to speak with research groups in the College to address questions regarding job searches.

• The Cornell University Job Search Guide, available from the Career Services office, includes sample resumes, cover letters, and articles about the job search process.

The Graduate School also has a career development office <http://www.gradschool.cornell.edu/grad/students/careers.html> They offer individual career counseling, career development workshops, and career development resources.

In addition to the services provided by the Engineering and Graduate School career services offices, every other August the Engineering Graduate Student Association (producers of this fine handbook) also organizes a workshop on the academic job search. Email egsa@cornell.edu for more information. From time to time, the Big Red Barn and the Graduate School also hold career-related workshops and programs.

1.9.2 Publications to Help With Career Planning

Graduate students pursuing a Ph.D. have found the American Directory of Research & Technology (corporate research labs) to be a very useful publication. The Engineering Library has the most recent edition.


1.9.3 Understanding the Process

Job searches vary between fields and types of positions being sought. However, most job searches have a few basic components in common. We summarize these below to give you an idea of what is ahead of you. However, the best preparation for a job search is to talk to your advisor, other graduate students who have already started (or finished!) their job search, or someone at career services.

When embarking on a job search, you’ll probably be expected to provide most or all of the following for each position for which you apply:

• Resume or CV

• Personal/Research Statement

• References

For an interview, it may be necessary to prepare a job talk, particularly if you are interviewing for an academic position. You should also make sure that you have determined what questions you want to ask, and what factors will weigh for or against a job before you go on an interview.

Finally, most job searches end with a period of negotiation between you and your future employer. You should ask your advisor or colleagues about what aspects of the offer are likely to be open for negotiation in your field and for the specific position you are pursuing.

1.10 Graduation

Cornell awards degrees in August, January, and May each year. The commencement ceremony is in May, usually on the Sunday of Memorial Day weekend. Students who will have finished their degree requirements
by the end of August are eligible to take part in the ceremony. If you finish the requirements before
the graduate school sends out the graduation information (usually mid February) you will automatically
receive the information. However, if you plan on finishing between February and August, you must go to
the Graduate School and request the information. You must finish your requirements before the end of
March to have your name printed in the graduation programs. The programs automatically contain the
names of student who received degrees in the previous January and August.

One of the things the graduation information packet includes is info on getting your robe. M.S./M.Eng
graduates can rent a black robe for about $12. The robe is similar to the undergraduate robe, but nicer
with the special hood. Ph.D. graduates have the special privilege of wearing a red robe which can be rented
for about $46. Graduates going into academia will want to consider buying their robes, which cost about
$700.

The information packet will also contain lists of all the activities happening during graduation weekend.
There’s lots of stuff for your parents and family to do!

For ceremonies, there is a university ceremony, department ceremonies, and a Ph.D. ceremony. The
university ceremony starts off with all graduating students lining up on the Arts quad (Ph.D. students in
front, JGSM and Law students next, Vet, Masters, and finally all undergrad seniors). The procession then
marches through campus to the football stadium. As long as the weather is nice, the ceremony takes place
outdoors in the stadium. If the weather is bad, the ceremonies are moved indoors. Due to limited indoor
seating, graduates are only allowed 4 guests (tickets given in graduation information packet). Note that
the tickets are ONLY important if the weather is bad, otherwise you’re allowed as many guests as you can
bring.

If you receive your diploma at graduation, then you will receive it at your department ceremony. Larger
departments have separate ceremonies for graduates and undergraduates whereas the smaller departments
combine the two.

The Ph.D. ceremony is usually held on the Saturday of commencement weekend in the late afternoon.
It is open to all Ph.D. grads, parents, and friends. The ceremony is much smaller than the university one.
In addition to speeches by the Grad School Dean and guest speaker, each student is called onto the stage
and gets to shake hands with the Grad School Dean and university President.

As a final note, if friends and family are planning on coming to watch you graduate, you should warn
them to make hotel reservations very early. Since all the undergraduates are also graduating at the same
time, the hotels fill up early. The same thing goes if your family would like to eat out graduation night.
Make reservations early! Another alternative for graduation housing is available in the dorms on campus.
For a small fee per room for the whole weekend, your family can stay in one or more dorm rooms. These
are usually made available sometime in March; they are distributed on a first-come-first-served basis, but
usually the housing department is able to accommodate all requests. Check the commencement information
packet for more information.

1.11 Graduate Fields

1.11.1 What is a Graduate Field?

Faculty who can chair committees for graduate students are divided up into groups (called graduate fields)
based on their research interests. Hence, a graduate field is a collection of faculty with similar research areas.
Not all graduate fields have a corresponding department and not all departments have a corresponding
graduate field. Also, a faculty member may be a member of more than one graduate field. Some faculty
in the Chemical Engineering department (who participates in biomedically related research) are members
of both the Chemical and Biomedical Graduate Fields.

When you apply to graduate school, you apply to a specific graduate field. Your graduate field deter-
mines the specific requirements for graduation. For example, it determines the number of minors you must
complete and what classes, if any, are required.

The graduate field system at Cornell is fairly unique among universities. It gives the university and the College of Engineering flexability, because they can create a graduate field in an up-and-coming area with less hassle and expense than would be required of a full department. If interest in the new area continues to grow, an undergraduate program and an associated department can be created later.

For a more extensive discussion of graduate fields, and a complete list and description of the Engineering Graduate Fields at Cornell, see Chapter 2.

1.11.2 Director of Graduate Studies (DGS), Director of M.Eng. Program, and Graduate Field Assistant (GFA)

Each graduate field has a Director of Graduate Studies, known as the DGS, who is responsible for M.S./Ph.D. students in his or her graduate field. The office of the DGS is responsible for maintaining graduate student records, processing applications and admissions decisions, and completing other administrative tasks. The DGS is a useful person to know if you wish to change student status, change your Special Committee, or get an opinion on any issue that you don’t want to take to your own committee members for any reason.

The Director of the M.Eng. program in each department serves in a similar capacity for M.Eng. students.

The Graduate Field Assistant (GFA) for each graduate field is the administrative assistant who assists the DGS and Director of the M.Eng. program with their respective tasks. The GFA in your field is a very important person to get to know; he or she can often serve as a helpful first point-of-contact for many questions and problems. In most fields, the same GFA serves both the M.Eng. program and the M.S./Ph.D. program.

1.12 Managing a Graduate Career

There are as many strategies for approaching graduate school as there are graduate students, and no one route is right for everybody. However, we’ve put together some general suggestions and tips on managing your graduate career that should at least point out some of the questions to ask yourself and pitfalls to avoid.

1.12.1 Being A Successful Grad Student

There is no perfect formula for negotiating graduate school. However, many people have thought about and written on this topic, and there are some common themes that everyone who has gone to graduate school seems to focus on. We’ll summarize a few of these themes here, and give you some pointers to places to get more information.

Obviously, choosing an advisor, and to a lesser degree a special committee, is pivotal in determining your experience as a graduate student. We discuss some factors in making these decisions in sections 1.12.2 and 1.4. After you have chosen an advisor, though, what else should you do to start your graduate career out right? We offer the following advice:

- Read a lot. This is particularly important in your first few years. Keep notes on the papers you read, summarizing the questions they answer, their contributions, and their shortcomings.

- Keep a research journal, with dates and details of your original work. Most graduate students are never faced with having to justify that their work is their own, but it is wise to protect yourself. It will also be useful when you are writing papers or your thesis.
• Don’t be afraid to try new things. This could mean pushing your research in a new direction, taking the time to learn about a topic that might not seem directly related to your work, or even deciding to pursue a different thesis topic than the one with which you started.

• Manage your time. Set regular appointments with your advisor. Set goals for yourself throughout the week. Avoid trying to cram all of your research into the night before a meeting with your advisor.

• Find a mentor. Whether it is your advisor, another committee member, or even a faculty or researcher from another department, having a source of advice and support is invaluable.

It is also important to plan your graduate career, rather than just letting it carry you along. Keep in mind what your career goals after graduate school are. If you want to get an academic job, you might want to look into some of the teaching courses or workshops that Cornell offers (see section 1.6), or try to get extra teaching experience. You can also use summer positions to gain experience that may not be easily available within your research group.

While summers in Ithaca are beautiful, the summer is also often a good time to get outside experience, working in industry or at a research lab, or visiting a group at another university. Many Ph.D. students find that in their final year or two they prefer to focus on their thesis than to spend time away from Cornell, so you may want to look for a position elsewhere during your first couple of summers.

Most advisors are very supportive of their students and want them to succeed. However, advisors do not always have the same priorities as their students. The more you communicate your goals to your advisor, the more they can help you. Ultimately, it is your responsibility to make sure you get as much out of graduate school as possible.

1.12.2 Choosing an Advisor

Choosing your faculty advisor is probably one of the most important decisions you’ll make for your graduate and research career. There are a number of books and articles written for graduate students that give advice about this crucial choice. We have summarized Cornell’s rules and regulations about the advisor and the special committee in sections 1.4 and 1.5. Now, some advice on how to make a good choice.

Cornell requires that you have an advisor within three weeks of first registering in the graduate school. In some cases, this may just be a temporary advisor. Some departments assign their Director of Graduate Studies to be every first-year student’s advisor, for example. Then, when you eventually decide who you want to work with, you can easily change by filling out the appropriate forms. Your advisor serves as the chair of your special committee. (See Section 1.4.)

While choosing an advisor, you should consider several factors: research interests, type of research projects, seniority, relationship with past students, usual time it takes to graduate while working with him/her, how much independence his/her students enjoy, type of funding offered, etc. Then think about your own needs and expectations. It may be difficult to find a faculty who would fulfill all of your expectations so you may have to find a balance. Different people give different weights to different factors and so the decision will have to be your own!

To find more about a faculty member’s research, you should attend any seminars they give, take/audit courses they teach, and read the papers written by them in past. If you need more clarification, go talk to them. Remember, this is the beginning of a research career for you and you should really feel interested in your work. Besides, by attending classes taught by them or their talks, you will get a chance to know them better.

Regarding seniority, here is an excerpt from “How to be a Good Graduate Student” (a URL for this article is provided in the last section of this chapter):

“How long have they been on the faculty? There are advantages and disadvantages to being one of the first members of a new research group. On the positive side, you often have more
freedom to choose your research topic and to influence the direction of the group’s research. On the negative side, you may be more isolated (since there won’t be older graduate students in the group), and your advisor won’t have as much experience. . . .”

One thing to keep in mind is whether your potential advisor has tenure or not. There are advantages and disadvantages to each choice.

First, junior faculty have vast incentives to produce a lot of high-quality research. Thus, it probably won’t be hard to find a project. On the other hand, as junior faculty they are highly motivated to promote their own work. Tenured faculty may have a bit more flexibility and may be more inclined to let graduate students take the lead in research. Senior faculty, however, are not always as prolific as in their pre-tenure days, and therefore you may have to be more assertive about getting publications out and projects underway. Senior faculty generally have more “clout”, both in their research area and in their departments. It never hurts to have a senior faculty member’s backing throughout your graduate career — if not as your official advisor then as a mentor. Junior faculty are often very enthusiastic and are often actively looking for graduate students to work with.

To find out more about the relationship of faculty members with their past students, talk to the senior students and recent graduates. You should be asking questions about the nature of their interactions (how often and whether collaborative or not) and level of independence they enjoy(ed) while working with them. Ask about the average time their students take to graduate. How much interest do they take in finding a topic for their new students? Also ask about the quality of the research they do, how helpful they were in job searches, the kind of reputation they enjoy in academia and industry, etc. If you are interested in an academic position after graduation, the reputation of the advisor may be important; many in academia believe that a student will possess some of the qualities of the advisor that he/she worked with.

Type of funding you may get while working with a faculty member is also important. If a faculty member does not get a lot of research grants, then you may have to rely on teaching assistantships and you may not get as much time to focus on your research.

Even if you were careful while choosing your advisor, it’s quite possible that after some time you may find it difficult to work with him/her. Your advisor may lack the technical knowledge to help you, may not be very accessible or interested in your work, may not have a positive attitude, and, in some extreme cases, may try to harass you. In such cases, it may be advisable to consider changing your advisor. Obviously, you should not make such a decision in haste: changing advisors could mean restarting your research from scratch. Sometimes, it helps to let the faculty member know politely when your expectations are not met; talking may eliminate your grievances. You may also want to use one of the resources mentioned in section 3.7; in many cases, you may be able to find a less-drastic solution than changing advisors.

1.12.3 What is a Thesis?

The content of a thesis or dissertation varies widely depending on the faculty member who serves as your advisor. Remember, it is primarily your advisor who will decide whether or not your “writing” is acceptable as a thesis or dissertation.

Within the college of engineering itself, there are variety of thoughts and practices on this matter. One of the opinions is that each chapter (with the exception of introduction and conclusion) of your thesis/dissertation should be a publication in a refereed journal. Other advisors think that the thesis/dissertation should be a unified and coherent presentation of your research.

Your best bet is to talk to your advisor and look at a thesis or dissertation of someone who has graduated from your research group in the recent past to get a rough idea of what is expected.

Although what goes into a thesis or dissertation and in what order is a matter of taste (yours and your advisors), the Graduate School enforces a certain level of consistency among all theses and dissertations at Cornell. Before starting to write or compile your thesis, it is definitely a good idea to read the Graduate
School's guidelines for theses and dissertations. These are available in booklet form from Caldwell Hall (DE4) or on the web at <http://www.gradschool.cornell.edu/grad/students/thesis/intro.html>.

Checking the guidelines ahead of time will help you avoid any major formatting changes later. Talk to your advisors and peers about how to be more efficient in this process.

In addition to the published guidelines, a member of the staff of the graduate school is responsible for checking and approving the format of all theses and dissertations submitted at Cornell. This person must approve the format of your thesis before you submit it, but the thesis advisor also has regularly scheduled office hours to help you ensure that you are meeting the thesis/dissertation guidelines as you prepare your thesis. It is especially important to see the thesis advisor if you would like to include special graphs, data, or other visuals that do not easily conform to the usual guidelines.

1.12.4 Getting More Information

The advice given here is a brief sampling of what some engineering graduate students at Cornell think is most important. For a broader perspective, there are many resources on the web about surviving and enjoying grad life. Here is a brief list of sites we recommend:

- Marie desJardins, *How to be a good graduate student.*
  <http://www.cs.indiana.edu/how.2b/how.2b.html>
  Aimed at beginning graduate students, this short introduction is considered by several Cornell students to be the standard work on what it means to be a graduate student.

- Phil Agre, *Networking on the network.*
  <http://dlis.gseis.ucla.edu/people/pagre/network.html>
  Many graduate students don’t realize just how much networking is necessary to begin building a research career. This essay is an excellent introduction to some of the things you need to know about building your research network. It contains an excellent list of references as well. Agre’s stated goal is to get this article into the hands of every Ph.D. student on the planet.

- Ronald T. Azuma, *So long and thanks for the Ph.D.*
  <http://www.cs.unc.edu/~azuma/hitch4.html>
  This is a good article written by a graduate school survivor.

Chapter 9 of this handbook also offers a selection of quotes from Cornell engineering graduate students about their experiences and advice.