

**RUTGERS UNIVERSITY**

**The Facts and Myths Booklet**

**A Helpful Guide for  
Chemical and Biochemical Engineering Undergraduates  
at Rutgers University**

**2003-2004**

# THE FACTS AND MYTHS BOOKLET

This booklet was originally written by Prof. Edmond I. Ko of the Department of Chemical Engineering at Carnegie Mellon University.

We made some changes and added a section on our Co-op program.

We sincerely thank Prof. Edmond I. Ko for giving us permission to use this booklet.

H. Pedersen, Chairperson  
S. Wang, Undergraduate Director

# TABLE OF CONTENTS

<b>Preface</b>	<b>1</b>
<b>Table of Contents</b>	<b>2</b>
<b>Facts and Myths about . . .</b>	
<b>Engineering Education</b>	<b>3</b>
<b>Career Choices</b>	<b>5</b>
<b>Summer Jobs</b>	<b>8</b>
<b>Co-op Program</b>	<b>11</b>
<b>Undergraduate Research</b>	<b>12</b>
<b>Graduate Study</b>	<b>14</b>
<b>Minors</b>	<b>17</b>
<b>Academic Services</b>	<b>19</b>

# ENGINEERING EDUCATION

## **What is the purpose of an engineering education?**

An engineering education provides students with the skills and methodology for applying basic scientific principles towards the design and manufacturing of products and processes. A student acquires technical competence in a discipline, develops good problem-solving skills, and above all, cultivates the desire and confidence to sustain life-long learning.

## **Why is life-long learning important?**

It is impossible to learn everything during your four years of college, not so much because of time constraint but because of the evolution of knowledge. Thus, it is important for you to learn *how to learn*. With a solid understanding of fundamental principles and good problem-solving skills, a well-educated engineer is very adaptive in keeping up with new information and technology. It is equally important for you to distinguish between content and skills. Knowledge, as a collection of facts, is not very useful unless you know how to apply that knowledge to solve problems.

## **Does technical competence guarantee a successful engineering career?**

Technical competence is a necessary but insufficient condition to being a good engineer. To be effective, an engineer must be able to work in teams, communicate with people, and understand the world in which he or she lives. After all, solutions to engineering problems are constrained not only by technical knowledge, but also by other issues related to business, politics, and the law.

## **What can I do as an engineering student to develop these non-technical skills?**

Being aware of their importance is a good start. Some specific steps to strengthen these skills are: working with peers, working in groups, reading extensively (technical and non-technical materials), writing, talking and listening to others, giving talks, and taking your general education courses seriously. In other words, focus on the breadth of your education and strive to become a well-rounded person. There is one caveat; you should develop these skills in addition to, and not in lieu of, your technical skills. Developing technical competence should remain your top priority.

## **Will a degree in chemical engineering restrict me to practice as a chemical engineer?**

It should not. While most engineers start out working in the discipline of their undergraduate degrees, a significant number end up practicing in other disciplines as their careers develop. There is a set of skills that are common to all engineering disciplines. If you learn them well, you should be able to move from one discipline to another after acquiring the discipline-specific language. Furthermore, since chemical engineers get a broad exposure to physical and chemical sciences, as well as to economics and systems engineering, they are often successful in research and development, and in management positions.

**Will an engineering degree limit me to an engineering career?**

Not at all. For example, an engineering education is a good first degree for careers in medicine, law, and business. An engineering student learns to be an analytical thinker, a good problem solver, and a well-rounded individual. These are the traits that will make you successful in many career paths.

**Where can I find more information on engineering education?**

Talk with your advisor and other chemical engineering faculty members. The undergraduate office has articles and pamphlets relating to engineering education. One example is: *What Happens to Chemical Engineering Education?* by E.L. Cussler, University of Minnesota. This pamphlet is taken from: *A Lecture in the Phillips Petroleum Company Lecture Series, Oklahoma State University, Stillwater, Oklahoma, March 1, 2002.*

## CAREER CHOICES

### **What types of jobs can I get with a B.S. degree in chemical engineering?**

The typical jobs would be entry-level positions in production and process engineering at a plant site, technical service (providing engineering advice and analysis to production), marketing (including technical sales), and market development.

### **What are the traditional and emerging areas of employment for chemical engineers?**

The traditional areas are petroleum and chemical industries and emerging ones are electronics, food, pulp and paper, and pharmaceutical industries. These are all specific product orientated engineering areas. There are also opportunities as consultant engineers.

### **What can I do while in school to make myself more *marketable* with a B.S. degree?**

First of all, grades are important. But you also need to develop other important skills, through activities inside and outside of the classroom, such as communication, group and personal skills, and leadership. Make as many constructive contacts with faculty as possible. Try to take a summer job in industry or to do a research project if you are interested in graduate school (see the section on graduate study). Knowing a foreign language is also becoming more important as companies compete globally. Finally, see the section on minors.

### **Do engineers move from one company to another during their careers, or should they consider their first company the place where they will retire?**

If the fit is right, then a person who works diligently can expect a long-term career with one company. However, he or she might have to accept a transfer within a company to different jobs and/or different parts of the country/world.

The climate in industry today is less conducive to one career/one company than in the past. In the past, chemical companies prided themselves on employee/employer loyalty, as long as both sides were doing their jobs. Now, however, we are seeing terminations based on company needs, not necessarily employee faults (although this is hard to discern in every case), and individuals are more willing to accept an offer from a different company to get a promotion. One feature of the law that has enhanced employee mobility from company to company is *vesting* of pensions. Now an employee can take his or her pension to a new company. For some people, moving to a new company is often a way to advance, but making too many moves too fast is viewed negatively.

### **So what are the employment prospects for chemical engineering graduates over the next 5 years?**

A recent trend that is likely to continue is an increasing fraction of graduates find jobs in small and medium companies that produce specific products but not commodity products; many start with small consulting firms. The important point for you to realize is that a

chemical engineering education prepares you for many different career paths. In general, the tenure of a job is about four years.

### **When is a good time to begin interviewing for jobs?**

If you want to increase the likelihood of having a job at graduation, start early and plan ahead. Give yourself plenty of time to put together a resume and submit it to Career Services, Busch Campus Center, early in your senior year. You should aim at having your interviews in the fall semester or early in the spring. See the section on summer jobs about networking and obtaining industrial experience.

### **Can I do research in industry without a graduate degree?**

It is possible but not likely. If a B.S. graduate works in research, he or she will be at a disadvantage when compared to an M.S. or Ph.D. graduate, especially on new projects.

### **Is my career limited in industry with only a B.S. degree?**

It is probably limited in research and may be limited in process design. The limitation is greatest when there is more emphasis on the technical side of engineering than on the commercial side of the business. However, having a graduate degree is always impressive when promotions are considered.

### **It sounds as though I should consider graduate school as an option. Where can I get more information?**

See the section on graduate study. Nationwide, only about 20% of the B.S. chemical engineers go to graduate school. At Rutgers University, that number has fluctuated between 10 and 25% over the last five years.

### **What is the value of an M.S. degree in chemical engineering?**

This is not an easy question to answer because the marketability of an M.S. degree has changed from time to time and has varied among companies. In general, an M.S. degree could be beneficial in a process design or an applied research position. The same recruiter who talks with B.S. candidates also interviews M.S. candidates, while a different recruiter is often sent for Ph.D.'s. This indicates that an M.S. graduate is considered more like a B.S. graduate with greater technical expertise.

### **Would a degree in business, an M.B.A. for example, help my career?**

It would not be helpful for a career in process and project engineering or in research but might be beneficial in technical marketing or in management. An M.B.A., in addition to an engineering degree, is not as desirable as it was 10 years ago. In general, a young engineer would be wise to work at least two years in industry before pursuing an M.B.A.

### **Can I become over-qualified with a graduate degree?**

Yes. You would be over-qualified if your job is close to the commercial/product side and marketing/sales. You may also be over-qualified for process engineering.

### **When is a Ph.D. degree desirable?**

A Ph.D. is desirable for research and development positions, large-scale design, and process research in industry and for teaching positions in academia. Note, however, that traditionally only about 10% of Ph.D. chemical engineers go into college teaching/research; the others go into industry and government. So it is a misconception that you only pursue a Ph.D. when you want an academic career.

### **How expensive is it to get a graduate degree?**

You should not have to pay for a graduate degree, especially at the Ph.D. level. If you have a strong academic record, you should be accepted by a research university that will offer you a fellowship or an assistantship that covers your tuition and a stipend. See the section on graduate study.

### **How is process research different from process engineering? Specifically, why does the former require a graduate degree and the latter does not?**

Process research deals with the design or retrofit of an entire process. Process engineering is concerned with the operation of that process. Both are important functions, but the former requires advanced study because it requires a deeper understanding of basic science and engineering principles.

## **SUMMER JOBS**

### **Are summer jobs in or around the chemical process industries (CPI) only available for junior or senior students?**

This is not necessarily so. All students (freshmen through seniors) should be applying for summer jobs. Sure, your odds are better at gaining jobs that are at higher professional levels as you gain more education, but all jobs in the CPI are important experiences. At the freshman and sophomore level you might be assisting in the quality control laboratory, taking samples for environmental compliance, and doing other similar jobs. Learning how to do these jobs well and asking additional questions to extend your knowledge of the plant or process would be most beneficial professionally. Later in your career, you will be asking others to take samples, carry out quality control procedures, etc., and it is most illuminating to have observed it first hand to appreciate what it takes to accomplish these tasks well.

### **What type of summer jobs are there for undergraduate students?**

It depends partly on the organization for which you are working for and partly on you. You are not likely to be given the most exciting and satisfying jobs in your first summer experience with an organization. You are probably not educated or experienced enough to handle many assignments. It is really hard to design a summer job assignment that can be completed in about three months and have a large and satisfying impact on the organization. However, you can make a big difference in the satisfaction you derive from the job by working hard and seeking out other jobs or tasks that seem interesting to you. An appropriate amount of initiative is often very much appreciated.

### **Are summer jobs a good pathway for gaining permanent job positions?**

This is definitely true for industrial summer jobs, especially in hard economic times when the number of people hired is low and the cost of recruiting is being reduced. If you have been a summer employee with a company, they have gotten to know you and you them. This reduces the risk of either party not being happy in the critical first year of employment.

### **How can I find a summer job?**

Looking for summer job postings in the department office or in Career Service, Busch Campus Center, is a good start, but a large majority of summer jobs are obtained by extensive *networking*. Networking is the activity that involves letting lots of people (professors, family, classmates, friends, church members, professional society members, etc.) know that you are very seriously searching for summer employment. Searching the want ads is another surprisingly successful way for finding summer jobs. All of these activities require a large dose of get-up-and-go, self-promotion, and general good salesmanship. Gather up your courage, get your self-confidence fired up, and don't take no for an answer. It is also important that you do not wait until the last minute to start looking. You need to make networking contacts throughout the year. Consider the Job Fair (organized by Career Services) and other similar business fairs as important contacts

for even more links. Begin working in earnest early in the spring semester towards finding a summer job.

### **How well can I expect to be paid?**

Again, it depends on the industry. The larger organizations tend to pay slightly higher; the general range is \$15 to \$20 per hour. Salary is important but not as important as the experience. You should consider trading \$5/hr for a better experience if you can accept the financial consequence.

### **Should I look for summer jobs in large corporations or small firms?**

It really does not matter because you can get valuable industrial experience in both. On the other hand, companies of different sizes do have different work cultures. So if you are lucky enough to have the opportunity to work in small and large companies in the summer, you will have a better idea of the kind of environment you would prefer for a permanent job.

### **Should I only look for summer jobs that are close to home?**

Having a summer job near home brings certain advantages, the most obvious of which is that you can save some money by living at home. But many larger companies that offer summer jobs away from home help students find housing, organize summer employee activities, etc. Since you really should seek out the most rewarding experience, both personally and professionally, you should not restrict your job search geographically unless you have a special need

### **Will I be able to get a good idea of what a career in industry will be like from my summer job?**

It will give you a glimpse of the types of things that a full-time professional might do. These views can be very illuminating and can change your career direction. You will be viewed very differently as a summer employee than as a permanent employee and a stay of about three months is not normally long enough to understand the dynamics of the organization or the profession. If you really love it or really hate it, wait a year and check back. Things change.

### **Is my resume key in gaining a summer job?**

The most important item is your network contact, the person or persons who will link you to the organization. Your resume is important and should be prepared carefully and separately for each job position. Your resume should be shaped to stress your strengths as they relate to the company and the job position. If you don't know about the company and job position, then get to work and find out. Call the company and get their literature. Try to use your network contact to find out more about the job. Go to the library and read about the industry that the company serves. Read in depth about the technology that is important to the company. This is hard work but it makes a big difference.

### **What other information should be included in my resume?**

Career Services, Busch Campus Center, has sample resumes. Use them as a guide in putting together a draft of your resume; then show it to your advisor or other faculty members for feedback.

### **How should I prepare for a summer job interview?**

The most important part is to show that you understand the industry and the company's goals. It's also important to ask good questions, listen attentively, and indicate that you will be a willing and eager summer employee. Looking good is appropriate but do not get carried away. A business suit or dress is all that is required to show respect for the time that they are giving you in the interview. Call ahead and see if you will be touring the plant and dress accordingly. Again, Career Services, Busch Campus Center, has an informative handout on interviews.

### **Are there summer job opportunities other than industrial positions?**

There are summer research internships in university and government labs. In recent years, many of our students have found such jobs in fields other than chemical engineering and at other universities, so do not limit your search. The search strategy is actually similar to that for industrial jobs: network, start early, and look aggressively. A research position in a university usually pays less than in industries (in the range of \$8 to \$15 per hour) but would be helpful to students who are interested in graduate study. If you are unable to land a technical summer job, look for a non-technical job, and try to take a manager or assistant manager position instead of just clerking. Managerial experience and ability are very attractive to recruiters from industries when you are looking for a permanent position in your senior year.

# CO-OP PROGRAM

## **What is a co-op program?**

The co-op program is one that allows a student to take an apprenticeship-engineering job in industry at an appropriate time during the pursuit of their B.S. degree in the discipline. The work period is usually between the junior and senior year. The duration of the co-op program is a minimum of six continuous months of employment. Partial credit cannot be issued.

## **What are the requirements?**

The co-op program is different from that of an internship or other kinds of employment in that the co-op program requires: (1) the approval of the Undergraduate Director; (2) good academic standing; (3) a written report from the student upon completion of the co-op work experience; and (4) a brief evaluation of the student's work from the immediate co-op supervisor upon completion of the co-op work experience (the evaluation must be mailed or faxed directly to the Undergraduate Director). Students must complete and return the registration form found in our *Undergraduate Handbook* to the Undergraduate Assistant before special permission numbers will be issued for registration.

## **How many credits are allowed?**

A maximum of six (6) credits are allowed toward the 130.5 credits required for graduation. Students are given six credits (pass/fail) for six continuous months of successful engineering-related work in an approved job. The course numbers for co-op are 14:155:496 and 14:155:497.

## **How do you look for a co-op position?**

You are encouraged to look for the co-op position on your own. However, you can also come to the Department or your advisor to ask for co-op job leads. Co-op positions are posted on our Careers and Employment bulletin board outside room C-226. You can also contact Career Services.

## **Should I participate in the co-op program?**

If you prefer experimental and practical work to theoretical work, and if you like to work with people (or seeking the experience of working with people), the co-op experience is for you. If you need money to pay for your education, participation in the co-op program is a way to help alleviate your financial problems.

## **Can I get a job on campus for co-op credits?**

In general, no. Co-op credits are those earned from industrial jobs. If you are interested in doing research, register for 155:491 and 155:492, the special problems course. These do not count as co-op credits.

# UNDERGRADUATE RESEARCH

## **Why should I consider undergraduate research?**

Research can be an enriching educational experience. You will have the opportunity to learn about research, do an independent project, and interact closely with a faculty member. It is a particularly useful experience for students who are interested in graduate study. On the other hand, not everybody enjoys doing research, so it is a choice each individual student has to make.

## **How do I register for a research project?**

You can participate in a research project in several ways. You can do it for credit by enrolling in either Special Problems (155:491 or 155:492) or the J. J. Slade Scholar Program. The latter however, is only open to juniors and seniors with a cumulative GPA of at least 3.2. You can also do research as a paying job either as a work study or non-work study student. Finally, if you really are interested in the experience, then you can volunteer your service as a research assistant.

## **How many credits can I earn for completing a research project? Can I use these credits to replace required courses?**

This depends on the nature of the project and the mechanism by which you participate in it. You will not receive academic credits for volunteered or paid work. Most students take 155:491 or 155:492 for 3 semester credits. The J. J. Slade Scholar Program requires 6 semester credits beyond those required for graduation, which can be taken in the summer after your junior year or over the two semesters in your senior year.

## **When can I do a research project?**

In principle you can start as a freshman. In reality, most students participate in research in their junior and senior years as the first few chemical engineering courses are needed as a background. Research projects go on during the academic year as well as in the summer.

## **Is there a GPA requirement for research?**

As mentioned above, the J. J. Slade Scholar Program is open only to juniors and seniors who's cumulative GPA is at least 3.2. But, as long as you are in good academic standing, there is no minimum GPA requirement to register for 155:491 and 155:492.

## **How do I find available research projects?**

You can start by finding out the research interests of our faculty from our website: <http://sol.rutgers.edu>. Then contact each individual faculty member regarding any open positions.

### **Can I work on the project I want?**

As much as we would like to accommodate all interested students, we do have limited resources so a student may not get his or her first choice or may not get a project at all. However, you should realize that you could learn the methodology of research by working on any topic and in the past the majority of students who are interested and persistent have found a research position.

### **What criteria do professors use in choosing students for research? Do they vary from one professor to another or is there a departmental policy?**

Each professor might have a different set of criteria depending on the nature of the project. By and large we are looking for students who are responsible, motivated, diligent, and enthusiastic. This is why it is important for you to have an interview with the faculty member you are interested in working for.

### **What are the procedure and academic requirements for participating in a project?**

After you have found a faculty member who is willing to supervise you, you should discuss with him or her the nature of the project, the number of semester credits that you will be earning, and the criteria for grading. Usually, you are required to submit a written report at the end of the project.

### **Where can I get additional information?**

You should feel free to talk to your academic advisor or your course instructors. Another excellent source of information comes from juniors and seniors who are doing, or have done, projects. Ask them to share their experience with you so that you can make an informed choice.

# GRADUATE STUDY

## **Why should I consider attending graduate school?**

As an undergraduate, you learn about chemical engineering principles primarily through course work. In graduate school, even though you will continue taking some advanced courses, the primary objective is for you to become an independent researcher. In other words, a graduate education is different in scope from, rather than a continuation of, an undergraduate education. One way to look at this is that you absorb knowledge as an undergraduate, but you create and disseminate knowledge as a graduate student. Consider going to graduate school if you are interested in a career in research and development or teaching at the college level.

## **Is there a minimum GPA requirement for attending graduate school?**

Most chemical engineering departments will not consider applicants with a GPA below 3.0. A GPA of at least 3.5 is usually required for admission to the top 10-15 schools, but the GPA is not the only criterion for admission. Other important factors are the Graduate Records Examination (G.R.E.), strong letters of recommendation, and research experience.

## **Which schools should I apply to?**

The best source of information is our faculty, your academic advisor, and your course instructors. It is a good idea to ask several different faculty members for their opinions. The chemical engineering academic world is fairly small, and the faculty have a pretty good idea of what is happening at a number of universities. They also have a sense of what schools might be best suited for you.

## **How do I get information from different schools?**

The American Chemical Society Directory of Graduate Research is a good reference for chemical engineering departments, as well as chemistry and biochemistry departments. It lists the faculty members of each department with a brief synopsis of each faculty member's research interests. Important data, such as department addresses and phone numbers, are also listed. Write to the director of graduate admissions for each department in which you are interested and ask for the department's guide to research and graduate studies. Each year the Chemical Engineering Division of the American Society for Engineering Education publishes a graduate education issue listing all graduate programs. A copy is available in the Department Office.

## **When is the appropriate time to start the graduate school application process?**

Begin collecting information (research guides, applications) the beginning of the fall semester of your senior year. Some people begin contacting schools for information in their junior year, but keep in mind that you will not receive the most up-to-date research guides. However, it doesn't hurt to start early. Each university will specify an application deadline, typically in January. Most chemical engineering departments require the general G.R.E. exam, and a handful require the engineering G.R.E. exam. Be sure you are aware of the requirements of every department to which you intend to apply. The G.R.E. exam can be taken in your junior or senior year and can be repeated. Most students take it in October of the senior year.

**How many schools should I apply to?**

You should apply to one or two *dream* schools, one or two that you have a good chance of being accepted, and one or two *fallback* schools. So, five to six is a good number.

**How easy is it to get financial support?**

Admission to a Ph.D. program is usually accompanied by an offer of financial aid. Financial aid includes tuition and a stipend for living expenses and ranges from \$1300-\$1800 per month. The amount can vary quite from one university to another. Some universities offer small *signing bonuses* as incentives, but they amount to very little when averaged over the four or five years of graduate school. Some prestigious fellowships are available, including ones from the National Science Foundation.

**Should I apply to a M.S. degree program first?**

Most chemical engineering departments have de-emphasized their M.S. programs because it takes several years for a student to learn about research and to solve a significant problem. Some departments even discourage M.S. applicants by offering these applicants either a program that involves no research or a lower stipend (if any at all) than to Ph.D. students. If you are indeed uncertain about whether you want a Ph.D., you should discuss your situation with the person who is in charge of admissions in a particular program and seek his or her advice.

**Should I consider a Ph.D. degree if I am not interested in an academic career?**

As pointed out in the section on career choices, it is a misconception that you only pursue a Ph.D. degree if you want to be a professor. The plain fact is that the vast majority of all Ph.D. recipients in chemical engineering in the U.S. accept industrial positions.

**After I apply, when will I know if I am admitted?**

The time varies from one department to another. Most departments make acceptance offers in *waves* and let their applicants know sometime between late January to early March. The majority also follow the April 15 deadline of informing applicants about acceptance.

**Should I visit the departments where I have been accepted?**

It is a very good idea to visit a school before accepting an offer of admission. It is the best way to get all your questions answered, to find out about the faculty and their research programs in more detail, and to meet the students you may be working with. It is common practice to invite students who have been offered admission to visit the department. Very often, with some notable exceptions, travel and hotel expenses will be paid by the host department.

**If I am lucky enough to have multiple offers, how should I decide which school to attend?**

This is a very difficult question to answer because only you know what the most important factors are for you. But remember, if you carefully pick the schools to which you apply initially, then you can hardly make a bad decision. You will receive a good education at any one of them, but remember, you should have the big picture in mind when you make your decision. In other words, you should be looking for the best education to fulfill your career goals. Issues such as a difference in stipend and the cost of living in a particular city are really not significant in the long run.

**Is it possible to get a job right after graduation and then have them pay for your graduate school?**

Some companies will do this, but it is perhaps the least common funding route for graduate school. It is more common for the M.S. degree than for the Ph.D. Financing the education is typically not an issue for the Ph.D. student, that is, the school pays the tuition and the research program pays the stipend.

**Is it better to get a job for a few years after graduation and then go to graduate school, or to go straight to graduate school with little work experience?**

This is a matter of personal choice and people have done it successfully both ways (even though more students go straight to graduate school). Future employers might consider someone with prior work experience to be a plus, but students who attend graduate school immediately after completing the B.S. degree do not seem to be at a disadvantage when it comes time to find a job at the Ph.D. level. Success in graduate school is the primary determinant. Some people, who have worked before returning for a graduate degree, will find it difficult to get away from the responsibilities and nice salaries they may have enjoyed during their post-B.S. employment. This often causes people to abandon their graduate school plans after a few years in the workplace.

**How hard is it to change majors between undergraduate and graduate school?**

Many chemical engineers do extremely well in medical, law, and business schools. Some go into related areas, such as chemistry. However, this is less common for graduate school. Chemical engineers are often well suited for graduate school programs in biomedical or environmental engineering.

**What if I'm not sure what type of research I want to do?**

Some students start graduate school knowing exactly what research group they want to join and even what project to pursue in that group, and change their minds a couple of months later. Most departments give students sufficient time and encouragement to familiarize themselves with all the research possibilities in the department. There is ample time to talk to faculty and other students to get a good idea of which direction you want to take. In fortunate cases, there may even be special courses, which can be taken during the first semester, that are closely related to the research of one or more professors. It is perfectly acceptable not to know your research interest when you apply for graduate school. In any case, you should join a department only if there are three or four faculty members with whom you would be happy to work with. Finally, remember that you attend graduate school to learn the research process; the research problem itself is simply a means to an end.

**How much time is spent taking classes vs. doing research in graduate school?**

Typically, the first year is devoted primarily to taking classes, and research begins in earnest in the summer after the first year. The few remaining classes required for graduation can usually be completed by the end of the second year. You may also be required to participate, as a teaching assistant, in two or three courses. Many students, especially those interested in an academic career, find this to be a rewarding experience. Although you may be slightly involved in teaching, remember that the Ph.D. degree is primarily a research degree.

# MINORS

## **What is a minor?**

A minor allows you to pursue an area of interest that is outside the required courses for your major. Pursuing a minor usually means taking a series of courses in that area.

## **What is the difference between a minor and a double major?**

A minor involves limited study in a curriculum and normally consists of 6 courses designated by the minor department. A double major involves satisfying the core requirements of two separate majors.

## **Can a chemical engineering student pursue a minor outside of Rutgers?**

No; however, a selected number of courses may be taken elsewhere if approved by the minor department.

## **What have been the most popular minors for chemical engineering students?**

Sciences, mathematics, economics and psychology have been popular with our students. The less popular minors are english, music, etc.

## **Do I need a separate advisor for a minor?**

Yes, you should contact the minor department.

## **When do I have to decide on a minor?**

Again, this depends on the minor in which you are interested. In general, the earlier you plan, the easier it is to work out your schedule because you will have more semesters to take the required courses. This is particularly important for a minor outside of the sciences because scheduling conflicts often arise. Your first meeting with your academic advisor is the best time for you to discuss your plans regarding a minor.

## **After I decide to pursue a minor, what do I need to do and can I change my mind?**

Obtain, complete, and return the *Declaration of Minor* form to the Office of Academic Affairs (B-100). A copy of this form will remain in your file. Inform OAA promptly should you change your mind. For example, if you decide not to finish a minor you need to consult OAA to ensure that the alternate courses would still satisfy the requirements for your major.

## **Would having a minor enhance my employment opportunities upon graduation?**

In some cases it would. For example, if a company is looking for a particular skill in a prospective employee, then having a minor, which specializes in that skill gives you an

advantage. However, not having a minor usually does not hurt since most employers are looking for broadly educated chemical engineers. By pursuing a minor, you are sacrificing breadth for depth because you will be committing most, if not all, of your electives to a particular area. The bottom line is the pursuit of a minor just to make you more marketable may lead to disappointments at graduation.

**Will a minor help me get into graduate school?**

Most graduate recruiters would not value a minor as highly as good grades, strong letters of recommendation, and research experiences. Having a minor helps is if you are applying to a graduate program in that minor.

**Why should I even consider pursuing a minor?**

A minor is not an essential part of your education and will not affect your career options after receiving your degree. Remember, pursuing a minor is a choice. You should make that choice if you are genuinely interested in a subject matter, intellectually curious about it, and enjoy it.

**Will I be recognized for having completed a minor?**

Yes, a formal recognition will be included on your transcript.

# ACADEMIC SERVICES

## **What are academic support services?**

These resources at Rutgers help students succeed in their academic programs by offering assistance other than faculty advising.

## **What are some of the services available?**

### **Office of Academic Affairs**

*academic advising, transfer information, declaration of major and minor, graduation requirements, add/drop information, scholastic standing, etc.*

School of Engineering, B-100; 445-2212

[www.soe.rutgers.edu/oaa](http://www.soe.rutgers.edu/oaa)

### **Office of Special Programs**

*tutoring in engineering courses, Educational Opportunity Fund, financial aid and scholarship information, special needs*

School of Engineering, B-110; 445-2687

[www.soe.rutgers.edu/osp](http://www.soe.rutgers.edu/osp)

### **Learning Resource Centers**

*tutoring, time management, learning and study skills, etc.*

Kreeger Center, CAC; 932-1443

### **Counseling and Student Development Center**

*counseling and psychological support*

Please contact Dean Donald Brown, Office of Special Programs, for referral information

### **Career Services**

*career counseling*

Busch Campus Center; 445-6127

<http://careerservices.rutgers.edu>

### **Center for International Faculty and Student Services**

*immigration and visa information, english and cross-cultural workshops, International Friendship Program, etc.*

180 College Avenue; 932-7015

[www.rci.rutgers.edu/~cifss](http://www.rci.rutgers.edu/~cifss)

## **What are learning skills and why should I know them?**

Learning skills include textbook reading strategies, lecture note taking, test anxiety and time management, and stress management. If a student is having difficulty with a course it is often due to weaknesses in one or more of these skills. Finding your weaknesses is an important first step towards improving your academic performance.

## **What services are provided by the Counseling and Student Development Center?**

The main services provided are individual psychotherapy, crisis support and management, and group counseling and workshops. You should seek professional help if you encounter personal, emotional, and interpersonal difficulties that are adversely affecting your academic performance.

## NOTES