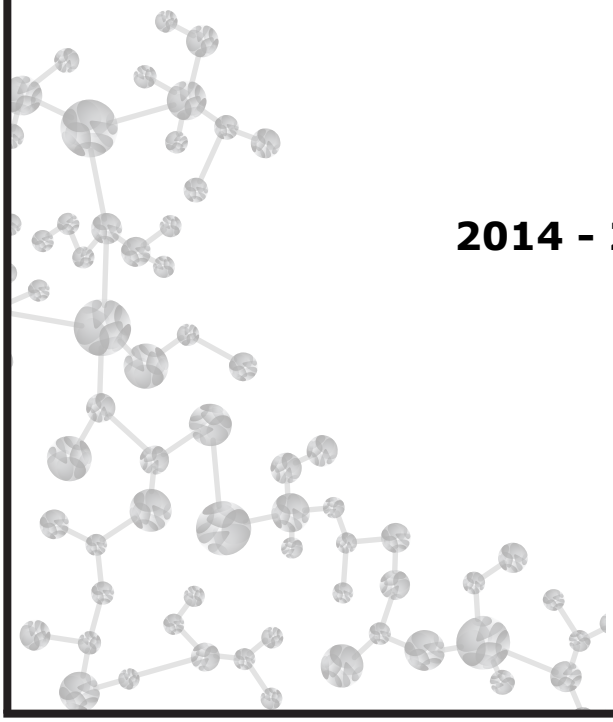
Society of Engineering Sciences

presents

Unofficial Guide to Engineering Sciences



2014 - 2015

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Introduction

Welcome to Cal! We, the students of the College of Engineering, would like to congratulate you on your admission to one of the finest engineering institutions in the world. You are now a member of a very elite group of students who make up Cal's Engineering Science Program.

As former freshmen, we understand the feelings of confusion and the overwhelming amount of information you may be experiencing as you enter your college experience. It is a monumental task to sort through all of the new information and determine the path you will take here at Berkeley. You have to take the initiative to find out about classes and chart your own course. Within a couple of years, you will be making some important decisions that will undoubtedly affect your future. Drawing on our past experiences in Engineering Science and other related engineering disciplines, we hope that we will be able to give you a hand in making informed decisions and to help you avoid the pitfalls of the college system.

The Unofficial Guide to Engineering Science contains information concerning classes, majors, graduate schools, jobs, careers, and campus resources. We hope that this will become a first resource to you whenever you have any questions about the engineering program. This guide does not replace your faculty adviser, ESS adviser, or any of your peer advisers. However, we hope that the booklet will help answer most of your questions about your new major. Perhaps it will help you formulate your own path here at Berkeley. Welcome to the Cal Engineering family! Good luck and GO BEARS!

Energy Engineering

Energy Engineering (ENE) interweaves the fundamentals of classical and modern physics, chemistry, and mathematics with energy engineering applications. A great strength of the major is its flexibility. The firm base in physics and mathematics is augmented with a selection of engineering course options that prepare the student to tackle the complex energy-related problems faced by society. Because the program emphasizes science and mathematics, students are well-prepared to pursue graduate studies in physics or engineering. Energy Engineering is a multidisciplinary field requiring an integration of physical principles with engineering analysis, augmented with realities of policy and engineering economics. The program incorporates courses from many departments on campus to create a discipline that is rigorously based in science and engineering, while addressing a wide variety of environmental issues. A required senior design project allows students to synthesize and apply the knowledge they have gained to a current problem in energy engineering.

Examples of relevant challenges include improving energy efficiency in buildings, transportation, and industrial sectors; reducing emissions of carbon dioxide and other environmental impacts associated with fuel combustion in power plants and engines; designing and managing smart energy grids; developing non-fossil energy systems including wind, solar, geothermal, and nuclear power; and developing and improving production, storage, and distribution infrastructure needed for electric vehicles, hydrogen fuel cells, and bio-fuels.

Engineering Math and Statistics

This major is a combination of math and engineering. Due to the breadth of this program, it is especially suited for those who plan to enter graduate school soon after obtaining the bachelors degree. If you are unsure of engineering but still love math and science, Engineering Math and Statistics (EMS) is still for you. Additional engineering or science deficiencies for graduate work that you may have can be made up early in graduate school, and your broad background can offer some creative sparks for research. If it turns out that engineering is not right for you, you still will have important knowledge of it that can help you in other fields. This is an excellent program for additional math education and a stepping-stone to graduate work in math or science education. You may also develop a pre-actuarial curriculum with technical courses in math, statistics, operations research, and engineering economics and with social science course in economics, business and law. Your broad background could enable you to show your students numerous fields that rely on math, creating more interesting and challenging curricula. It is important to emphasize that lower division math classes are very different from upper division classes. Upper division classes are more theoretical and have little emphasis on computation. For additional guidance, you may want to contact the mathematics department. The department office is located in 970 Evans. Also, the Mathematics Undergraduate Association (MUSA) can be very helpful. They may be contacted by e-mailing musa@math.berkeley.edu.

You can find many potential clusters of engineering courses that will give you some concentration. One way is to look at the courses required or recommended for other engineering majors and their various options. The College of Engineering Undergraduate Guide (http://coe.berkeley.edu/guide) is a good source to look at classes required for other majors. Of all the engineering departments, the Industrial Engineering and Operations Research (IEOR) department is closest to EMS. Look at the IEOR 160 series.

Your upper division math/stat classes require Math 128A (a class in numerical analysis for which prior exposure to a high level programming language is recommended), Math 110 (linear algebra, a course very similar to Math 54), Stat 101 or 134, 3 electives in math or statistics from an approved list, and, most importantly, one of the following two-course sequences:

1. Math 104, Introduction to Analysis, and Math 105 (Integration), Second Course in Analysis.
2. Math 104 and 185, Introduction to Complex Analysis.

Note that Math 104 is a very highly recommended course where you basically prove calculus. However, be aware that Math 104 is NOT an easy course. To quote the Math Department's Undergraduate Announcement, "students are advised that this [Math 104] is a very difficult course, and is best taken following another upper division mathematics course."

If you are more interested in applied mathematics more than pure math, then the math electives that may be of interest are:

123 Ordinary Differential Equations
126 Intro to Partial Differential Equations
128B 2nd course in Numerical Analysis
170 Mathematical Methods for Optimization

The four basic core courses for the math major in L&S are Math 104, 185, 110, and 113 (Abstract Algebra). Thus, if you are really interested in math, you might want to choose 113 as an elective. L&S math majors also need to take one course from each of two of the following subject areas: Computing (which you automatically satisfy because of Math 128A); Geometry (Math 140, 141, 142); Logic and Foundations (Math 125A, 135). These courses are possibilities for the three-course elective. If you are interested in statistics, then you should consider completing the full Math 134-135 sequence to have a more complete background in Probability (Math 134) and Statistics (Math 135), even though there are statistics courses satisfying the elective requirement which require only 134. Just for reference, L&S statistics majors are recommended to take Math 104, 105, 113, 126, 128A, and 185. If you can, give the honors sections a try when you take Math 104, 185, 110, and 113, especially 104. These are rigorous and difficult sections, but they are worth the work if you really love and appreciate the beauty of mathematics.

Although it is not required, you may want to take Math 74, a transition to upper division mathematics. This class teaches you how to write clear concise proofs, and it helps you adjust to upper division math classes, which tend to be far more theoretical than lower division classes. You should consider taking Math 74 concurrently with Math 53 or 54.

Within computer science, the 150 series are computer architecture courses; the 160 series, software; the 170 series, computer theory; and the 180 series, computer applications.

The requirement for a computer science minor is CS 61ABC, Math 70, and three upper division courses in computer science (also including EE 122). Unfortunately, the CS minor is not conferred for upper division CS courses used to satisfy a major, but at least you can have the EQUIVALENT of a CS minor, which is still something for the resume. Another feasible minor is chemical engineering provided completion of either the Chem 1 or Chem 4 series. Because any two EMS students can potentially have drastically different programs, it is very important that you glean as much as you can out of your faculty adviser and talk to people in the many fields in which you are interested. Ask your faculty adviser and your professors for people that can give you more information. If they refer you to another professor, do not be afraid to go to his/her office hours even though you are not in his/her class.

Engineering Physics

Chief among the attractions of Engineering Physics (EP) is the ability to take diverse classes. Go wild! But it helps to emphasize a particular area of study, whether it be the Physics side or the Engineering side. Choose your curriculum according to your interests. For example, if you are thinking about going to graduate school for Physics, taking a programming class might not be immediately relevant.

Read the fine print in the General Catalog and know what the prerequisites are for a class. That way, you can take your requirements before taking upper-division classes. Since some classes are offered in only the Fall or Spring semester, missing a prerequisite can become a hassle. Key survey classes that are important prerequisites for many interesting upper division classes are E45, EE40, and ME C85/CEE C30.

Some of the required classes have a list of recommended – but not strictly required – classes. Ask the professor if the prerequisite is actually necessary. Also, many students agree that unless you're going to emphasize math or chemistry, you will be best off if you use Advanced Placement credit for any math and chemistry classes you can. This should help guard against redundancy and give you more time for the really interesting and important upper division classes. It could also help make your semester unit loads more bearable. We strongly encourage taking the Physics 7 Honors sequence. The added rigor and challenge will help you adjust to upper-division Physics and Mathematics courses more easily.

As an Engineering Physics major, you have a range of focuses you can pick from--think of it as engineering with a more fundamental background. So you might be interested in electrical engineering and semiconductors, but you study more solid state physics than most electrical engineers. Or you want to do mechanical engineering, but work through classical mechanics. You could think of Engineering Physics as starting you off with more of a first-principles approach!

Since you have all these different choices for which engineering and physics classes you can take, try to figure out what you want to do early so you can plan your coursework out! Talk to faculty advisers and look at professors' research you are interested in--which fields are they from? If you want to go to engineering graduate school, look up their requirements so you are adequately prepared!

From the lab courses, Physics 111 seems to be the most useful for basic engineering and physics research--it equips you to understand experimental technique and instrumentation, which is ubiquitous. EE 143 is great if you are interested in semiconductors and fabrication techniques, which is another useful skill, especially in EE and physics labs. Both of these classes can help to make you a great undergraduate researcher.

For math electives, you have a choice between the 121 series and 104/185. Unless you are *really* interested in theory and hardcore math, take the 121 series! The 104/185 sequence is notoriously difficult and time-consuming, which will probably impact your understanding and performance in other classes. On the other hand, the 121 series prepares you for math you'll see in upper division physics courses (special functions, solving different differential equations, and fourier math). Also, more of your peers will be in the 121 series, so you'll have a good study group and a more familiar curve.

After you finish your lower division courses, there's a lot of opinions about which physics upper divisions you should take first. Some people say Physics 105 (mechanics) is quite fundamental, but it's so time-consuming you should save it for the end. Physics 112 (thermodynamics) can be easy or hard depending on your instructor, but little thermodynamics topics do show up in other classes like quantum mechanics and solid state physics. It's not necessary, but it is nice to have!

With these two classes, just be sure you have lots of friends for a study group! And remember that every semester, Physics 105 and Physics 112 are 8am classes.

Because you will have to make choices between engineering and physics courses, it might be helpful to have some student descriptions of classes in addition to the General Catalog (catalog.berkeley.edu). Remember the engineering courses tend to hone your numerical-spatial problem solving skills while physics courses will demand critical thinking with almost no numbers.

Remember to consult with your faculty adviser often, and inform your adviser about your plans for graduate studies.

Environmental Engineering

The Environmental Engineering Science (EES) major is a rigorous interdisciplinary program pairing engineering fundamentals with courses in the environmental and natural sciences. Although environmental engineering options may be found in the chemical, civil, mechanical, and material science engineering departments, the engineering science curriculum provides a broader foundation in the sciences. At the same time, it allows students to focus their study on environmental issues more than any other program option in the College of Engineering. The department of civil engineering is a close competitor, offering an environmental emphasis. Many lower division students with a strong interest in environmental engineering have trouble choosing between the engineering science track and the civil engineering emphasis. The differences in the two programs are subtle, but numerous. During the freshman and sophomore years, Civil Engineering requires courses in engineering geology, civil engineering materials, and computer-aided design, none of which are required for the environmental engineering science curriculum.

A civil engineering student is also required to take four core courses in their junior year, of which no more than two are related to environmental engineering. Finally the civil program requires a design elective, which is not included in the engineering science curriculum. On the other hand, environmental engineering science students must take a semester of general biology, a year of upper division math or statistics, and an upper division science sequence. Unlike the civil engineering emphasis, the Engineering Science program does not yield an accredited engineering degree. However, the flexibility of the engineering science program allows each student to specialize in what they are most interested in, while a civil engineering degree covers the breadth of civil engineering practice with some emphasis on environmental engineering.

As a student in this program, you will have many chances to direct your own curriculum. It is important that you plan ahead and find out which courses have prerequisites that must be satisfied prior to taking them. One key decision occurs during your sophomore year when you can choose three basic science electives from this list: Physics 7C, Biology 1A, Biology 1B, Chemistry 1B, Chemistry 3A, Chemistry 3B, and EPS 50. Physics 7C focuses on relativity, optics, and quantum theory, and provides little knowledge which you will find useful in future courses. Biology 1A should be taken if you are considering an ecology or microbiology cluster in your senior year. The Chemistry 3 series is relevant to many aspects of environmental engineering and would probably be a good choice for one of your two courses in the sequence. EPS 50 is helpful for the Geotechnical Engineering cluster. These are all fun courses and most environmental engineers who have taken them enjoyed the experience. Your first taste of environmental engineering will be in the beginning of your junior year.

You will find yourself with even more choices in your junior year. Most environmental engineers choose CE100 as their fluid mechanics course. Unlike ME106 and ChemE150A (the other two options), CE100 discusses

open channel flow applicable to streams and rivers, an important aspect of environmental engineering. Note that the course curriculum does not convey the fact that ME106 requires ME104, and ChemE 150A requires ChemE140. The choice between CE130 and ME104 is somewhat arbitrary, as you will probably not find yourself using the information learned in either of these classes in your future studies. CE130 focuses on stresses and internal forces in beams, whereas ME104 mirrors much of the material taught in Physics 7A. It does, however, go into much greater depth. For thermodynamics, ChemE141 and E115 are the choices most relevant to your studies. ME105, while interesting, focuses on thermodynamics in engines and power plants. ME105B with a biological focus on thermodynamics can be a good alternative. Lastly, you will be required to select an advanced mathematics sequence in your junior year. All of these math courses are potentially valuable depending on your interests. The 121 series covers material generally required of graduate engineering and upper division physics students and hence they are quite challenging. Perhaps of most interest is the statistics option. While Statistics 101 is highly theoretical, 102 teaches skills which are valuable to most environmental engineers. The most important influence you have in choosing your curriculum occurs during your senior year when you choose your cluster courses. The College of Engineering Announcement outlines the choices, but it is equally possible to create your own or mix courses in the suggested clusters.

With adequate planning, it is very easy to get a minor in chemical engineering. Simply choose ChemE140, and then take thermodynamics (141) and fluid mechanics (150A) through the Chemical Engineering department. Finally, choose the “Process Engineering” cluster in your senior year and you will have completed the minor. For the minor to be awarded, you must submit a notification of completion to 420 Latimer Hall.

Chemistry minors require one year of organic chemistry, one year of physical chemistry, and two additional upper division chemistry courses. Taking Chemistry 3A, instead of 1B, and then Chemistry 3B as a lower division science elective can satisfy the organic chemistry requirement. Physical chemistry (Chem120A-120B) may be taken as your upper division science sequence. With these four classes out of the way, you will be two courses away from a minor in Chemistry. See the College of Chemistry or the General Catalog for more information.

NOTE: Be sure to consult frequently with your faculty adviser AND the ESS office in 230 Bechtel for detailed information about courses/degree requirements.

Academic Resources

Center for Achieving Engineering Excellence
Counseling, tutoring, and workshops in math and science for College of Engineering students.
227 Bechtel Engineering Center, http://coe.berkeley.edu/caee

Student Learning Center
Tutoring in first year math, science, composition, and social science. Also provides study skills workshops. 140 Cesar Chavez Center. For further information see the web site. http://slc.berkeley.edu/

Eta Kappa Nu
Peer tutoring by EECS honors society students in lower division engineering prerequisites and upper-division EECS classes. 290 Cory Hall 10 AM – 4 PM during the week. http://www-hkn.eecs.berkeley.edu/student/tutoring.shtml

OCF (Open Computing Facility)
OCF accounts are available to all students free of charge. The lab computers are equipped with Windows 2000 and Office 2000; they are also loaded with UNIX for the more daring user. http://www.ocf.berkeley.edu

Tau Beta Pi (TBP)
Test Bank, Course Surveys, Mock Interview Opportunities and a general helpdesk.
https://tbp.berkeley.edu/students/

Society of Engineering Sciences (SES)
Professional and Social club of Engineering Science
ses.berkeley.edu

In addition to the above resources, tutoring and academic assistance is available at all of the Residence Halls at the Academic Services Centers.

Computing Resources

If you have a computer, or the means to purchase a computer, it is highly recommended that you do so. But if this is not possible, don't worry, there are plenty of options.

On campus, there are several computer labs and facilities that are available free of charge to be used as a resource for the student. These facilities come equipped with both Mac and PC's with internet access, as well as printers. There are several locations of these computer labs on campus with varying hours. For all the locations and times, check *Resource: A Reference Guide for New Berkeley Students* that you will receive during your orientation. In addition, if you are enrolled in an EECS class then you will have access to the workstation in Cory and Soda Halls.

Internet access and email are integral to your educational experience and becoming integrated into the classroom. Most courses have web sites for class information, and professors and graduate student instructors find email the most convenient way to communicate with their students.

If you need Software it can be downloaded from
http://software-central.berkeley.edu/

Or software can be purchased from The Scholar's Workstation
http://www.tsw.berkeley.edu

Introduction to Advising

When seeking answers to questions regarding courses or your degree, here is a list of some important resources.

Engineering Student Services Adviser

Your ESS Adviser is located in 230 Bechtel and is available for advising Monday, Tuesday, Thursday and Friday 9am – Noon and 1pm – 3:30pm. Have a quick question? Drop-in on Wednesday from 9am-11:30am and 1pm-3:30pm. For a specific time allotted exclusively to you, you are strongly encouraged to make an appointment with your adviser, thereby avoiding any excess waiting during the drop-in period. Schedule an appointment at http://coe.berkeley.edu/ESS.

Your adviser will suggest a reasonable curriculum for you to follow at Cal. This is the adviser you want to talk to concerning requirements for your major. They also answer such questions regarding breadth requirements, changing of majors and transfer and AP credit or engineering-related paperwork.

For further questions, feel free to call or email Engineering Student Services, 510.642.7594 or email ess@coe.berkeley.edu.

Faculty Adviser

In addition to your ESS Adviser, every engineering student is assigned to one member of the faculty in his/her given field of study. The Student Affairs Office assigns your faculty adviser, and you will be notified of the name of your adviser shortly after your arrival at UC Berkeley. If a good relationship is developed with your faculty adviser, he or she can be an invaluable resource, providing insightful, experience-based knowledge to help guide you through your years at Cal. This is the adviser you approach with specific questions regarding courses and instructors. They have a better understanding of which courses are best and most pertinent to your studies and can also provide detailed descriptions of classes. They will also approve your schedule when enrollment begins and make sure that you are meeting all of your academic requirements while maintaining good academic standing in your department.

In addition, your faculty adviser can be a friend in your department who can recommend you for research and job opportunities, as well as serving as a good source of reference for graduate school. Your faculty adviser is usually available during his or her office hours, and sometimes by appointment.

Engineering Science Office

The current Engineering Science contact is Joan Chamberlain who can be reached at joan@ce.berkeley.edu.

The Engineering Science office is located in 230 Bechtel Engineering Center, and its hours are Monday - Thursday, 8am-5pm and Friday, 10am-5pm.

Other students

Often the most reliable information and opinions come from your peers. We encourage you to get involved in societies like SES so that you can meet many fellow engineers who have already experienced the curricula at Cal and who will be willing to answer your questions. Societies like SES hold advising and peer-counseling to provide as many resources to the student as possible.

Engineering Student / Alumni Mentorship Program

This program pairs up current Berkeley students with alumni who have already established their career goals. It is a valuable service that allows students to sharpen their academic focus and begin career planning. For more information, go to:
http://alumni.berkeley.edu/Students/Mentorship/main.asp

Faculty Advisers

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Environmental Engineering Faculty Adviser
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harley@ce.berkeley.edu

Professor Ilan Adler
Engineering Math and Statistics Faculty Adviser
4183 Etcheverry
adler@ieor.berkeley.edu

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acarias@eecs.berkeley.edu

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wuj@berkeley.edu

Professor Jonathan Wurtele, Physics
Engineering Physics Faculty Adviser
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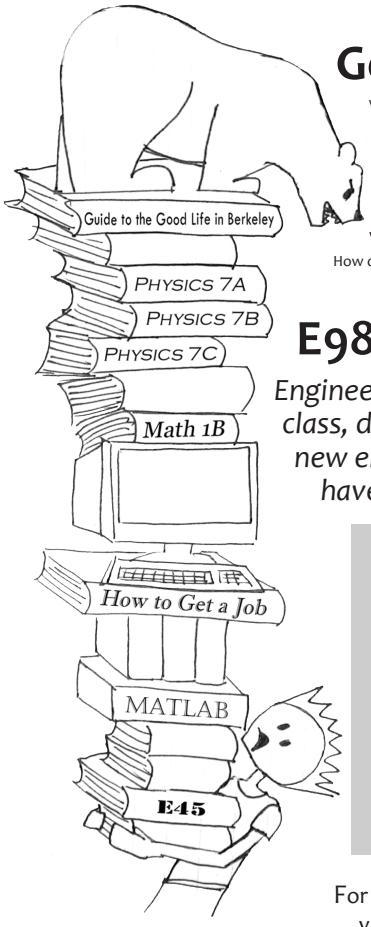
wurtele@berkeley.edu

Professor Tarek Zohdi, ME
Energy Engineering Faculty Adviser
6117 Etcheverry Hall
zohdi@me.berkeley.edu

E98



Got Questions?

What classes should I take, and with which professors?
How do I get a summer internship?
How can I study more effectively?
What's the right major for me?
Is it possible to have a life AND be an engineer?
What are some good places to eat around here?
How do I succeed as an engineer at Berkeley?

E98 has answers.

Engineering 98 is a student-run class, designed specifically for new engineers by those who have been through it all.

This 1-unit, P/NP DeCal covers:

- Study strategies and academic resources
- Interview tips and resume development
- Tele-BEARS, professor, and course advice
- Internship and research information
- Student life and the best places to eat!

For more information:
visit: http://engle.berkeley.edu
e-mail: e98@tbp.berkeley.edu

Engineering 98 is brought to you by

E98 Surviving Berkeley Engineering and Tau Beta Pi The Engineering Honor Society

Graduate School

How to Find a School

Start by meeting with your professor and/or faculty adviser during office hours to talk about suitable schools and graduate programs aligned with your interests.

To find a description of universities and their graduate programs, you may want at Peterson's Guide to Graduate Schools. Another useful resource is The Gourman Report, which is a compilation of "top 25" lists of graduate schools for many specific programs, including bioengineering and environmental engineering. Also, ask your professors or faculty adviser about which programs have good reputations in the particular field which you are interested in. Once you get a tentative list of schools you could go to the Career and Graduate School Services on 2440 Bancroft Way and look at their catalogs. During the summer before your senior year, call or email the graduate schools for applications and a description of their graduate program. Most schools will first send you a catalog and an application later. If you plan to enter graduate school in the fall, application deadlines usually range from December to February. Graduate schools have either a bioengineering or a biomedical engineering graduate program depending on how closely associated the program is to its medical school. Most programs are for a Ph.D. degree and to a lesser extent the MS degree. Some schools also have MD/Ph.D. programs for the biomedical sciences/ engineering that may also be worth looking into.

Letters of Recommendation

Most graduate school applications require at least three letters of recommendation. Students usually get letters of recommendations from professors, graduate students, or employers. Graduate schools are not only looking at your academic ability, but also at your ability to interact and work with other people. If you have worked for any professors or have had an internship in industry, make sure you ask your professor or supervisor to write you a letter of recommendation.

Graduate Record Examinations (GRE)

The GRE is a standardized test the scores of which are accepted by most graduate schools across the US and also in many other countries as one of the criteria for consideration for admissions to the graduate programs being offered by them. Among the graduate programs that accept your scores in the GRE, engineering programs are the most lucrative. A combination of high scores in GRE, engineering degrees and lots of hard work is the key to a successful career in the field of engineering!

(GRE continued)

Although most graduate schools have worked out various criteria for selecting the applicants who can be granted admissions, your performance in the GRE is one criterion that will be considered by most graduate schools. The weight age given to your GRE scores may vary from school to school, but it is a well known fact that competitive or good GRE scores will definitely tilt the scales in your favour if you are being compared with other applicants who may be as good as you in the other criteria but have lower GRE scores than you.

While considering your scores in GRE, engineering colleges or graduate schools offering majors in engineering pay more emphasis on your Quantitative Reasoning score which is the math score. As it is necessary for an engineering aspirant to be proficient in math, your Quantitative Reasoning score will provide an insight into your skill levels in math. Although your scores in the other two GRE sections are also important, you should aim for scoring very high in the Quantitative Reasoning test section of the GRE if you wish to graduate with a major in engineering subjects.

Medical School

For bioengineering and environmental engineering majors, it is easy to change to premed since the course requirements parallel each other. However with an engineering science degree, you still have the option to apply for medical school. In order to apply, you must take the MCAT approximately 12-18 months before your expected entrance to medical school. The MCAT is comprised of four sections: Verbal Reasoning (VR), Physical Science (PS), Biological Sciences (BS), and the Writing Sample (WS). For each of the first three parts (VR, PS, BS), a separate score is reported with the maximum score being 15. An average score for people who are admitted to medical school is a little above 10. For further information on requirements of 123 medical schools and brief descriptions of each, consult Medical School Admission Requirements by the Association of American Medical Colleges. This book and many other helpful handouts (including the MCAT registration packet) can be found at Career and Graduate School Services on 2440 Bancroft Way.

Jobs, Careers, and Interships

How to Get a Research Job

If you are interested in doing research within an engineering science group, you should talk to faculty advisers and talk to the professors directly. If you would like to work in another department, such as Mechanical Engineering, EECS, Molecular Cell Biology, or Chemical Engineering, obtain the departmental announcement which contains a detailed listing of professors and what they are currently working on. From this list you can call or email the professor to make an appointment. Prepare yourself when meeting the professor. Look professional and act interested. Ask questions, to demonstrate that you have some knowledge of the professor's research. Have a resume and a copy of your transcript ready. Consider beforehand whether or not you want to be paid (very often lab budgets don't initially allow for this) and how much time you want to put in. If the first interview doesn't work out, don't be discouraged. Just try again! The most important part of the process is starting. Once you start and get some contacts, eventually you will get a research job. Also, try looking at URO (Undergraduate Research Opportunities Program) through the College of Engineering or URAP (Undergraduate Research Apprenticeship Program) through the College of Letters and Sciences.

If You're Not Going to Graduate School

The majors in Engineering Science are geared towards graduate/medical studies. Thus, most of the curriculum focuses on the theoretical aspects of the various disciplines, leaving out some of the more practical engineering courses. This may put you at a disadvantage when competing for an industrial position against a mechanical or chemical engineer, who has a stronger practical-industrial background. On the other hand, holders of a Ph.D. degree usually take research and development positions. Nevertheless, there is no reason to despair. If your purpose and desire is to get a position in industry (and start earning good money in the process) with just a Bachelors degree, then these humble pointers might be of some help:

1) Decide what you like and/or want; try to take as many "related" engineering courses as possible. This might seem something painful to do since this may imply giving up your "easy" electives for some "hard-core" engineering ones, but the payoff will be landing a good job, since now your weaknesses have become your strengths.

2) Get an engineering related job before graduating. This is a must since this is what employers look for when they hire someone. Anything will work, i.e., part-time, full-time, paid or volunteer.

3) Remember that experience is what counts. For job listings and references go to the Career and Graduate School Services Center, located at 2440 Bancroft Way. If it is too hard for you to work during the semester try to get a summer job or take a semester off and get a CO-OP. Taking a CO-OP or an internship is the best way to get a permanent job. Always have your resume ready. This is crucial. "Don't leave home without it." The handbook available at the Career Center has very valuable resume advice and examples. You may even want to enroll in one of the many resume-writing classes offered on campus.

Internships

An internship is a wonderful and effective way to connect your academic experience with the professional work arena. It allows you to gain valuable exposure to the workplace, provides the opportunity for skill development, and gives you a competitive edge in the job search.

Getting Started: visit https://career.berkeley.edu/Internships/Internships.stm

- Internship Listings
- Frequently Asked Questions
- Meet with a Counselor
- Externships - Short term "job shadowing" opportunities
- Campus Opportunities - Campus-affiliated internships and experiential opportunities

Libraries & Department Offices

Libraries

Bioscience and Natural Resources Library, 2101 VLSB, 642-2531
Kresge Engineering Library, 110 Bechtel, 642-3339
Math/Stat Library, 100 Evans Hall, 642-3381
Chemistry Library, 100 Hildebrand Hall, 642-3753
Physics-Astronomy Library, 351 Le Conte Hall, 642-3122
Main Stacks, Doe, 643-4331

Department Offices

College of Engineering
Office of the Dean,
320 McLaughlin Hall
510.642.5771
coe.berkeley.edu

Engineering Student Services
230 Bechtel Engineering Center
510.642.7594
ess.berkeley.edu
ess@coe.berkeley.edu

Biochemistry & Molecular Biology
mcb.berkeley.edu

Bioengineering
bioeng.berkeley.edu

Cell & Development Biology
mcb.berkeley.edu

Chemical Engineering
cheme.berkeley.edu

Chemistry
chem.berkeley.edu

Civil & Environmental Engineering
ce.berkeley.edu

Computer Science
cs.berkeley.edu

Electrical Engineering & Computer Science
eecs.berkeley.edu

Engineering Sciences
engineeringscience.berkeley.edu

Genetics
mcb.berkeley.edu

IEOR
ieor.berkeley.edu

Immunology
mcb.berkeley.edu

Integrative Biology
ib.berkeley.edu

Material Science and Mineral Engineering
mse.berkeley.edu

Mathematics
math.berkeley.edu

Mechanical Engineering
me.berkeley.edu

Molecular and Cell Biology
mcb.berkeley.edu

Neurobiology
mcb.berkeley.edu

Physics
physics.berkeley.edu

Organizations & Competition Team

For a complete list of the organizations and competition teams within the College of Engineering please visit:
coe.berkeley.edu/students/organizations.

More Opportunites at Cal

Rose Hills Research info:
http://surf.berkeley.edu/surf-rose-hills

Learn more about the world and **Study Abroad**:
http://studyabroad.berkeley.edu

Undergraduate Conference Travel Grant Info:
http://iis.berkeley.edu/content/undergraduate-conference-travel-grant

Society of Engineering Sciences

The professional and social club of Engineering Science
- meet others in your major!

Mission Statement:
The Society of Engineering Sciences is dedicated to enhancing the lives of students within the Engineering Science department at University of California, Berkeley. The Society provides a node for Engineering Science majors to meet, interact with professors and faculty advisers, find research opportunities, and explore common goals. We support the diverse interests and needs related to the interdiscipline of Engineering Science and its scholars.

Founded in 1980, the Society of Engineering Sciences is comprised of students with interests in Energy Engineering, Engineering Math and Statistics, Engineering Physics, and Environmental Engineering Science. The primary purpose of this society is to give representation to and advance the interests of the Engineering Sciences. Additionally, SES seeks to provide resources, support, and activities to Engineering Undeclared students and to represent their interests in the college. Due to our multidisciplinary nature, all majors are welcome.

SES provides the opportunity for interaction of students with common interests. While SES represents a huge diversity of fields, it also serves to unite a group of largely interdisciplinary majors, which face unique goals and issues. Overall, SES is an extremely flexible and personal organization whose main goal is to continually adapt and serve the wide variety of member interests.

Anyone interested in becoming more involved is encouraged to contact one of the officers below. Please visit our website at ses.berkeley.edu. SES is an Engineering Student Council sponsored organization.

Fall 2014 Co-Presidents

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