Chemical Engineering Student Handbook
Omega Chi Epsilon is the nationally recognized honor society for chemical engineers. The Beta Omega Chapter was formed at Rensselaer Polytechnic Institute in 2003 by a group of students from the American Institute of Chemical Engineers or AIChE Chapter that was already established on campus. All current members are students majoring in a chemical engineering degree or those who have already earned such a degree. Membership is given to those who are at the top of their respective classes - top 1/4 of the junior class, top 1/3 of the senior class, and graduates with a GPA of 3.5 or higher. As a whole, the Beta Omega chapter has worked to provide community service opportunities to its members, promote the chemical engineering field to younger students, help older students decide on future paths and instill values of honor and professionalism.
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## 1. Course Advice

### Example Schedule for Chemical Engineering Bachelor’s Degree

#### 1st Year

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<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
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<tr>
<td>CHEM 1100</td>
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<td>ENGR 1100</td>
<td>4</td>
<td>Introduction to Engineering Analysis</td>
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<td>ENGR 1300</td>
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<td>Engineering Processes</td>
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<td>MATH 1010</td>
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<td>Calculus I</td>
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<tr>
<td>BIOL 1010</td>
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<td>Intro to Biology</td>
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<td>ENGR 1400</td>
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<td>PHYS 1100</td>
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<td>CHME 2010</td>
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<td>Material, Energy, and Entropy Balances (MEEB)</td>
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<td>Beginning C Programming for Engineers</td>
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<td>MATH 2400</td>
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<td>Differential Equations</td>
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<td>PHYS 1200</td>
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<td>Organic Chemistry II</td>
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<td>Energy, Entropy and Equilibrium (EEE)</td>
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<td>Free Elective</td>
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#### 3rd Year

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<td>Modern Techniques in Chemistry (Mod Tech)</td>
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<td>CHME 4010</td>
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<td>Transport Phenomena I</td>
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<td>CHME 4030</td>
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<td>Chemical Process Dynamics and Control (CPDC)</td>
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<td>CHEM 4420</td>
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<td>Microscopic Physical Chemistry (P-CHEM)</td>
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<td>CHME 4020</td>
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<td>Transport Phenomena II</td>
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<td>CHME 4150</td>
<td>3</td>
<td>Chemical Engineering Lab I</td>
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<tr>
<td>CHME 4500</td>
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<td>Chemical Reactor Design (CRD)</td>
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<td>Chemical Engineering Elective</td>
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<td></td>
<td>Free Elective</td>
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<td>CHME 4050</td>
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<td>Chemical Process Design</td>
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<td>ENGR 4010</td>
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<td>Professional Development III</td>
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<td>Chemistry Elective</td>
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### CORE Engineering (nearly all engineers have to take these courses)

- Advanced Chemistry
- Chemical Engineering

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1. CHEM 1110, Chemistry I with Advanced Lab is best for ChemEs (offered Fall term annually).
2. BIOL 2120, Introduction to Cell & Molecular Biology is a better biology class for those interested in going to the biological side of chemical engineering (offered Spring term annually).
3. May be replaced by CHME 1010, Introduction to Chemical Engineering.
4. A better programming class like CSCI 1100 can be taken instead (4 credits).
5. Choice of STSS 4840, Professional Development II (communication intensive) or PSYC 4170, Leadership Theory. Visit SIS for a complete list of 4-credit courses that satisfy PD II requirement, but remember that they cannot be double counted for use with the HASS core requirement.
6. Choice of CHME-4160, Chemical Engineering Laboratory II or CHME-4170, Bioprocessing Laboratory Course.
7. Any 3-credit CHME course or Undergraduate Research in ChemE department is allowed.
8. Any 4-credit, at least 2000-level course in ENGR, ENVE, MANE, BMED, CIVL, ECSE or 4-credit research in those departments is counted. CANNOT be ENVE 2110, Introduction to Environmental Engineering or ENGR 2250 Thermal and Fluids Engineering.
9. Any 3-credit (or 4-credit if you want), at least 2000 level CHEM course. CANNOT be CHEM 2440 Physical Chemistry for Life Sciences or CHEM 4410, Macroscopic Physical Chemistry.
Electives
- Chemistry Electives

*Note: Can be any 3-credit or greater, at least 2000 level CHEM course. CANNOT be CHEM 2440 Physical Chemistry for Life Sciences or CHEM 4410 Macroscopic Physical Chemistry.

CHEM-2030 Inorganic Chemistry I

Even though it is a 4-credit course, it can still be used towards the chemistry elective. It is offered every spring semester and I took it with Prof. Dinolfo. It covered basic concepts and theory of inorganic chemistry, for example, atomic and molecular orbital theory, transition metals and a touch in organometallics. I found taking it helpful for me to understand organic chemistry later. The course load is not very heavy but it does require attendance in order to take down notes that Prof. Dinolfo will not post on LMS.

CHEM 2110 - Equilibrium Chemistry and Quantitative Analysis

This course covers equilibrium chemistry (particularly solubility and acid-base chemistry) and its application to chemical analysis. It is taught by Prof. Korenowski; he is a lenient professor. He will work with you so that you get the best possible grade in his class. There is no required homework. There are 3 take home exams (questions don’t change from year to year usually), and there is a presentation at the end of the semester on a journal article that uses some sort of analytical technique.

CHEM 2440 – Physical Chemistry for Life Science (DOES NOT meet chemistry elective requirement!)

I took Physical Chemistry for Life Science taught by Prof. Ryu. It met with Macroscopic Physical Chemistry for 3/4 of the semester. The last quarter was with a medical doctor who taught us about the biological application of physical chemistry. Most of the course is on thermodynamics which we see in EEE.

CHEM 2540 / ERTH 2140 – Introduction to Geochemistry

This course is a chemistry course cross listed as a geology course, so there is material from both areas. However, you don’t need any previous knowledge coming into the class; you will learn everything you need. Some major topics include the origin and differentiation of the Earth, thermodynamics and kinetics as applicable to the Earth, and some advanced topics that are only covered if time permits. The course style is exams with homework. The homework is done on an individual basis, but you are allowed to work with others. There is a review for the exam, which helps. All of the lectures are posted online as PowerPoint presentations. Overall the course can be tricky at times, but if you do the homework and pay attention, it is not hard. It can be boring at times if you are not interested in geochemistry, but it covers broad topics so there should at least be some that interest you.

- Chemical Engineering Electives

CHME-4400 Chromatographic Separation Processes

This is a course offered each spring semester. I learned materials on chromatographic dispersion, adsorption isotherms, solute movement analysis and different chromatographic techniques. It has weekly homework, one midterm, and a final exam. Undergraduates can obtain extra credit by doing oral and written presentations on a topic of your interest. Prof. Cramer taught this class and it’s a great elective if you want to work in a field related to chromatography or separation after you graduate.
CHME 4460/ CHME 6430 – Biomolecular Engineering

This class is usually taught by Prof. Tessier and counts as a CHME elective. Students learn about antibodies, phage display, yeast display, cloning, and processes for duplicating and manipulating proteins. The class usually is about 1/3 graduate students, and it is taught much like a graduate class. There was only one final exam when I took the class, and two papers, though there were supposed to be three. Each student was also assigned a research paper to read and present to the class. The class only meets once per week for a three hour period. Most students find Professor Tessier to be a very good teacher, and he is well liked. And for those of you who know Prof. Tessier...yes of course there are brownies!

CHME 4966 – CACHE Process Simulations

This class is a 2 credit elective taught by Professor Baysal. The course covers process modeling using Aspen Plus computer simulation software. Grades are based on short homework assignments, the occasional quiz, and a project that spans the majority of the semester. The class is extremely beneficial to seniors who have not yet taken the capstone Chemical Process Design class.

CHME 6963 – Model Predictive Control (MPC)

This class can be used to satisfy the three credit-hour chemical engineering elective requirement. It is offered in the fall usually in odd-numbered years (2007, 2009, 2011, etc.). Building on knowledge gained in CPDC, the course begins with an introduction to digital control techniques (as opposed to analog control taught in CPDC) including digital PID and digital Internal Model Control (IMC). MPC is then gradually introduced. The course grade is based both on homework and a final project—no exams are given. The course can be taken at either the undergraduate or graduate level. The only difference is the amount of work required to complete the final project. One of the best aspects of this course is that it teaches students MATLAB programming, something that looks great on a resume. CPDC is the only prerequisite for both the graduate and undergraduate versions.

- Engineering Electives

*Note: Any 4-credit, at least 2000-level course in ENGR, ENVE, MANE, BMED, CIVL, ECSE or 4-credit research in those departments is counted. CANNOT be ENVE 2110 Introduction to Environmental Engineering or ENGR 2250 Thermal and Fluids Engineering I

ENGR-2090 Engineering Dynamics

Engineering Dynamics is a fairly straightforward class and a good choice for an easier engineering elective. Dynamics is the continuation of Intro to Engineering Analysis, but whereas that class is about statics, this involves points and bodies in motion. The same concepts apply as from statics (primarily force and moment balances), with the addition of momentum balances. The class format is two 2 hour classes per week. Each class was divided into approximately 30-45 minutes of lecture and an hour of example problems. Almost every day in class Prof. Tichy reminded us that we “Learn by doing.” If that is not your preferred method of learning new material, look for a different section of the class or a different elective. The course, as taught by Prof. Tichy, was based largely on those example problems and extending what was learned from them to the 10 quizzes and 3 tests. Attendance was also a small factor (5%) in the grade. Homework was optional and not graded. If you’re looking for a B, simply attending class is enough (even studying for the tests are unnecessary). If you want the A, it’s not hard;
do some example homework problems and review for the tests and final exam for an hour or two the
day before. Overall, the course is not any more difficult than IEA (there are no matrices!) and does not
get in the way of a busy Chemical Engineering schedule.

ENGR-2350 Embedded Control

This class can be used to serve as the general engineering elective. Both software design (computer
programming using the C-language) and hardware design (circuit board wiring) are taught in the first
half of the class. The students demonstrate knowledge of these topics through lab-work, including
making a very simple game similar to Guitar Hero. In the latter half of the course, the students apply
their knowledge to programming a smart car and a self-flying blimp. The work in this course is mostly
lab-based, but there are a few outside-of-class homework assignments (especially in the first few weeks)
and two lab reports. Students are allowed to choose lab partners, so it is recommended that students
sign up for the course with someone they work well with, if at all possible.

Recommended prerequisites:
CSCI-1190: C-Programming for Engineers, another computer science course, or knowledge of C-
programming

ENGR-2530 Strengths of Materials

Strength of Materials is an engineering course very similar to IEA. It is recommended to take Strengths
following IEA because Strengths is a course that goes more in depth in structure, forces, and moments.
Back exams for Strengths are available, and students are encouraged to visit the professor’s office hours
when having difficulty with the subject matter. A word of warning, to receive an A in this course, you
must earn a 96 or better overall.

ENGR-4100 Business Issues for Engineers and Scientists (BIES)

Business Issues for Engineers and Scientist (BIES) is taught by Dr. Carl Pavarini, who is an RPI graduate
and comes to campus only to teach this class. It is taught as though one has never taken a business
course before, and therefore you are taught only what you need to know in business as an engineer or
scientist. You will learn business-related issues that are critical for successful commercialization of new
technology in start-ups and existing businesses. (Examples: How to read an income report, how to tell if
a company is doing well or not, how to identify target customers, and how to reach different sales
channels.) The class meets for 3 hours once a week, and Dr. Pavarini usually takes a 10 minute break
about halfway through the class. Class is taught based on cases from real life situations. There is a
midterm and a final; both are 25% of your grade each. Then in-class participation is 25% and the weekly
homework is the last 25% of your grade. Weekly homework is a max of two pages (either typed or
written) of questions based on the readings of that week and is an acceptable/unacceptable type of
grade. BIES is a fairly straightforward engineering elective and is very interesting especially if you have
never taken a business course before.

ENGR-4760 Engineering Economics

This three credit course gives students an overview of everything an engineer needs to know about
economics and accounting. The course covers accounting for interest, financial risk analysis of projects,
financial project comparison, and discounting. The information learned in the class is very useful for
having a big market picture of the projects you will be working on as an engineer. The course is
extremely easy and involves short weekly problem sets and several mini tests. Beware though- the course is only 3 credits – not enough to fulfill your 4 credit engineering requirements. If you take this course you will need to take another 3 or 4 credit advanced general engineering course (or take FORTRAN programming which is only one credit).

**MANE-2830 Nuclear Phenomena for Engineering Applications**

Nuclear Phenomena for Engineering Applications (NPEA or “Nuke”) is a straightforward and enjoyable four credit course for students looking to satisfy their general engineering elective. The only pre- requisites include Physics I and Chemistry I, which are both completed by the end of freshman year (see Example Schedule for Chemical Engineering Bachelor’s Degree). The course provides a broad overview of the basic concepts of quantum mechanics, nuclear reactions, nuclear decay, fission, fusion, and radiation. Those who possess an interest in physics and nuclear engineering will find this course quite enjoyable. Although topics can be dry at times, the professor is extremely nice and does her best to ensure that all students do well in the class. There are three exams and no final, with occasional quizzes and homework problems due each week. Exams hold the most weight toward your final grade, and if you do well on them (or show improvement over the course of all three) you will receive an A.

**MTLE-2100 Structure of Engineering Materials**

This course is an extension of ENGR-1600 Materials Science for Engineers with a much larger focus on the structures of materials than other areas of materials science. There is also a greater focus on the experimental techniques used to determine a material’s structure along with some of its properties. This course is not as challenging and time consuming as ENGR-1600 because there is less lab work involved and the course is taught at a slower pace; however, the material is slightly more conceptual. Exams tend to be of similar style to the problems given by the Professor Tomozawa for back-exams, homework, or practice purposes.

Suggested Prerequisite: ENGR-1600

If you would like to learn more about material science and you have done fairly well in ENGR-1600, you should definitely consider this class as an elective.

**MTLE 4310 – Corrosion**

Generally offered in the spring semester by the Material Science Department, this course introduces students to the different types of corrosion. The course also discusses common methods to measure and prevent corrosion. Electrochemistry and oxidation/reduction reactions provide the foundation for much of the material discussed. An apropos example of the material covered is as follows: stainless steels are materials that generally resist corrosion, however some are highly susceptible to stress corrosion cracking (SCC) in the presence of chlorides. This is why steam generators in nuclear power plants are constructed out of other high-performance alloys and condensate water management strategies are employed.

For chemical engineers, this is a valuable course to understand how different materials are affected by various types of corrosion. This will better prepare you for what you will see in industry and provide you with a better understanding of the role that corrosion plays in the design and selection of materials.
MTLE 4960 – Failure Analysis

Generally offered in the fall semester in the Material Science Department, this course delves into the failure mechanisms of difference materials. The course is extremely hands-on and you will be assigned three different projects in which you literally analyze a failure and reverse-engineer the story of how it happened. Examples include: a broken bike frame and failed machine parts from local companies who can truly benefit from the students’ insight. Students are able to learn and utilize techniques in metallography, optical microscopy, SEM, red dye penetration, charpy impact testing, and more. It is a great course for chemical engineers to become more familiar with different materials and their associated properties. Recommended prerequisites include Materials Science for Engineers ENGR 1600

- Research to Satisfy a Required Elective

Aside from taking courses to satisfy an elective, you could conduct research. For example, if you do research in the chemical engineering department, you could register it for credit, in which case you could satisfy your 3-credit requirement (see page 15 for more information). Students have also done research outside of the chemical engineering department. For example, one could do research in the MANE department if interested, and this can be registered to satisfy the 4-credit requirement. In the past, students have registered this as an independent study with the professor. In order for the Registrar to recognize such an arrangement as satisfying the general engineering elective requirement, a written approval from your advisor (via e-mail) must be filed. It is always a good idea to double-check with the registrar on any changes in these paperwork formalities.

- Other Useful Electives (Not Required for Graduation)

MATH 2010 – Multivariable Calculus and Matrix Algebra

This class isn’t actually necessary to get a Bachelor’s degree (or at least it wasn’t for my class year), and thus it only counts as a free elective. A professor recommended that I take it, though, because most other colleges require Chem E’s to take it and because the math taught in it is useful for other classes. After taking this class I definitely recommend it. Directional derivatives, maxima and minima, double integrals, line integrals, div and curl, and Green’s Theorem; matrix algebra and systems of linear equations, vectors and linear transformations in $\mathbb{R}^n$, eigenvectors and eigenvalues, applications in engineering and science, are the main topics covered.

The course has a prerequisite of Calculus II and is offered every semester. I had Professor Harry McLaughlin for this class, and found him to be a very good teacher. The class wasn’t difficult to get an ‘A’ in, because he only tested on pretty much the same exact questions he went over in class, but I still learned a lot of useful things that have since reappeared in my other classes such as the divergence and curl functions, Green’s Theorem, least squares fits using matrices, and directional derivatives.

Minors

A minor can be a nice addition to market yourself to your future employer. It may also be a good way to explore an interesting field outside of your major. If you are considering a minor in addition to your bachelor’s degree, it is a good idea to look into something that will be relevant to your future endeavors. Unless you are infatuated with a particular subject, there is no point in taking classes that won’t be helpful later.
Potential minors for ChemE’s are Biology, Biochemistry and Biophysics, Chemistry, Economics, Environmental Engineering and Management. Remember to refer to the catalog of your year of entry for specific requirements for completing a minor. Each department has their own specifications for completing a minor, but most follow a common theme. The requirements vary between the different fields for the specific coursework, but after these are completed, every minor requires that a “Minor Approval Form” be filled out and filed with the Registrar before graduation. This form can be found on the Registrar’s website under ‘Forms’. The form requires approval from the department head for the minor that you are applying for, some basic information, courses taken to satisfy the requirements, as well as the signature and address of your academic advisor.

Fitting the required classes into your schedule may be the hardest part. You will notice that in the catalog if you look up your particular major, there is a tentative outline of the classes that you should take and an example of the order to take them in. You should also note that there are humanities electives and free electives. Those are the areas that you should look to take classes towards your minor. Although there is a schedule described here, don’t feel obligated to follow it. Rearrange your course loads as you please, just make sure to take into account any prerequisites required for upper level classes.

- Economics Minors

After you’ve selected an economics minor, you must complete at least 16 credit hours before graduation. There are two classes that must be taken for some of these credit hours. They are ECON 1200 Introductory Economics and ECON 2010 Managerial Economics. That means that you will then have 8 credit hours of your choice to decide between the other offered economics courses. In order to satisfy depth requirements, it would be a good idea to choose two courses that are at the 4000 level. All of the classes must be taken for a grade rather than pass/fail.

In order to choose the two additional courses, it would be wise to look through the course catalog ahead of time to see what is offered each semester. Often economics classes are held in either the fall or spring annually.

- ECON 2020 Intermediate Macroeconomics: Provides an in-depth look at macroeconomics.
- ECON 4110 Economic Analysis of Technical Change: Impact of technology on the economy in the United States
- ECON 4120 Quantitative Analysis: The math of economics.
- ECON 4130 Money and Banking: A good choice for developing your understanding of the U.S. Banking system and other associated financial institutions.
- ECON 4140 Structure of Industry- Competition, Innovation, Entrepreneurship, Policy: Discussion class that describes the main foundations of industry.
- ECON 4150 Economics of Government Regulation: Regulatory policy and government intervention in the United States.
- ECON 4160 Public Finance: Taxes, corporations, sales, payday; everything you need to know about that level of finance in the United States.
- ECON 4180 Development of Economic Thought: Analyzes all of the different economic approaches to thinking.
- ECON 4190 International Economics and Globalization: Deals with the Global economy and international trade.
- **ECON 4210 Cost-Benefit Analysis**: How one comes to the most cost effective methods and solutions.
- **ECON 4230 Environmental Economics**: Environmental planning and policies with a large focus on sustainability.
- **ECON 4240 Natural Resource Economics**: Understanding the limited natural resources allocated to the planet’s population.
- **ECON 4260 Environmental and Resource Economics**: Protection of the environment through public policy.
- **ECON 4570 Econometrics**: More math of economics focused on theory and method.
- **ECON 49xx Energy Economics and Policy**: Excellent class for those interested in the energy industry. Not listed in the catalog, but look for it when spring courses are listed.

The above options are all good ideas to fill these other 8 credits. The only prerequisites are the two required courses mentioned previously. Note that there is a wide variety of options in the Economics department, so pick a class that you will actually enjoy and attend.

Once you have successfully completed the 16 credit hours, you will then have to visit Professor Donald Vitaliano in Sage 3405 or John Heim in Sage 3410. You can email either professor before you arrive, to make sure that they will be there at vitald@rpi.edu and heimj@rpi.edu. During your visit they will discuss the classes you took and ask how you enjoyed them, then they will give you a form to complete that lists the courses you took. You can also get this sheet online at the Registrar’s website under Forms; it is called the “Minor Approval Form”. After getting the sheet signed by the appropriate individuals, you will submit the paper to the Registrar. The entire process is easy enough. Just make sure to plan out your free elective spots according to what additional economics classes you are interested in for the spring and fall semesters.

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**Biology Minors**

As stated before, a minor is a particularly attractive addition to your credentials for marketing yourself to future employers. It demonstrates motivation to expand your knowledge beyond the minimal requirements for your major. For chemical engineers, a minor in biology can be extremely beneficial if you are looking to pursue either a career or an advanced degree in the fields of bio/nano technology, drug discovery, pharmaceuticals, medicine, or biochemical engineering. These fields and others like them have become a major focus of research and development, both in industry and academia. As chemical engineers, we play a major role in the development of these technologies. Nearly every chemical engineering professor on campus here is involved in some sort of biological research, whether it be in wet labs or through computational simulation. Biology has become an integral component to the field of chemical engineering.

That being said, it is easy to earn a minor in biology here at RPI. The requirement is to complete at least 16 credit hours before graduation. When selecting course within the biology department to take, it is necessary to keep a few details in mind. Traditionally, the biology class that chemical engineers have taken to count toward their major is BIOL 1010 Introduction to Biology. However, the option has now become available for CHME’s to take BIOL 2120 Introduction to Cell and Molecular Biology instead and have it count toward graduation. Whichever you choose remember that those four credits will not count toward your minor. That being said, there are many higher-level classes within the Biology Department that require either one or both of these classes as a pre-requisite, so it would be beneficial to take both BIOL 1010 and 2120.
In addition to these courses it would be sensible to look through the course catalog ahead of time and see which courses are offered each semester. Most classes are held either fall or spring term annually. Below is a list of highlighted courses within the biology department. Check the course catalog to find classes that interest you the most when planning your schedule.

- BIOL 2120 Intro to Cell/Molec Bio: Provides an overview of cellular biochemistry, metabolism and signaling.
- BIOL 2500 Genetics and Evolution: In depth look into the mechanisms of inheritance, gene expression and evolution.
- BIOL 4620 Molecular Biology I: Takes a detailed look at the intricate mechanisms of replication, transcription, and translation within a cell.
- BIOL 4640 Proteomics: Characterizing protein expression patterns in development, aging, and disease.
- BIOL 4700 Freshwater Ecology: Studies of freshwater aquatic systems, their hierarchies, and the physical/chemical regimes of the organisms within. Includes trips to Lake George and the Adirondacks.
- BIOL 4760 Molecular Biochemistry I: Focuses on the chemistry, structure and function of protein, nucleic acids, carbohydrates, and enzymes.
- BIOL 4961 Cancer Biology: Excellent class for those interested in learning the detailed mechanisms of how cancer works and proliferates throughout the body. Not listed in the catalog but look for it in the fall semester or email Professor George Plopper (ploppg@rpi.edu).

When gathering signatures on your “Minor Approval Form” you will need to visit Professor Harry Roy in the Biology Department on the first floor of the Jonsson-Rowland Science Center (JROWL). Leave your minor form with his secretary for him to sign. As a final note, if you plan to take any upper level biology course, be sure to plan accordingly so you have the necessary pre-requisites fulfilled in time for when the class is offered.

**Biochemistry/Biophysics (BCBP) Minors**

A BCBP minor is great if you want to learn more about biological pathways and cutting edge laboratory techniques, and you only have space in your schedule to take 4 additional classes. To find out which classes are necessary for a Chemical Engineering undergraduate student to get a minor in BCBP, one should peruse the course catalog for their freshman year online. For the 2012-2013 school year, BCBP minor required taking both of the classes listed below:

**BCBP 4760 - Molecular Biochemistry I Credit Hours: 4**  
**BCBP 4770 - Molecular Biochemistry II Credit Hours: 4**

As well as two of the following:
**BCBP 4310 - Genetic Engineering Credit Hours: 4**  
**BCBP 4640 - Proteomics Credit Hours: 4**  
**BCBP 4710 - Biochemistry Laboratory Credit Hours: 4**  
**BCBP 4780 - Protein Folding Credit Hours: 4**  
**BCBP 4870 - Protein Structure Determination Credit Hours: 4**  
**BIOL 4620 - Molecular Biology Credit Hours: 4**  
**CHEM 4310 - Bioorganic Mechanisms Credit Hours: 4**
MATH 4720 - Mathematics in Medicine and Biology Credit Hours: 4

Molecular Biochemistry I has historically been taught by Professor Makhatadze, and if you have him he gives all multiple choice tests from the textbook.

Just like any other minor, you have to fill out a minor application form and get it approved by your advisor and the head of the department offering the minor. Currently, Professor Makhatadze is the person that can sign off on BCBP minors as the head of the “BCBP department”.

Taking Graduate Courses (6000 level) as an Undergraduate

It is actually not too uncommon for undergraduates to take graduate courses before they get their Bachelor's. There are several reasons one may choose to do this. One reason is the ability to learn more about a certain area of interest. Another reason is to prove one's ability to handle graduate work, similar to taking AP or other college-level courses in high school to determine how well a student is able to handle college-level work. Also, taking a graduate level course will prepare a student to perform at a higher level, which could make the transition to graduate school easier.

Keep in mind that many graduate schools do not allow credits for required courses to be transferred in. That is, if a student takes graduate thermodynamics as an undergraduate, he/she will be expected to retake it at the university he/she attends to get his/her Ph.D. Therefore, if getting a head start on graduate requirements is the only motivation, such as taking AP courses in high school to get out of undergraduate requirements, it is not recommended to take a graduate course.

Before registering for a graduate course, it is recommended that an undergraduate contact the instructor(s) and explains his interest in the field of study and asks the instructor(s) if it is alright for undergraduates to take the course. Also, it is necessary to complete the form entitled "Approval Form for an Undergraduate to take a Graduate Course" which can be found on the Registrar's website under the "Forms" tab. The form is very simple, and the registrar approves most submissions. The reason for the existence of the form is to comply with New York state laws, which place restrictions on the number of undergraduate students in graduate courses.

Back Materials

Back exams can be a very useful study tool for chemical engineering, as well as other exams at RPI. OXE has an extensive archive of back exams for courses listed in the Chemical Engineering Curriculum. The exams provided are not guaranteed to be correct or up to date; they are intended to be used only as a study aid. To request an exam, please email oxe-officers@union.rpi.edu. You will get the .pdf copy through email.

Back exams are also available to all RPI students from the APO, a community service fraternity on campus, whose office is located in the Union 3420. Three back exams can be borrowed at one time for up to 15 minutes and you can scan them in the student government suite room located on the third floor of the union.
Advising and Learning Assistance Center at RPI (ALAC)

The Advising and Learning Assistance Center (ALAC) is located on the second floor of Russell Sage Laboratories. ALAC offers Supplemental Instruction and Drop-In Tutoring throughout the academic year. However, if tutoring is not offered in a class you are struggling in, ALAC will provide you with a tutor and will cover the fee of a tutor for up to 1.5 hours a week.


2. Alternative Study Tracks

Transferring into the Chemical Engineering Program at RPI

My Background

I started my college career at Dutchess Community College (DCC) in 2005, where I received my associate’s degree with 72 credits in engineering science with a concentration in chemical engineering. I transferred to RPI in the fall of 2007 with 61 undergraduate credits that transferred. My advisor was Professor Bequette, and there was one other CHME transfer that year from another community college of New York. RPI offered me a $5,000 transfer scholarship for four semesters, but they gave it to me for all five semesters I was at RPI. I lived off campus my entire time at RPI. I had three friends at RPI, two of whom graduated DCC with me, so we lived together off campus.

My First Impression/Experiences

I transferred in as a junior and was required to take the sophomore and junior CHME courses simultaneously my first year which was quite demanding. If there is another transfer student in your year I suggest working with them and matching up your schedules because it is a little hard to know your place at first since you are in a mixture of sophomore and junior classes. There will be plenty of time to work in groups and make new friends since the CHME program requires groups in almost all of your classes. I was a little overloaded that first year so I decided to go on co-op the summer and fall of 2008 to get some work experience, and also to break up the CHME course load. Because of the structure of the CHME program most students go on a full year of co-op, but since I transferred I was able to go for just a summer and semester. This still offset my graduation by a year but it helped to lighten my course load and make my time easier to manage. It was sad to see many of my good friends graduate the year I should have, but I do not regret going on co-op and was able to make friends with the class right behind me when I returned to school. There were even other students who went on a year-long co-op that were returning, and we became good friends because of our common experiences.

My Impressions Now

Now that I am 8 credits from graduating, I couldn’t be more excited. Granted after 5 years of undergrad anyone would be ready to leave, but I would not change what I did. Going on co-op gave me invaluable work/life experience and also gave me the opportunity to work a summer internship in 2009 as well. As a transfer student coming in as a junior, many of your classmates will have already had industrial experience so it is important to take the time and get that experience also. The CHME program at RPI is demanding and you always seem to have more work than all of the other majors, except for ARCH, but that’s another story. The CHME community is small which makes it very tight-knit; I like that about it.

My Suggestions

Have a plan. When I arrived and was making my first semester’s schedule I had done my research. I had planned out what my two years would look like and also considered an alternate plan, which included the co-op. Granted you will most likely move classes around and change some things based on what your advisor says is a priority, but definitely knowing what you need to take and having a rough outline of you final years is helpful. If you have the opportunity to go on co-op, take it. I am working part time for the company I co-oped for in 2008 between classes this semester to help make some extra cash. If you do not know anyone or do not want to live off campus, definitely think about the dorms. It will help making friends and getting to class easier. Do not slack off, I cannot stress this enough! There are times
were you will have more work than you know what to do with and be in 5 different groups throughout the semester. Manage your time wisely and be sure to make an effort to go to class and do the assignments. If you fail a CHME course it might delay your graduation because they are only offered once a year, but there are always exceptions. As a transfer student you have a lot of leeway. Some classes you transfer can be split and used for multiple requirements and some classes/requirements you might not need at all, especially in the H&SS block. Be sure to have a serious one-on-one with your advisor once you have a general idea of what you are doing, so that you do not take extra classes or miss an important graduation requirement.

Co-terminal Program

The Co-terminal Program allows students to complete their Bachelors of Science and their Masters of Engineering requirements within five years. At the end of the 10th semester, the student is given both degrees. The Co-terminal degree program allows students to get a Bachelor’s degree and a Master’s degree in 5 years. The Master’s degree can be either a Master’s of Engineering or a Master’s of Sciences. For the Masters of Engineering one only has to take 30 credits of classes, and no thesis is required. For the Masters of Sciences, a thesis is required as well as coursework. There are also strange rules for the amount of credits the thesis counts for out of the total 30 that one must complete for a Master’s of Sciences, and students are also required to take the Ph.D. comprehensive exam at the end of their first semester of the Master’s. After the passing the exam, students can complete their Master’s or skip straight to working on their Ph.D.

Students must apply when they have obtained junior standing, although there is some leeway. Most chemical engineering professors will dissuade students from going for their masters for several reasons. Generally, there is no increase in pay or responsibilities in industry for graduates with a master’s degree. Furthermore, students have to pay to get their masters (students are paid to get their PhD). However, getting a masters through the co-terminal program definitely has its benefits. Although job duties and pay will not differ substantially, employers will hire masters students over bachelors students. The co-terminal degree will allow students to specialize in an aspect of chemical engineering if they wish to do so. Also, the co-terminal program allows you to keep your financial aid through the fifth year. Finally, whereas getting a master’s degree typically takes two or more years, the co-terminal program will only require one.

I have chosen to do the co-terminal program and highly recommend it for students that are ahead in their coursework, getting a hefty financial aid package or want to gain more knowledge and experience before they leave RPI. If you are in a position to graduate within three years, staying an extra year to get a masters will allow you more summers to gain experience, and simply being a year older makes you more attractive to employers. If you do not receive any financial aid, then it might not pay off. Definitely go to career fairs early in your undergraduate studies, speak with employers about your credentials and ask if they feel you will need to get a masters to be competitive. Ultimately, the co-terminal program is a way to gain a competitive edge in industry.

Once you decide on the co-terminal program, you will need to do several things:

1. Print the co-terminal application and Plan of Study form from online (Google it)
2. Make sure you meet the requirements (>90 credits and have a 3.5 GPA overall and in major)
3. Write a two-year plan and fill out your Plan of Study form with your advisor
4. Visit the head of the graduate department in chemical engineering to check that your elective classes are acceptable, and to talk about finding a graduate advisor.
5. Make sure you have all the correct signatures.
Chemical Engineering as Pre-Med

*Note: Please refer to the specific school for more updated and detailed information.

If you are unsure about whether or not you want to go to medical school, chemical engineering is a good major choice. The Chemical and Biological Engineering Department at RPI gives students a good basis for medical school, especially in math and physics. While the chemical engineering discipline will prepare you for the challenges faced in medical school, additional chemistry and biology courses are required and you will have to plan your electives accordingly. Especially important is to note whether the medical school you consider attending accepts AP credit as substitutes for their required courses. A short list of schools and their requirements is given to give you an idea of the requirements and how they vary between institutions:

<table>
<thead>
<tr>
<th>MEDICAL SCHOOL</th>
<th>Biology Classes</th>
<th>Amount</th>
<th>Lab</th>
<th>AP Credit</th>
<th>Chemistry Classes</th>
<th>Amount</th>
<th>Lab</th>
<th>AP Credit</th>
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<td>8 cred</td>
<td>yes</td>
<td>no</td>
<td>General</td>
<td>8 cred</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td></td>
<td>Genetics (S)*</td>
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<td>no</td>
<td>Biochemistry</td>
<td>4 cred</td>
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<td>no</td>
</tr>
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<td>no</td>
<td>Chemistry:</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Inorganic</td>
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<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Organic</td>
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<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Quantitative analysis</td>
<td>1 course</td>
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<td>no</td>
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<tr>
<td>Washington University in St Louis</td>
<td>General</td>
<td>1 year</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Organic</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Biochem can substitute (S)</strong></td>
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<td>n/a</td>
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<tr>
<td>Albany Medical College</td>
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<td></td>
<td></td>
<td></td>
<td>Organic</td>
<td>1 year</td>
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<td>n/a</td>
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</table>

*(S) means the course is suggested but not required

<table>
<thead>
<tr>
<th>MEDICAL SCHOOL</th>
<th>Physics Classes</th>
<th>Amount</th>
<th>Lab</th>
<th>AP Credit</th>
<th>Math Classes</th>
<th>Amount</th>
<th>AP Credit</th>
<th>Humanities Classes</th>
<th>Amount</th>
<th>AP Credit</th>
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<tbody>
<tr>
<td>John Hopkins</td>
<td>General</td>
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<td>yes</td>
<td>yes</td>
<td>Calc or Stats</td>
<td>6-8 cred</td>
<td>yes</td>
<td>General</td>
<td>24 cred</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Writing-Intensive</td>
<td>2 courses</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCLA</td>
<td>General</td>
<td>1 year</td>
<td>yes</td>
<td>no</td>
<td>Calc and Stats</td>
<td>1 year</td>
<td>no</td>
<td>Spanish (S)*</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Washington University in St Louis</td>
<td>General</td>
<td>1 year</td>
<td>n/a</td>
<td>n/a</td>
<td>Calculus</td>
<td>1 course</td>
<td>n/a</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Diff EQ</td>
<td>1 course</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albany Medical College</td>
<td>General</td>
<td>1 year</td>
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<td>n/a</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
<td>n/a</td>
</tr>
</tbody>
</table>

*(S) means the course is suggested but not required
All of these courses are available within the chemistry and biology departments:

- 1 year of general biology = Intro to Bio and Intro to Cell Bio
- 1 year of general chemistry = Chem I and Chem II
- Biochem = Molecular Biochemistry
- Quantitative Analysis = Equilibrium Chemistry with Quantitative Analysis
- Genetics = Genetics

Consider a minor in chemistry, biology, or biochem/biophysics and choosing biochemical engineering electives (information can be found in the RPI online catalogue). Taking organic chemistry off campus is not advised, and you will also have to take the organic chemistry lab unlike your fellow ChemEs. Chemical Engineering + Premed is certainly manageable, but it is a good idea to get in contact with the pre-med advisor. He/she can be found by emailing the head of the department of science or by asking your pre-med friends. Of course there’s the usual for any pre-med: start looking into the MCATS early and develop relationships with professors and deans to procure (2-4) letters of recommendation.

ALAC offers a Pre-Health Committee. This is a committee you apply to in the fall of your junior year to see if you are eligible to be “sponsored” by them. If you are sponsored, the pre-health committee will collect all of your letters of recommendations and write one header letter of recommendation. That packet will get sent out to medical schools when you apply. They also help you with other tasks such as writing your personal statement and helping making decisions on which schools to apply to.

The Pre-Health Committee has been chaired by Assoc. Prof. Michael Hanna for over 20 years. He and other committee members provide guidance and advice for all Rensselaer students and alumni to assist them in the process of preparation for medical study, preparing their applications, providing their recommendations, and general counseling concerning the admissions process. There is a formal review process by the Committee which involves a personal interview. This process is run through the Advising & Learning Assistance Center and students from all majors are welcome to participate.

The pre-health committee is not there to make sure you are taking the right courses to get into medical school. If you apply and you do not have the proper course load, they will not accept you. It is the responsibility of the student to try to either seek guidance from their adviser about what they need to take for medical school or to set up a meeting with the appropriate person within ALAC at the beginning of their freshman year to make sure they know what courses they need to take to be on a pre-med track. Some medical schools though will like you to take more of a biology heavy course load though so it is recommended to take some of the following:

- Human Physiology
- Microbiology
- Developmental Biology
- Molecular Biochemistry I (this course will fulfill chemistry elective)
- Molecular Biology
- Biostatistics
Graduating Early

If you are one of those students who wants to finish up their education quickly, limit the debts they will have to pay after graduation, or put their many AP credits earned in high school to good use, graduating a year early is a viable option. Actually choosing the courses to graduate a year early from the chemical engineering program at RPI can be tricky because many of the courses required to graduate are only offered once a year and require prerequisites. If you don’t take the right prerequisite courses early on, it is very difficult to try to fit all of the classes you need for graduation into your sophomore and junior year schedules. So to make things a bit easier for incoming freshmen, who are thinking about graduating a year early, provided on the next page is a template of when classes should be taken. The classes that are underlined are much more important to keep in the semester indicated because they are required for later classes in the curriculum. You can be more flexible with the other classes and take them whenever is convenient. The semesters are balanced so that no one semester is all challenging classes. The first semester is the only semester without a humanities class. Graduating in three years does require that you take approximately one extra course a semester compared to your peers, and it does take some work, but if you are a motivated student with the necessary AP credits, it is possible for you to do so and still have a life outside of school.

In order to graduate in three years, you should have AP credit for Calculus I and II and Chemistry I and II at a minimum (the schedule below is for a student with those credits already fulfilled before entering RPI) because these are necessary to take MEEBAL and Organic Chemistry first semester. If you have AP Physics or any other AP credits, great! You don’t have to take Physics I and may not have to take the electives or some of the humanities listed on the schedule. Graduating in three years will be even easier. Note that the requirements for humanities classes are complex at RPI (you must take a 2000 and 4000 level course in the same area to meet your depth requirement, have at least one social sciences and liberal arts related class, and have at least one communication intensive class) so you should take a good look at the RPI catalog if you want to minimize the amount of humanities classes you have to take. And lastly: this is just a guideline. If you want to graduate early, talk to your advisor as soon as possible and they will do their best to help you.
**1st Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 2250</td>
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</tr>
<tr>
<td>ENGR 1100</td>
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<tr>
<td>CHME 1010</td>
<td>1</td>
</tr>
<tr>
<td>MATH 2400</td>
<td>4</td>
</tr>
<tr>
<td>CHME 2010</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 2600</td>
<td>3</td>
</tr>
</tbody>
</table>

**CHEM 2260** 3 Organic Chemistry II

**ENGR 1400** 1 Engineering Communications

**CHEM 4530** 4 Modern Techniques in Chemistry (Mod Tech)

**PHYS 1100** 4 Physics I

**ChME 2020** 4 Energy, Entropy and Equilibrium (EEE)

**2nd Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 4030</td>
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<td>CHME 4010</td>
<td>4</td>
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<tr>
<td>PHYS 1200</td>
<td>4</td>
</tr>
<tr>
<td>Engineering Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

**CHEM 4420** 3 Microscopic Physical Chemistry (P-CHEM)

**CHEM 4020** 4 Transport Phenomena II

**CHME 4020** 4 Professional Development II

**Chemistry Elective** | 3

**Free Elective** | 4

**Chemical Engineering Elective** | 4

**3rd Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHME 4040</td>
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<tr>
<td>CHME 4150</td>
<td>3</td>
</tr>
<tr>
<td>CHME 4500</td>
<td>4</td>
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</table>

**Chemical Engineering Separations** | 3

**Chemical Engineering Lab I** | 3

**Chemical Reactor Design** | 3

**Humans or Social Science Elective** | 4

**Free Elective** | 4

**CORE Engineering (nearly all engineers have to take these courses)**

- Advanced Chemistry
- Chemical Engineering

* Engineering communications is much less time intensive then CAD and perhaps advisable if you are taking 20 credits.

*T he topical chemical engineering courses (which are listed on SIS as some number in the 4960s depending on the year) tend to be “softer” and structured more like humanities courses and might be advisable if you are seeking to lighten your course load spring semester of your second year.

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10 A better programming class like CSCI 1100 can be taken instead (4 credits)
11 Choice of STSS 4840, Professional Development II (communication intensive) or PSYC 4170, Leadership Theory. Visit SIS for a complete list of 4-credit courses that satisfy PD II requirement, but remember that they cannot be double counted for use with the HASS core requirement.
12 Any 3-credit (or 4-credit if you want), at least 2000 level CHEM course, CANNOT be CHEM 2440 Physical Chemistry for Life Sciences or CHEM 4410, Macroscopic Physical Chemistry.
13 Any 4-credit, at least 2000-level course in ENGR, ENVE, MANE, BMED, CIVL, ECSE or 4-credit research in those departments is counted. CANNOT be ENGR 2110, Introduction to Environmental Engineering or ENGR 2250 Thermal and Fluids Engineering I
14 Any 3-credit CHME course or Undergraduate Research in ChemE department is allowed
15 BIOL 2120, Introduction to Cell & Molecular Biology is a better biology class for those interested in going to the biological side of chemical engineering (offered Spring term annually)
16 Choice of CHME-4160, Chemical Engineering Laboratory II or CHME-4170, Bioprocessing Laboratory Course
3. Career Advice

Co-op

While summer internships are good for learning the ropes, co-ops are much better for actually getting to do real work within a company. When working as a summer intern, by the time you catch up with the processes of the company and the new technologies, a company can only get 2 to 3 weeks of actual work out of you. Whereas when you are on a co-op for 4 or more months, you will get the chance to work on real and more exciting projects. As a CHEME, it can be difficult to go on co-op for only one semester. (Not that it’s impossible; it is doable as long as you plan all your classes correctly from freshmen year.) I waited until after my junior year because I wanted some actual chemical engineering courses under my belt before going out into the “real” world. Subsequently, I left for one year and completed two different co-ops. I didn’t know what direction I wanted to go in after graduation so I figured if I did two co-ops back to back then I’d get double the exposure to what I wanted and what I was capable of doing.

I worked closely with the CDC to find my first assignment, and while on that assignment, I found my second co-op, yet again, working with the CDC through email. I would suggest starting your search as soon as possible! I began my search in the fall of my junior year; however, I didn’t get my first assignment until the middle of the spring semester, so don’t stress too much if you don’t have a job by winter break. Also use all of your resources when looking for a co-op: RedHawkJobLink, professors, family/friends, even Google. I found my first assignment just by easily searching “chemical engineering co-op” on Google.

While on co-op, I had an absolute blast! I got to work with some incredible people and see some amazing places in the US. I made many professional contacts and made myself more marketable at the same time. I am currently back at RPI as a super-senior, and because of my co-op experience, I started my senior year with a full time offer already in place! I would be lying if I told you that coming back to school after a year of working was easy, especially for your last year. Senior year is tough and it is even tougher when you have to adjust your life back to “school-mode.” But it’s not impossible. Just keep yourself motivated and know to ask for help when you need it! Going on co-op was the best career decision I’ve made while here at RPI, and I have absolutely no regrets about it at all!

Internship Seeking

Prepare for an internship as if you were applying for a full-time position. The Archer Center and the Center for Career and Professional Development are both great resources to learn about every aspect of the interviewing and Internship process. The CCPD also helps students put together and revise their resumes. Internship interviews may be over the phone or may be scheduled as an in-person interview. In-person interviews can usually happen on campus, as many companies send recruiters to campus over the course of the year just for this purpose. The recruiter schedule can be found on the CCPD website. For an in-person interview, be sure to bring a copy of your resume and a copy of your unofficial transcript, which you’ll want to hand to them at the beginning of the interview after shaking their hand and greeting them. Typically interviewers ask questions about your previous experience working on teams. They’ll often ask you to talk about a time when you solved a problem on a team that nobody else could, or to talk in detail about the approach you took to solving a specific problem. It helps to have thought of answers to typical questions like this before the interview. More typical questions can be found under the “student materials” on the CCPD website.
It’s also important to interview your interviewer. Often, the interviewer will set time aside at the end or prompt you for questions, but even if they don’t it’s a good idea to ask about what you’ll be doing at your internship. This shows initiative and that you’re interested in the job. Also, your interviewer can often give you a lot of information that can help you determine if you really want to take the job. Some interviews will have personality assessments, but it is extremely rare for interviews to have aptitude assessments. Make sure to thank your interviewer before leaving.

Second interviews are common before a company gives you the job. The company may have you travel to their company site. Be sure to have researched a little online about the company and be prepared for a committee style interview with two or more interviewers. Be honest with the interviewer. For example, let him or her know if you are open to traveling for an internship. Do not be discouraged if your GPA is low; companies tend to focus more on your leadership roles and your extracurricular activities.

Other Potential Summer Opportunities

There are other opportunities to take advantage of over the summer other than doing an internship. There are many summer programs available at universities other than Rensselaer. One such program is the Global Village for Future Leaders of Business and Industry training program through the Iacocca Institute at Lehigh University. During my internship at the Iacocca Institute’s Global Village program, I had the opportunity to work with engineers, architects, IT specialists, businessmen, and even entrepreneurs from 60 different countries including Kazakhstan, Belarus, Chile, Moldova, Sweden, and Germany. We interacted with business executives on a daily basis, consulted companies and presented in front of CEOs. The current 1200 alumni pool includes employees from Siemens, 3M, Barclays, PWC, etc. Above all, I got a better understanding of what I wanted to do in the future.

Other summer opportunities include:
- Taking classes at Rensselaer or at your local university
- Volunteering
- Obtaining a job outside the field of chemical engineering
- Student Orientation (SO) Advisor at Rensselaer
- Undergraduate Summer Research at Rensselaer

Research Experience for Undergraduates (REU)

The Research Experience for Undergraduates is an excellent opportunity for many students who decide to explore research as a future endeavor. It allows students to participate in research at different universities including Auburn University, Cornell University, Carnegie Mellon University, etc. during the summer break. Deadlines are early in the spring semester, and at least two letters of recommendations are required. The National Science Foundation funds the research, and universities often offer stipends and/or housing. The student is required to participate in the research and deliver presentations throughout and write a report at the end of the summer experience.

For information on opportunities: [http://www.nsf.gov/crssprgm/reu/reu_search.cfm](http://www.nsf.gov/crssprgm/reu/reu_search.cfm)
Applying to Graduate School

There are a few things that you should keep in mind if you are thinking about applying to graduate school. As with everything else, it is better to have a plan in the beginning of your studies here at Rensselaer. Graduate schools are looking for four main components in undergraduate students who are looking for admission into their PhD and Masters Programs.

1. GPA (Self-explanatory)
2. Recommendation Letters
3. Undergraduate Research
4. GRE and/or GRE Subject Tests

These items should be collected as you make your way through your undergraduate career at RPI. As always, your extra-curricular activities and leadership roles on campus will also play important roles in your application. (Generally, maintaining a GPA above a 3.80 is competitive for application to the top 10 graduate programs.) It will be a huge advantage to know the schools you are considering ahead of time so that you are aware of those qualifications associated with a particular department. When selecting schools to apply to, it is generally a good idea to have some variety in your list, ranging from reach schools to target schools to safety schools. Furthermore, one should generally apply to 6-8 schools.

In addition, you can browse each school’s current research to see which professors you would be interested in working with and what projects sound the most appealing to you. You may contact current graduate students at that school to get a better feel for the research and the group. This will give you the advantage of getting to know the school well ahead of time.

Top Rankings in ChemE graduate schools: http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-engineering-schools/chemical-engineering-rankings

Recommendation Letters

Recommendation letters are good when written by professors who actually know you both in and out of class. That way they can actually speak to who you are as a student and as a person. It is also good to pick at least one professor in the field that you are interested in or a professor who attended the same school that you are applying to. The alumni network for the top graduate schools is incredible in this department. Just look online for biographies of your professors and see who has done what research and where. Then take some time to get to know him or her. Professors are always glad to talk and discuss interesting topics in their fields or even just things that you may find interesting. So get involved and meet some new people.

Make sure that you give professors and recommenders ample time to think about and compose your letter. The earlier you decide on your final list of schools and provide the recommender with the information that they request, the better. Thank you notes are also nice, especially when handwritten to those faculty members and recommenders that wrote your letters. Depending on the school you attend, you will need anywhere from two to five recommendations from different people who can attest to your character. Many times students will have their research professors write their recommendation letters. This brings us to point #3, research.
**Undergraduate Research**

As a chemical engineer you have an advantage with having a department that is very willing to offer research positions to students even in younger years as freshmen and sophomores. The key is to ask even if you only have a slight chance of getting a research position. You can look for more information on obtaining research in earlier sections of this handbook (REU section). The main point here is that schools like to see involvement in fields of research on top of the extra-curricular activities and leadership positions that you hold on campus. Graduate program admission officers are looking to note if you have had some practice in labs, performing simulations, and general day-to-day problem solving used in the same manner that you will be executing research when you are brought into their PhD or Master’s program.

**GRE or GRE Subject Tests (GRE Website: http://www.ets.org/gre)**

The final point that you should account for in planning your undergraduate career in preparation for graduate school applications, is taking the GRE, or Graduate Record Examination. This is a 4 hour exam that is basically a glorified SAT. It should be taken when you feel confident, but no later than the summer before senior year. The math or ‘Quantitative Reasoning’ section is very easy for engineers especially after applying advanced math concepts daily. However, it is recommended that you complete a few practice sections before test-day, as finishing all of the questions in the time allotted is not trivial. The often harder ‘Verbal Reasoning’ section involves learning lots of vocabulary words (> 1000 for a high percentile score) and the ‘Analytical Writing’ section tests critical thinking and articulation. There are prep courses offered by a number of different companies and a milieu of books available for purchase.

In addition to the general GRE, there are GRE subject tests that look into particular subjects separately. Some graduate schools will require that applicants take one or more of these exams, but it depends mainly on what you are applying for a PhD or Master’s degree in and what your undergraduate degree is in already. Both the standard GRE and GRE subject tests are offered several times annually at specific test taking centers. You will need to find the nearest test taking center, as RPI is not one, and arrive according to that location’s specifications. Proper identification is taken very seriously so don’t forget your photo ID as you are taking the test on a computer and will need to prove that you are indeed who you say you are.

**Financing Graduate School**

Nearly all graduate schools that accept you to their PhD programs will provide you with a comfortable stipend, waive tuition, and possibly provide you with health and dental insurance. However, you are encouraged to apply for outside aid. Often, the awards are larger than the stipend offered by the university. Most importantly, these awards are nationally recognized. They are highly competitive. Furthermore, it will pay a favorable edge when it comes to selecting an advisor in graduate school.

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4. Extracurriculars

Undergraduate Research Program (URP)

Some Preliminaries

Perhaps one of the best things about being a student at RPI is the fact that the number of undergraduate research opportunities is nothing short of staggering. Even in the humanities and social sciences departments, it is not uncommon to find multiple professors offering positions on their research teams to undergraduates. More importantly, the Howard P. Isermann Department of Chemical and Biological Engineering—as of this writing—comprises approximately thirteen (13) faculty members, many of whom currently advise multiple undergraduates. Within these groups, students typically collaborate with one or two graduate students on a project that is already in progress; however, many advisors are willing to allow proven undergraduates to begin and oversee their own individual experiments.

Selecting and Joining a Group

Technically speaking, students of all years are eligible to participate in the Undergraduate Research Program. As such, if you have conceived of a particular project that you would like to explore, or decided that you very much want to work with a specific faculty member, do not let the length of your tenure at RPI stop you. That being said, a significant percentage of the faculty is of the belief that students are not all that useful in the lab until their second year. Subsequently, if you are looking for a research position as a freshman, you will have to make an exceptionally strong case as to why you are qualified for the job.

As far as selecting an advisor is concerned, the process is reasonably straightforward:

1) Begin by gathering information on the professors/groups that you would like to work with. Skim each group’s webpage for biographies and research interests. It is also a great idea to read the abstracts (or at the very least, the titles) of a few of the group’s recent publications.

2) Narrow down the list of professors in whom you are interested based on which projects you find most compelling.

3) Contact the professors on this revised list via email and ask to arrange a face-to-face meeting. Be sure to attach a resume or C.V. to the email. Highlight any coursework which you believe is applicable to the research that the group does. Also, realize that most faculty members are extremely busy and will often take a number of days to respond to you. If after three or four days you have not received a reply from a given professor, send them a polite reminder email. The key is to be respectfully persistent.

4) Approach the face-to-face meetings as you would any other interview, but do not allow them to become a source of extreme stress. Just be certain to know a little bit about the group you are interviewing with and to project confidence.

5) Select a group to join from those that offer you a position.
Handling the Paperwork

Once you have accepted an offer from a professor to join his or her group, you must decide how you wish to be compensated for your work (credit, pay, or experience). Ultimately, your advisor will have to approve the decision that you make.

Regardless of the type of compensation you select, it will be necessary for you to complete an Undergraduate Research Program (URP) Application and return it to the Office of Undergraduate Education. In addition to your personal information and a few other items, you will be asked to provide an approximately 500 word summary of your research plan. This must be written by you, but can be discussed with your advisor ahead of time.

If you opt to be paid for your time in the lab, you will be required to complete a few additional forms for the Payroll department. On the other hand, if you decide to receive credit for the research that you do, the Registrar requires that you file a separate form with their office.

Concluding Remarks

While the process outlined above seems relatively complicated at first, it is really quite manageable if you develop a system and stick to it. Make certain that you are aware of the deadlines for each of the forms/applications that you must submit. These are listed on the Office of Undergraduate Education’s website, and generally fall within the first few weeks of a given semester. Consequently, the summer and winter breaks are a great time to “get the ball rolling” by researching groups and sending emails. Finally, be aware that most groups require that you prepare a presentation or report on the work that you have done over the course of a semester. Oh, and do not forget to enjoy the experience!

Study Abroad

Despite what some may tell you, with the heavy course load chemical engineering entails, studying abroad is possible and can be done successfully within RPI’s curriculum standards. The exchange program for engineers is called the REACH program, (Rensselaer Education Across Cultural Horizons). As of spring 2012, there were three international schools affiliated with this program: Technical University of Denmark (Denmark), Nanyang Technological University (Singapore), and Victoria University (Australia).

There are many benefits to going abroad. You really do undergo an international experience. You will get to interact with students from a wide array of countries, not just the country you’ll be residing in. Students from all over North America, Europe, and Asia will be joining you at your host university. You will learn about countless number of cultures, lifestyles, and religions. In just one semester, you will learn how to adjust to a new environment, as well as acquire skills to help you learn in different education systems. Every country has a different educational model and different standards for learning. In many courses, the grade in a course is based on only one final exam. There are other noticeable differences in teaching standards and methodology, such as whether homework is graded and how much of it is assigned. It is helpful to gain such an appreciation of other cultures and learning styles as we graduate and enter a more competitive global job market.
Transfer of Credits: How it Works

Some of the courses might not completely cover all of the material and other courses will go above and beyond what is taught in the RPI classroom. Even though this is the case, you will still receive the credit from RPI as long as you obtain a final grade of C or higher. Your GPA and class rank at RPI will remain unaffected from your semester abroad. Your term rank will be zero because you are not receiving a GPA for that specific semester when you are away. This really does not pose a problem for most people, but it is good to be aware of. The credits will transfer, but the grades will not. On your RPI transcript, it will show that you received transfer credits for those classes. However, if any school requests to see your transcript from your study abroad university, they will see your actual grades.

Transferring Course Credit

The Office of International Programs has been in contact with the other host universities to compile a list of PRE-APPROVED courses that are equivalent to RPI courses across the engineering disciplines. However, not every required course for each major, including chemical engineering, has been pre-approved (in my experience, none of the courses I took at DTU were pre-approved). Needless to say, just because a class isn’t pre-approved, does not mean it won’t be transferred over. If you find a course in the host university’s catalog that is equivalent to a course that you need to take or seek to take at RPI, then it can still be transferred after going through a separate approval process. A credit transfer form, which can be picked up at the Registrar’s office or downloaded off the Registrar’s website, must be filled out and submitted to the Registrar. This form can be completed prior to your departure or upon arrival back from your host university. I HIGHLY recommend this paperwork be filled out before departing. The credit transfers can take up to a year to get entered into the RPI system, so it is best to get this process started as early as possible. IF A COURSE HAS ALREADY BEEN PRE-APPROVED AND IS ON THE MASTER EQUIVALENT COURSES LIST PUT TOGETHER BY THE OFFICE OF INTERNATIONAL PROGRAMS, THEN A CREDIT TRANSFER APPROVAL FORM IS NOT NECESSARY. Unfortunately, courses that previous chemical engineers took at either NTU, DTU, or Victoria University have not been added to the master pre-approved transfer courses list. Because of this, courses that you know have been approved in the past, may need to be approved again do to this lack in cross communication between the Office of International Programs and the Office of International Programs.

KEEP TWO COPIES OF ALL PAPERWORK SUBMITTED TO THE OFFICE OF INTERNATIONAL PROGRAMS AND TRANSFER CREDIT FORMS SUBMITTED TO THE REGISTRAR. In my experience, my paperwork was lost twice in the Registrar’s office so it is best to keep your own records so you can reproduce them if they are lost. The most up-to-date REACH Transfer Equivalencies list can be found on the RPI SIS home page (http://sis.rpi.edu/).

Nanyang Technological University (NTU), Singapore

It is important to note that at Nanyang Technological University (NTU) in Singapore, they do not give out C- grades.

You can access helpful NTU material online at the following URLs:

- Course Descriptions: https://wis.ntu.edu.sg/webexe/owa/aus_subj_cont.main
- Schedule of Classes: https://wish.wis.ntu.edu.sg/webexe/owa/aus_schedule.main
- Note: Any interesting course you find abroad you may be able to use as a free elective or humanities credit. Once you find it, make sure to contact the REACH (study abroad) office at RPI to get approval. You may have to get the appropriate forms from the registrar and obtain
signatures from department heads. Also, if you change courses around while abroad, make sure to contact your RPI representative before to avoid problems upon your return.

Another important adjustment when going to NTU, which some may refer to as weather shock, is the climate. Southeast Asia has a very hot humid climate for most of the year. Make sure you keep yourself hydrated everywhere you go. When traveling, put on sunblock, even if you have dark skin, as the sun is much stronger than what we are normally used to in this part of the world.

It is important to note what electronics you plan to bringing along. Singapore runs on a 220 V electrical system. America runs on a 120 V system. Therefore, if you bring devices to Singapore, make sure that it can also accept 220 V input (check by looking at the small print on the plug or charger). Once you arrive, you will have to buy a transformer because the plug shape is different than what we use. If you want to use a 120 V device over there, you will need to buy a converter. These are more expensive than a simple transformer and are also heavy and clunky.

**Denmark Technical University (DTU), Lyngby, Denmark**

**Academics:**

Denmark Technical University (DTU) is twenty-five minutes by bus from the heart of Copenhagen. It is one of the leading technical universities in Europe and is ranked the best technical university in Scandinavia. DTU is similar to RPI’s academic rigor. The grading system in Europe is on a twelve point scale starting from -3 with 0, 2, 4, 7, and 10 in between. In order to receive credit for a class taken at DTU you must receive a grade of 4 or higher. For American students, the minimum grade allowed is a 4; however, for most European and Asian students, a minimum grade of 2 is allowed, so do not let this fool you. Also, DTU uses the European Credit Transfer System (ECTS) where classes are either 5 or 10 credits. A rule of thumb is that the amount of transferrable RPI credits is half that of the ECTS credits (i.e. for each 5 ECTS course I took, I got 3 RPI credits, and for my 10 ECTS course, I got 5 RPI credits).

A semester is comprised of 13 weeks of classes, a week study period, and a week of final exams. Most classes at DTU will only have a final exam; however other classes have group projects that also count towards your overall grade. At DTU, every class will require you to work in teams; however, I did take one class (Transport Phenomena I) that required me to pass in two individual projects during the semester. All exams tend to be open book/open notes and the use of a laptop was allowed (with no internet access). There is no assigned or graded homework at DTU.

DTU has a very practically-orientated educational structure. Each class is on average 4 hours long: 2 hours are spent on teaching the material and 2 are spent on doing problem sets that apply the material. The instructor remains with the students to help the students with any questions they have on the material. Most professors at DTU prefer to be called by their first name, rather than professor. From my experience, it is a very informal relationship between the students and the professors inside the classroom and outside the class room. A large difference between RPI and DTU is the amount of theory versus the amount of application that is taught. Unlike at RPI, theory is mostly taught through application such as computer modeling and simulation. During the two hours in which the students do problem sets, you will mostly likely move to a computer lab in order to use Matlab, Simulink, COMSOL Multiphysics, or any other type of computer software.
Accommodation:

RPI students live on campus in the Kampsax residence halls. Each part of the hall is called a “kitchen”. This kitchen is shared between ten to fifteen students. There is a hallway that branches off from the shared kitchen, and everyone who shares that kitchen has a room and a bathroom to themselves. In Kampsax, there are many rooms reserved for international students so it is not necessary to buy/bring your own furniture. If there is anything missing from your room, such as a shower curtain or a broken lamp, you can go to IKEA yourself and buy new furnishings and be reimbursed by the DTU accommodation office. You must pay monthly for housing through the DTU payment portal and you cannot pay upfront the entire four months like you would do at RPI. Keep this in mind when determining your monthly budget prior to arrival at DTU. Most European exchange students find housing off campus and most of the Asian exchange students live in the on campus residence halls called Campus Village, which is a seven minute walk from Kampsax.

Introduction Week:

Introduction week is four days long prior to the beginning of the semester. I HIGHLY RECOMMEND PARTAKING IN INTRODUCTION WEEK. It is a lot of fun and you get to learn your surroundings and meet people from all over the world. The events are nothing like NRB and are way more interesting. During introduction week you will:

- Receive a tour of campus
- Receive a tour of Copenhagen
- Learn how to use the public transportation system
- Partake in night life activities in Copenhagen
- Learn about what DTU has to offer outside of academics

When I went to DTU in fall 2010, it was about a $100 to participate in introduction week.

Danish Weather:

Weather at DTU is very similar to weather in Troy. It will rain for ten minutes and then be sunny for twenty minutes and then it will start raining again. I was abroad in Denmark from mid-August to late December and the highest temperature I experienced was around 70 degrees. During the winter even though the temperatures were around the same winter temperatures in Troy and in the Northeast, it will feel colder than Troy during the winter because of the North Sea. It is recommended to bring more winter clothes and jackets than summer clothes since the summer weather ends with the last week of August.

Other Recommendations:

In order to receive the most up to date information regarding DTU it is best to go to the Office of International Programs and get contact information for people at DTU. The Office of International Programs can also give you contact information for RPI students who recently went abroad. These people are the best source of information. Not only can they give you the important information before you go, they can be a great contact when you are feeling lonely or experiencing culture shock when arriving at DTU.
Summer Study Abroad

For those students who are unable to participate in a study abroad program during the academic year, but would still like an educational/cultural experience in another country, there are several programs available through the Office of International Programs.

International Summer School – Chinese University of Hong Kong (Hong Kong, China)

Summer Study Abroad at the Chinese University of Hong Kong (CUHK) is a fantastic opportunity for students to learn and explore an exciting new culture on the opposite side of the world. RPI has built a strong partnership with the exchange program over the years. Students looking for a relaxing course load, change of pace from engineering intensive courses, and more culturally focused program will find this exchange quite appealing. The Chinese University of Hong Kong offers two summer programs for students interested in spending a month abroad during the summer.

I. International Summer School (ISS)

The ISS at CUHK is a five week program, from June 26-July 30, where students take two 3 credit classes in the areas of business, engineering, humanities, and Chinese language (Mandarin or Cantonese) and culture. Most courses count toward satisfying RPI’s humanities and social sciences requirements. Classes are in session twice a week and usually run for 2 ½ hours (with multiple 5-10 min breaks). Students are housed on-campus and are given access to all of the campus’ academic and recreational facilities. Located in the New Territories of Hong Kong, China, CUHK is a 15 min subway ride from bustling downtown HK. The exchange program is affiliated with universities around the world, giving you the opportunity to interact with students from Europe, Asia, Africa, Australia, and South America. The main focus of the program is weekend trips all over HK: from the lively downtown marketplaces, to the tranquil fishing villages and monasteries. However, nothing beats exploring the city on your own, or with a few new friends. In addition, students have the option touring Beijing, China, from August 1-4, once classes are over.

II. International Summer School – Chinese Language Program (ISS-CLP)

The ISS-CLP at CUHK is a slightly shorter (three week) program in August (August 3-24th) providing students with the opportunity to learn Mandarin or Cantonese through in-class lessons as well as out of the classroom immersion activities. Students can select courses based on their experience level. Again, students are required to take two classes (3 credits each), both of which are fully transferable as foreign language electives here at RPI. This program also offers weekend trips to various parts of the city, as well as an optional tour to Beijing, China from August 25-29th, after classes are completed.

Both summer options at CUHK are open to RPI students. For those of you who would like a study abroad experience that puts culture and exploration first, this exchange program is second to none. During my time in the ISS I had the opportunity to sample a wide variety of new food (most of which I could barely pronounce the name of), explore downtown, swim at the numerous beaches, hike the tallest mountain peak, visit multiple Buddhist temples, practice Mandarin and Cantonese with the locals, visit the highest bar in the world, bike across uninhabited islands, and visit the Great Wall, Forbidden City, Tiananmen Square, Summer Palace, the list goes on and on. No matter what your interests are, Hong Kong will satisfy them.
Students interested in either of these summer programs are free to apply on a rolling basis starting in February before the summer program starts. Applications are due by April. You must first be nominated by the Office of International Programs here at RPI. Once nominated you may apply directly to CUHK. More information regarding the Office of International Program’s nomination, transfer credit approvals, and other logistics can be found here: [http://undergrad.rpi.edu/update.do](http://undergrad.rpi.edu/update.do). Further information on the ISS program itself and where to apply can be found here: [http://www.cuhk.edu.hk/osp/iss/index.html](http://www.cuhk.edu.hk/osp/iss/index.html).

When traveling to a place like China, there are a few logistics to consider. First be sure to have all the proper vaccinations, which can be found in the above links. Second, those considering the Beijing tour or separate trips to mainland China will have to apply for an additional visa. While this can be done during your stay in Hong Kong, the Chinese Government charges Americans the most for visas. It is suggested that you apply for mainland China visa at your local embassy. Also, while much of the program is paid for by CUHK, students must pay for their own airfare. Be on the lookout for travel scholarships, should money be an issue. Finally, as with any foreign country, or city for that matter, do not carry large amounts of cash on you while outside of the University.

If you have any further questions regarding the program visit the Office of International Programs on the 4th floor of Walker Labs, or email Karen Dvorak (dvorak2@rpi.edu) or Jamie Obst (violaj2@rpi.edu).

**RPI/KNUST Exchange**

This is a study-abroad opportunity to Ghana, Africa. In the past, two chemical engineers (with junior status) are selected to participate. The program focuses on research in alternative forms of energy to bring a more reliable form of energy to Ghanaians. The contact for this program is Professor Ron Eglash in the STSS department. You may contact him at eglash@rpi.edu.

**Additional Summer/Winter Exchange Programs**

The Office of International Programs also offers other study abroad opportunities during the summer as well as during winter break. These include exchange programs in South Africa, summer research opportunities at Nanyang Technological University, and language programs in Singapore. More information on these programs can be found here: [http://undergrad.rpi.edu/update.do?catcenterkey=146](http://undergrad.rpi.edu/update.do?catcenterkey=146).

**Other General Comments about Study Abroad**

When you first arrive, you may experience what is known as culture shock. Symptoms range from anxiety to disgust to being uncomfortable. This is normal, and almost everyone goes through it. Just be prepared to undergo these transitions the first few weeks, and keep an open mind and attitude towards everything you encounter. You will also learn how to responsibly manage your time. This adjustment is because while you are studying and adjusting, you will be exploring and traveling. It would be a waste not to travel to any of the surrounding countries while abroad, and therefore, you must learn to balance travels with studies. To travel responsibly, you must make certain that accommodations, such as lodging, tours, transportation, and airplane flights are planned. The opportunities you will get from this one semester might make some of the most memorable times of your life, because of the places you will see (some that take people a lifetime to visit), and the people you will get to see them with, so don’t pass this up!
Another important aspect to traveling abroad is having access to cash money. It is hard to gain acceptance of travelers’ checks and other non-cash forms of money with banks in Southeast Asia. It can become a hassle and turn into a long process as they obtain overseas approval. It is advisable to bring over cash or to make sure you can access your money at a local bank from a bank in the US without fees. Note that if you carry more than $10,000 USD while traveling you must declare it at US customs, and depending on which country you are traveling to, there may be other regulations or associated restrictions.

It is important to mention that study abroad is not without its drawbacks. Some things you may encounter upon your return are a difficult time re-adjusting, especially with the rigorous study load at RPI that you have managed to avoid for a semester and a harder time re-establishing relationships with professors and picking things, like research, up where they left off.

Advice from those who have gone on before you:

- Make friends with the local students. They have been going to that school for several years now and will know the ropes and little tricks that will save you a lot of time in the long run. Most are really friendly and just want to interact with you to see what Americans are like. As long as you are respectful, you can both learn a lot about each other’s cultures and your studies will benefit as well.
- Make friends with the other exchange students. These students come from vast and diverse backgrounds. Many of them have the same ambitions as you for a ‘study abroad’ experience. You will still keep in touch with many of them afterwards because of the experiences you shared together, and you may even randomly run into them on your own travels.
- Do not be afraid to try any of the food! For the most part, everything I ate was so amazing and delicious. It might look weird or smell bad, but that doesn’t mean it is. There may be many things you may miss out on in life, but this should not be one of them. Take reasonable risks and try new things!

Clubs on Campus

- American Institute of Chemical Engineers (AIChE)

AIChE, the American Institute of Chemical Engineers, is a professional society that not only looks good on your resume, but allows you to develop yourself professionally and see where your interests may lie post-graduation. It includes 43,000 members from over 90 countries. Typically, the chapter membership fee each year is around $5 to $10, but it is up to the discretion of the current treasurer on what price to set. Becoming a student member online is currently free (as of spring 2010) for students within the U.S. and Canada and has many benefits, including webinars, job search tools, scholarships, and access to an international network. Visit [http://www.aiche.org/](http://www.aiche.org/).

The Society for Biological Engineers (SBE) is a technical community within AIChE and has a chapter that has been recently revitalized at RPI. Their goal is to promote the integration of biology and engineering with focuses on bioprocessing, biomedical, and biomolecular applications. They act as a distinctly separate club from AIChE at RPI. Therefore, they are worth looking into if your interests lie in the biotechnology realm.

An AIChE executive officer board should schedule a balance of professional events, such as speakers, tours, and seminars, and fun events, such as mixers, movie nights, bowling, go-karting, and laser tag.
Volunteer events, such as open houses or services to the community, should also be organized to give students a chance to give back.

One of the important services AIChE provides is resume CDs at both the fall and spring career fairs. As a member, you are entitled to submitting your resume to the board, which you should save in a PDF format with your name as the title of the file. The board then compiles members’ resumes onto CDs to hand out to companies specifically looking for chemical engineers at the fair. This is helpful as the resumes are already in electronic format and give companies the opportunity to access one pooled resource in their candidate search.

It is nice if a chemical engineering t-shirt is produced each year to give students something they can represent themselves with as a department. It is often facilitated with a t-shirt design contest, but sometimes the officers may need to take it upon themselves to create the finalized designs. Screen-It, Ltd., located on Hoosick Street in Troy, offers competitive rates and great service, as they are already used to working with organizations from RPI.

Another typical and beloved venue is a tour of Brown’s Brewing Co., located on River Street in Troy. Their current brewer as of spring 2010 is Peter Martin, who is a great guy and more than accommodating when it comes to AIChE tours. If as a group you decide to stay for dinner, he often will provide complimentary dishes or some sort of discount.

Overall, AIChE is a great organization to become a part of. Like anything in life, you get out what you put into it. If you invest the time and resources, you will surely benefit professionally, academically, and socially and will be all the better for it.

- **RPI Engineering Ambassadors**

  This student organization is focused on inspiring a younger audience (high school) to explore the role of engineers in society. RPI students are trained on how to give effective presentations. This training is then applied through hands-on demonstrations and short presentations regarding engineering topics to high school students. Funding is provided to participating RPI students. Furthermore, UTC (United Technologies) has close ties with this program. It is not uncommon for all students interested in UTC to acquire an internship or co-op through this program. To become involved, contact Elizabeth Herkenham: herkee2@rpi.edu. For more information: [http://lamp3.server.rpi.edu/soe/outreach/eap](http://lamp3.server.rpi.edu/soe/outreach/eap) [https://www.facebook.com/pages/RPI-Engineering-Ambassadors/300366633323103](https://www.facebook.com/pages/RPI-Engineering-Ambassadors/300366633323103)

- **Society of Women Engineers (SWE)**

  The Society of Women Engineers is a national professional organization with over 17,000 members worldwide in 100 professional and 300 student sections. There are also developing international sections in countries such as Singapore and India.

  **Mission:** The mission of the Society of Women Engineers is to “Stimulate women to achieve full potential in careers as engineers and leaders, expand the image of the engineering profession as a positive force in improving the quality of life, and demonstrate the value of diversity.” In demonstrating the value of diversity, the organization allows anyone to join, especially men and non-engineers! There are several networking opportunities and professional development workshops that will benefit everyone who attends.
Focused Activities: The RPI section of SWE consists of around 130 members annually. RPI SWE focuses on Professional Development, Outreach and Networking. Within the Professional Development category, RPI SWE provides several company information sessions that give members the opportunity to interact with possible employers. We offer workshops like resume critiquing, a fully catered etiquette dinner, and mock interviews to practice for the real things.

We have a very dedicated and fun outreach committee that creates several events throughout the year for young children to get them interested in Science Technology Engineering and Math (STEM). We host a one day event called “Girl Scout Engineering Day” in which children rotate through a number of fun hands-on activities, including the ever popular slime-making lab. We visit local elementary schools, middle schools, and even science fairs. In the networking category, RPI SWE offers several fun social events throughout the year like our Ice Cream Social, a Holiday Social, the spring “Swocial” and Tee Off with SWE, a golf workshop!

Awards: RPI SWE is an award winning section. At the annual conference in 2011 the section was recognized as a Gold status Outstanding Collegiate Section, received the Outreach MOU (Memorandum of Understanding) Partnership award for working with Girl Scouts, the Collegiate Transition Membership Award, and ranked 3rd in the Collegiate Website Competition.

Scholarships: RPI SWE offers some smaller scholarships throughout the year focused on book payments or conference funding, however, national SWE has hundreds of thousands of dollars to hand out to members each year. In 2011 at least 14 members of the RPI section received scholarships.

Conferences: There are two main conferences to attend annually: the Annual society conference (held in a different location within the U.S. each year) and the Regional Conference. RPI SWE is part of Region F, the northeast Region. Annual conference is an opportunity of a lifetime. Past conferences have been in Chicago, IL, Long Beach, CA, and Orlando, FL. The career fair is much larger than any at RPI. Company booths have huge pieces of equipment that have to be brought in by crane. Not to mention there are hundreds upon hundreds of workshop opportunities for 4 straight days. Regional conference is a little smaller, but offers more time for collegiate and professional members within Region F to network and share best practices.

Membership: RPI SWE events are generally open to anyone on campus; however, to be considered a full time SWE member and declare it on a resume, national dues must be paid. For college students there are a couple of options:

- **Collegiate**: $20 annually
- **Joint**: Reduced Joint membership with the American Indian Science and Engineering Society (AISES), the National Society of Black Engineers (NSBE) and the Society of Hispanic Professional Engineers (SHPE).
- **Collegiate to Career (C2C)**: One time $50 payment through all collegiate years and the first year as a professional member. A great opportunity for freshman and sophomores especially.

Resources:

Email: swe@union.rpi.edu

Website: swe.union.rpi.edu

Facebook: facebook.com/RPISWE

YouTube: youtube.com/rpiswe

National SWE website: swe.org
SBE is a subsidiary of AIChE, the American Institute of Chemical Engineers. It maintains student chapters to serve the intellectual and professional interests of students in the biological sciences. Although SBE is an engineering society, the local RPI chapter is open to any biology-related major (biology, biomedical engineering, biochemistry, biophysics, chemistry, etc.) or anyone interested in biology-related fields of work. The mission statement of the international SBE is “To promote the integration of biology with engineering and realize its benefits through bioprocessing, biomedical and bio-molecular applications.” By joining the national SBE you get access to free webinars (some of which are hosted by RPI faculty), publications, and other helpful resources. The local chapter focuses on allowing you to meet with professors here at RPI or leaders of industry, that have a focus in the biological sciences and engineering, to show you their research or their work, as well as helping to provide you with any help we can. Membership in SBE is now free to undergraduates.