

# **Academic Advising Handbook**

**Department of Chemical & Petroleum Engineering**

**1530 W 15<sup>th</sup>, Room 4132  
University of Kansas  
Lawrence, Kansas 66045-7609**



April 2007 Edition

# Academic Advising Handbook

## Department of Chemical & Petroleum Engineering October 2006 Edition

### I. SUMMARY

Academic Advising is an integral part of your development as a chemical or petroleum engineer. We feel that it is an important part of our responsibility to assist you in meeting your academic and professional goals. This advising manual provides much of the information that you will need to get the most out of your academic advising sessions. Please review it often as it provides answers to many of the questions typically asked by students.

The development of your academic Plan of Study is done under the guidance of a faculty advisor in partnership with you. For this to be successful, you should be open with your advisor about your capabilities, goals and problems.

Every student in chemical and petroleum engineering is assigned an advisor. The name of your advisor is (or will be) affixed to your advising folder held in the Department Office. Each advisor knows the curriculum, is familiar with the elective courses and will help you plan your academic program to graduate in Chemical or Petroleum Engineering within the time frame that you select. Each advisor is also familiar with the services provided by the University and can direct you to those services as the need arises.

Our goal is for you to have the same academic advisor throughout your study with us. Assuming that you stay in our program, that your advisor stays in our program and that you are satisfied with the advice, we intend for you to keep that advisor.

You may ask to change advisors. You may request this through the Department secretary. We do try to keep the advising load balanced among all advisors. Occasionally, we will not be able to honor a specific request. But we almost always can move an advisee to a new advisor.

You must see your advisor twice per year during the University advising period. Your advisor is also available throughout the academic year to consult with you on academic, professional and, when qualified, personal matters.

***You are responsible for scheduling an appointment with your advisor during the University Advising Period.***

Your advisor will post a list of available times on her or his office door. Advisor contact information is appended below at the end of this summary. At least ½ hour will be required for this session. Please come prepared with your Academic Folder that is kept in the Department Office.

From time to time, your advisor may already have your folder. If so, the Department secretary will know.

Once you and your advisor have discussed your progress, established and/or reviewed your Plan of Study, selected courses, signed your enrollment form and returned your folder to the Department Office, our Advising Coordinator will release the 'Advising Hold' electronically within one day – ***only during the one week official advising period. After the advising period is over, the advising hold is only released once per week, at most.*** You will then be free to enroll online from any internet accessible computer. We advise you to enroll in the courses agreed to between you and your advisor, but we recognize that you are responsible for your plan of study.

We encourage you to seek advice, as you need it, throughout the year. We are here to help you meet your academic goals.

When you need to add or drop courses, you should see your advisor. Bring your Academic Folder so that your advisor can assess the impact of your planned add/drop on your Plan of Study. Please do not wait to the last minute of an Add/Drop Period to see your advisor. She or he may not be available at that instant.

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### III. MISSION STATEMENTS

#### A. *Chemical Engineering Program*

##### 1. **Mission Statement**

The overall program mission for the B.S. degree in chemical or petroleum engineering is to provide a modern chemical or petroleum engineering education with proper balance between theory and practice. Graduates are prepared for professional practice in industry or government and for post-undergraduate training in chemical or petroleum engineering, medicine, etc. In addition to scientific and engineering training, students receive training in educational skills and in the humanities and social sciences.

##### 2. **Program Statement**

The principal objective of our program is to prepare graduates for professional practice in industry or government, and for post-undergraduate training in chemical engineering, medicine, and other related disciplines.

##### 3. **Program Outcomes (Goals)**

- Students must develop the ability to apply basic and engineering sciences to identify, formulate, and solve chemical engineering problems.
- Students must display an ability to integrate and apply knowledge to solve complex problems, including the design of experiments and processes, interpretation of data/results and modification of the design based upon interpretation of data/results.
- Students must be able to develop responsible solutions to the professional and ethical situations in which they may find themselves in practice.
- Students must be able to evaluate the potential risks, i.e. consequences and probabilities of engineering solutions which may affect society and the environment.
- Students must demonstrate proficiency in the use of computer software such as spreadsheets, mathematics packages, word processors, and graphics in solution of engineering problems.
- Students must develop effective oral, written, and interpersonal communication skills.

- Students must learn how to work and interact effectively in groups/teams which have diverse personalities, cultures, and backgrounds.
- Students must demonstrate the ability to learn independently and be introduced to the necessity for life-long learning.
- Students must demonstrate thorough grounding in chemistry and a working knowledge of advanced chemistry selected as appropriate to the goals of the program (AIChE Program Criteria).
- Students must demonstrate a working knowledge of chemical engineering principles including material and energy balances applied to chemical processes; thermodynamics of physical and chemical equilibria; heat, mass, and momentum transfer; chemical reaction engineering; continuous stage-wise operations; process dynamics and control; process design; safety and environmental aspects and appropriate modern experimental and computing techniques.

## ***B. Petroleum Engineering Program***

### **1. Mission Statement**

The overall program mission for the B.S. degree in chemical or petroleum engineering is to provide a modern chemical or petroleum engineering education with proper balance between theory and practice. Graduates are prepared for professional practice in industry or government and for post-undergraduate training in chemical or petroleum engineering, medicine, etc. In addition to scientific and engineering training, students receive training in educational skills and in the humanities and social sciences.

### **2. Program Statement**

The principal objective of our program is to prepare graduates for professional practice in industry or government, and for post-undergraduate training in chemical engineering, medicine, and other related disciplines.

#### Program Objectives

- Graduates must have demonstrated thorough grounding in geology including structural and sedimentary geology, chemistry, mathematics and physics; thorough grounding in the basic engineering sciences including statistics and dynamics, circuits, strength of materials, thermodynamics, material and energy balances, heat transfer, and fluid mechanics; working knowledge of reservoir engineering, production and well completion engineering, modern

drilling practices, well logging, economic analysis, water flooding and reservoir simulation, and appropriate modern experimental and computing techniques.

- Graduates must be able to function on multi-disciplinary teams and communicate effectively through active listening and verbal, written, and graphic expression.
- Graduates must understand the importance of professional responsibility and high ethical standards; must have a knowledge of contemporary issues; must possess a broad education necessary to understand the impact of engineering solutions in a global/societal context; and must have a recognition of the need for and an ability to engage in life-long learning.

### **3. Program Outcomes (Goals)**

- Students must develop the ability to apply basic and engineering sciences to identify, formulate, and solve petroleum engineering problems.
- Students must display an ability to integrate and apply knowledge to solve complex problems, including the design of experiments and processes, interpretation of data/results and modification of the design based upon interpretation of data/results.
- Students must be able to develop responsible solutions to the professional and ethical situations in which they may find themselves in practice.
- Students must be able to evaluate the potential risks, i.e. consequences and probabilities of engineering solutions which may affect society and the environment.
- Students must demonstrate proficiency in the use of computer software such as spreadsheets, mathematics packages, word processors, and graphics in solution of engineering problems.
- Students must develop effective oral, written, and interpersonal communication skills.
- Students must learn how to work and interact effectively in groups/teams which have diverse personalities, cultures, and backgrounds.
- Students must demonstrate the ability to learn independently and be introduced to the necessity for life-long learning.
- Students must demonstrate competency in mathematics through differential equations, probability, and statistics; fluid mechanics; strength of materials; and thermodynamics.
- Students must demonstrate competency in petroleum engineering including design and analysis of well systems, procedures for drilling and completing wells, characterization and

evaluation of subsurface geological formations, design and analysis of systems for producing, injecting and handling fluids; application of reservoir engineering principles and practices for optimizing resource development and management; use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty.

## IV. GENERAL ADVISING TOPICS

### A. *Responsibilities*

#### 1. **Advisee**

You are responsible for your course of study and the fulfillment of the graduation requirements. Before you can enroll, the University requires you to acknowledge that you are responsible.

Prior to meeting with your advisor, you are to obtain your folder from the Department office. You are to review your plan v. your current enrollment and review your plan for the coming semesters.

#### 2. **Advisor**

Your advisor is responsible for being available to meet your needs. She or he is there to provide advice on courses, course sequences, electives and planning. Your advisor is to schedule sufficient time to address your questions and, when necessary, provide insight into other aspects of your professional development. Your advisor is to develop insight into your capabilities, goals and desires and to provide assistance to you in meeting these subject to your capabilities. However, she or he is only an advisor.

### B. *Folder*

The Department keeps your academic folder. Contained therein are:

- A record of advising appointments, initialed by you and your advisor
- A record that documents notes, agreements, acknowledgements and drops made by you if you consulted with your advisor when you dropped courses
- A suggested semester by semester sequence of courses
- A section for developing your Plan of Study for each semester
- A record of courses completed that apply toward your degree.
- A current ARTS (Academic Record Tracking System) Form

The record of courses should be the absolute guide to progress through the curriculum. It should be updated at every advising session. While it should be consistent with the ARTS form, there may be differences due to your individualized course of study. Differences, however, should be reconciled prior to the Application for Degree is filed.

**C.     *Timing***

You must see your advisor twice per year during the University advising periods. These two periods roughly coincide with the last two weeks in October and the first two weeks after Spring Break.

We require that you meet with your advisor so that she or he can review your academic progress, discuss your performance during the current semester, plan future semesters and assist in your selection for specific courses for the coming semester and, potentially, summer session.

Advising is not complete until your advisor signs your advising form, you return your advising folder to the Department office and the department has a copy of your signed advising form.

Appendix H of this Handbook is an enrollment form supplied by the School of Engineering. A copy of this form should be brought to your advising time. This form will be signed by you and your advisor and becomes a record of your advising session. The School of Engineering has imposed an ‘Advising Hold’ on your enrollment. You will not be able to enroll until this hold is released by the Department Advising Coordinator. When you turn in your folder, staff will record that you have been advised, typically by copying your enrollment form.

The Department Advising Coordinator will then release the hold within two days after you return your folder *during the two-week advising period*. Release may take substantially longer outside this time frame.

At a time convenient to you, you sign on to the enrollment website and enroll. While you may enroll in any course you wish, subject to prerequisites, you should enroll in the courses on your enrollment form.

**D.     *Planning***

Planning the course of study is an important part of the advising process. For most students, the following guide for planning has been found to be helpful.

**Advising for Enrollment**

Second Semester Freshman  
First Semester Sophomore  
Second Semester Sophomore  
Fall Semester Junior

**Plan Through**

Second Semester Sophomore  
First Semester Junior  
Second Semester Junior  
To Graduation

You and your advisor should review your plan during each advising period, verify that adherence to the plan will result in graduation and modify the plan as necessary.

*Planning is intended to be a flexible guide to assist you in evaluating your progress toward graduation.*

You and your advisor must take the time each advising period to review the plan. Failure to do so could result in delays in graduation.

Preparation of your Plan of Study is to be done for all classes. When you are unsure of what electives you might take in the future, you still must plan when you will take them. They can generically be shown as Adv English (Advanced English), Chem Elect (Chemistry Elective), Engr (Engineering Elective), HSS (Humanities or Social Science Elective) etc. By so doing, you will have reserved a course slot in that future semester for an elective. We recommend that the advisor actually fill out the planning form in the advising packet subject to your counsel.

#### ***E. 'Sixty-Hour' Guideline***

The faculty have developed the chemical & petroleum engineering curricula with the proviso that students following these are well-prepared in the prerequisites, do not have substantial commuting time (i.e., are resident in Lawrence), do not have part-time job and/or do not have substantial extracurricular responsibilities.

For those who must or want to work at a part-time job, for those with extracurricular time responsibilities and/or for those with substantial commuting times, we recommend the following 60-hour guideline (with needed adjustments depending on some special situations noted below):

*The number of productive hours per week for a student is 60. Subtract from this the number of hours per week required for the job, extracurricular activity and/or commuting. Take the remainder and divide by 3.*

This gives the absolute **maximum** number of hours for enrollment. For example, if a student must work 20 hours per week, the **maximum** number of hours for enrollment should be  $(60-20)/3 = 13$  credit hours.

This formula **over-estimates**, however, the maximum number of hours when any of the following apply:

- The foundation in the prerequisite material is weak, e.g. a D in an earlier class such as Mass Transfer when enrolling in Design I;

- A substantial number of hours to enroll in are junior/senior level, e.g. Fall Junior Year with 8 hours of junior-level chemical engineering courses;
- A large percentage of the hours to be enrolled in are engineering courses, e.g. Spring Junior Year with 10 hours of chemical engineering courses;
- The number of contact hours is larger than the number of credit hours, e.g. C&PE 626 with 9 contact hours for 3 credit hours;
- Commuting time to the part-time job is substantial, e.g. from Lawrence to Johnson County; or,
- Preparation time for work is extraordinary, e.g. a part-time job where the dress code is not student casual.

With respect to items 1 through 3, students should consider using a divisor of 4 instead of 3. This is in recognition that the number of extra hours required outside of the classroom increases with weak preparation or higher-level courses. With respect to items 4 through 6, students should consider subtracting these extra hours from 60 as well as the number of hours required for work or outside activities.

With the recommended cap on the maximum hours, the plan of study will, in all likelihood, span five academic years rather than the normal four years. While some students may be able to handle more commitments than others, the faculty experience indicates that, for most students, ignoring this guideline will result in lower grades and a weaker foundation in the prerequisite material for subsequent courses. The effect is compounding. The result is decreased opportunities upon graduation.

Your advisor will assist in modifying your plan of study to meet your individual needs.

#### ***F. Advising Session***

You and your advisor will develop an individualized approach to your interaction. The general sequence of an advising session is:

- Review current academic progress
- Record previous semester grades in the advising packet
- Review and modify the plan
- Discuss courses for the coming semester
- Address any questions, concerns and problems.

Your advisor will post a schedule at her or his office providing time slots for which she or he will be available. You must sign up in advance. This session usually requires at least ½ hour. Please plan for this. With the onset of online enrollment and uncertainties associated with web loading, you should sign up early in the advising period.

### **G. *Add/Drop Periods***

The University has set three different periods during the course of a semester for adding and dropping courses. These roughly correspond to one third of the semester each. You should look at the University Calendar found on the KU website to find out the beginning/ending dates for each period in any given semester.

The University has specific rules for adding courses. Please consult the KU website.

Dropping courses can be done any time during the first sixty days of the semester. However, the restrictions and implications change as the semester progresses.

During the first Drop Period (See the University Registrar Calendar for the exact date in any given semester), you may drop a class without the course appearing on your transcript. (We encourage consultation with your advisor.)

During the second Drop Period which lasts through the sixtieth day, you may drop a class with your advisor's agreement. However, the instructor of record must assign a WP (Withdraw Passing) or WF (Withdraw Failing) grade. The WP or WF will appear on your transcript as part of your permanent record. Neither contributes to your GPA (Grade Point Average).

After the first 60 days of the semester, you may no longer drop a course.

On-line drop and add procedures are fluid as the University develops this system. You may actually be able to drop or add a class without seeing your advisor. We encourage you to see him or her, however. Your advisor will review your plan and assess the impact on your Plan of Study. The online system may have a 'Drop Hold' added that will need release before you can officially drop a course.

### **H. *Prerequisites***

The Chemical and Petroleum Engineering course sequences are tightly woven. The curriculum builds as you progress. Unlike most of your other experiences, each course depends upon you learning the knowledge and skills in the prerequisite courses. Should you fall behind developing this foundation, we advise you stop and re-take the course. However, you must understand that this will likely result in an additional year of study. You may not take a chemical or

petroleum engineering course without the having successfully completed the prerequisite requirements.

### 1. Chemical Engineering Prerequisite Summary

| #        | Course Title                                     | Prerequisites/Corequisites   |
|----------|--|--|
| C&PE 121 | Introduction to Computers in Engineering         | MATH 121   |
| C&PE 211 | Material and Energy Balances                     | C&PE 121 or consent<br>CHEM 188  |
| C&PE 221 | Basic Engineering Thermodynamics                 | MATH 122 or consent<br>C&PE 121 (corequisite)<br>PHSX 211 (corequisite)  |
| C&PE 511 | Momentum Transfer                                | C&PE 221   |
| C&PE 512 | Process Engineering Thermodynamics               | C&PE 221<br>C&PE 211 (corequisite)                                       |
| C&PE 521 | Heat Transfer                                    | C&PE 221<br>Differential equations                                       |
| C&PE 522 | Economic Appraisal of Chem and Petrol Projects   | MATH 122<br>C&PE 121<br>PHSX 211<br>C&PE 221 or consent                  |
| C&PE 523 | Mass Transfer                                    | C&PE 211<br>C&PE 511<br>C&PE 512<br>C&PE 521 (corequisite)               |
| C&PE 524 | Chemical Engineering Kinetics and Reactor Design | C&PE 511<br>C&PE 512<br>Differential Equations<br>C&PE 521 (corequisite) |
| C&PE 613 | Chemical Engineering Design I                    | C&PE 521<br>C&PE 522<br>C&PE 523<br>C&PE 524<br>C&PE 615 (corequisite)   |
| C&PE 615 | Introduction to Process Dynamics and Control     | C&PE 523<br>C&PE 524   |
| C&PE 616 | Chemical Engineering Laboratory I                | C&PE 523<br>C&PE 524<br>ENGL 102   |

| #        | Course Title                       | Prerequisites/Corequisites |
|----------|------------------------------------|----------------------------|
| C&PE 623 | Chemical Engineering Design II     | C&PE 613                   |
|          |                                    | C&PE 615                   |
| C&PE 624 | Plant and Environmental Safety     | C&PE 613                   |
|          |                                    | C&PE 615                   |
| C&PE 626 | Chemical Engineering Laboratory II | C&PE 523                   |
|          |                                    | C&PE 524                   |
|          |                                    | C&PE 615                   |
|          |                                    | ENGL 102                   |

## 2. Petroleum Engineering Prerequisite Summary

| #        | Course Title                                   | Prerequisites/Corequisites  |
|----------|--|-----------------------------|
| C&PE 121 | Introduction to Computers in Engineering       | MATH 121                    |
| ME 312   | Basic Engineering Thermodynamics               | MATH 122 (corequisite)      |
|          |  | PHSX 211                    |
| C&PE 511 | Momentum Transfer                              | C&PE 221                    |
| C&PE 517 | Reservoir Engineering I                        | CHEM 188                    |
|          |  | C&PE 211 (corequisite)      |
| C&PE 521 | Heat Transfer                                  | C&PE 221                    |
|          |  | Differential equations      |
| C&PE 522 | Economic Appraisal of Chem and Petrol Projects | MATH 122                    |
|          |  | C&PE 121                    |
|          |  | PHSX 211                    |
|          |  | C&PE 221 or consent         |
| C&PE 527 | Reservoir Engineering II                       | C&PE 517 or consent         |
|          |  | Differential Equations      |
| C&PE 528 | Well Logging                                   | Junior+ Standing or consent |
| C&PE 617 | Drilling and Well Completion                   | C&PE 511 or ME 610          |
|          |  | C&PE 527                    |
| C&PE 618 | Secondary Recovery                             | C&PE 527                    |
| C&PE 619 | Petroleum Engineering Laboratory I             | C&PE 527                    |
|          |  | ENGL 102                    |
| C&PE 627 | Petroleum Production                           | C&PE 617                    |

| #        | Course Title                        | Prerequisites/Corequisites |
|----------|-------------------------------------|----------------------------|
| C&PE 628 | Petroleum Engineering Design        | C&PE 522                   |
|          |                                     | C&PE 527                   |
|          |                                     | C&PE 617                   |
| C&PE 629 | Petroleum Engineering Laboratory II | C&PE 619                   |

***I. Success in Chemical Engineering and Material & Energy Balances***

If you earn a D in C&PE 211 (Material & Energy Balances) and do not retake the course, the likelihood that you will graduate in Chemical Engineering is very small. Therefore, the faculty strongly recommend you retake C&PE 211 if you earn a D and want to graduate in Chemical Engineering.

## V. CURRICULUM

### A. *General Requirements*

#### 1. **Requirements for the Bachelor of Science Degree**

The requirements for graduation are spelled out in the Undergraduate Catalog of the university. The Undergraduate Catalog is the official document of record and takes precedence over this handbook.

The Department of Chemical and Petroleum Engineering imposes these requirements:

- A student must attain a cumulative grade-point average of at least 2.0 in C&PE courses taken at KU through the junior year before being admitted to senior-level courses.
- A student must attain a cumulative grade-point average of at least 2.0 in C&PE courses taken at KU for graduation with a B.S. degree in chemical or petroleum engineering.

The School of Engineering imposes the following additional requirements.

- A student must attain a cumulative grade-point average of at least 2.0 in the courses applied toward the degree. A student must also have a KU cumulative grade-point average of 2.0 whether or not all courses are being applied to the degree.
- A student also must attain a cumulative grade-point average of at least 2.0 in all courses taken in the School of Engineering, including courses not applied toward a degree.
- A student entering with advanced standing must attain a cumulative grade-point average of at least 2.0 in the resident courses applied toward the degree and at least a 2.0 in all courses taken in the School of Engineering.
- A student must be officially enrolled in the School of Engineering while completing the last 30 hours of credit toward the degree.

#### 2. **Courses of Study**

The coursework required for the Bachelor of Science options in Chemical Engineering and Petroleum Engineering is included in the Appendix.

There are two principal programs: Chemical Engineering and Petroleum Engineering. Within Chemical Engineering, there are five options: General, Biomedical, Premedical,

Environmental and Petroleum. These options provide suggested electives. In addition, Chemical Engineering has a Co-op Program. Any of the five options can be coupled with the Co-op Program.

The suggested courses for each semester are indicated. Although there is some flexibility when elective courses are taken, most CPE courses are offered only in the semester indicated.

### **3. Mathematics**

A minimum of fifteen (15) hours of mathematics through differential equations is required.

You have two options in meeting mathematics requirements.

The first consists of MATH 121 - Calculus I (5), MATH 122 - Calculus II (5), MATH 223 - Vector Calculus (3), MATH 290 - Elementary Linear Algebra (2) and MATH 320- Elementary Differential Equations (3). This is Math Option A on the advising forms.

The second option consists of MATH 121 - Calculus I (5), MATH 122 - Calculus II (5), MATH 220 - Applied Differential Equations (3), and MATH 290 - Elementary Linear Algebra (2). This is Math Option B on the advising forms. If you choose this option and are a chemical engineer, you are required to take an additional 3 credit hours in mathematics, science, engineering, humanities or social sciences (MSEHS elective). This elective is specified in the Chemical Engineering Biomedical, Premedical and Petroleum options. If you choose this option and are a petroleum engineer, you are required to take an additional 3 credit hours in mathematics.

Your selection of your mathematics option is up to you. MATH Option A covers linear algebra and multivariable calculus and is chosen by students who want to continue develop mathematical skills from the traditional classical viewpoint. With Math Option A, MATH 320 (3 credit hours), Elementary Differential Equations, must be taken. Math Option B has an engineering applications approach and is, therefore, narrower in breadth than the MATH 223/290/320 (143/321) approach.

While the Chemical Engineering – Biomedical, Chemical Engineering - Premedical and Chemical Engineering – Petroleum curricula show the Math Option B, this is not a requirement. You may select the other but the number of hours for graduation increases by three (3).

Transfer students may have fulfilled the course requirements but may be short on hours. In this case, an additional mathematics course must be taken. MATH 526, Probability and Statistics (3 credits) is often used for this purpose. MATH 465, Probability and Statistics for Engineers, is also recommended. Other mathematics courses numbered 500 and above are acceptable. Alternatively, if you have transferred with Calculus courses that are equivalent to MATH 121 and 122, but with less than 10 hours credit, you may obtain credit by examination. You must petition the Department of Mathematics for this examination.

Substitution of basic science courses, to meet the minimum mathematics requirement, is not permitted.

Students may qualify for retroactive credit in mathematics by completing the second course in a sequence with a grade of "C" or better. Students passing MATH 122 or MATH 142 with an A, B, or C may receive credit for MATH 121 by contacting the Mathematics Department.

MATH 115 and MATH 116 count as the equivalent of MATH 121.

#### **4. Basic Sciences**

A minimum of 18 hours of basic sciences including calculus based physics and chemistry through qualitative analysis (CHEM 188) is required. If you are short credit hours because physics or chemistry taken at another institution does not have the same number of hours as at KU, you may make up the required credit hours with any natural science class or excess Advanced Chemistry hours.

If you have taken non-calculus based physics courses such as PHSX 114 and 115, you may complete the physics requirements by enrolling in PHSX 211 or 212 (as appropriate) for 1.0 credit hour. For this 1.0 credit hour, you must complete the lecture part of the course. You need not complete the laboratory part.

#### **5. English**

Nine hours of English are required. This includes ENGL 101 and ENGL 102. (Exceptions to these two are based on advanced placement considerations. See Section V.B.) The third English must be designated 'H' by the College of Liberal Arts and Sciences. ENGL 203 and above generally qualifies as the third English class.

You must enroll in the appropriate English course in your first semester at KU and maintain continuous enrollment in appropriate English courses, whether these are Applied English Center courses or regular English courses, until you have completed ENGL 102. You will not be allowed to drop ENGL 101 or ENGL 102.

You may not enroll in C&PE laboratory courses (C&PE 616, C&PE 618, C&PE 619 or C&PE 629) until you have completed English 101 and 102.

If you are an international student, as soon as you are released by the AEC, you must enroll in ENGL 101. Credits for English Composition at a foreign institution are not accepted for the required English courses in any engineering curriculum.

## **6. Humanities and Social Sciences**

All C&PE students must take fifteen (15) hours of humanities/social science courses including:

- One English course designated with an H representing a humanities
- At least one course designated as humanities (H or WH) in addition to the above English course
- At least one course designated as social science (S or WS)
- At least two courses offered by one department in either the humanities or the social sciences.

Courses in the College of Liberal Arts and Sciences designated U (Non-distribution) or N (Natural Science) cannot be used as part of the humanities and social sciences electives except for a foreign language as discussed in item 12 of this subsection.

The selection of these electives is up to you. Subsection D lists possible electives. While the selection is up to you, we encourage you enroll in courses in which you are interested.

## **7. Engineering Electives**

Twelve hours of engineering science/design electives are required except for Chemical Engineering - Biomedical which requires 11 hours.

Seven hours of engineering science are required from any field of engineering. The remaining (4-5 hours) may be engineering science or design.

At least 5 elective hours must be taken from engineering areas outside the department. At least three (3) hours must be taken within the Department. A maximum of six (6) hours may be taken from chemical and petroleum engineering. Electives in all cases must be selected from the approved list in this handbook. See Subsection C.

Introductory courses in all departments are not acceptable as engineering electives.

## **8. Maximum Enrollment**

You may not enroll in more than 19 credit hours per semester (nine credit hours during the summer session) except with approval of your advisor and the Associate Dean.

## **9. Credit/No Credit Grading**

Credit/no credit grading is allowed for courses used to fulfill English, humanities, and social science requirements only. Credit/no credit grading is not allowed for any other course.

## **10. C&PE Substitution Policies**

Substitutions are permitted by petition. The petition must provide justification for the substitution. Your advisor, the Department and the Associate Dean of the School of Engineering must approve your petition.

You should not assume approval until the petition has gone through the entire process. Petitions for substitutions should be made in the freshman-junior years where changes are still possible rather than in the senior year where it is more difficult to make adjustments.

## **11. Transfer Students and C&PE 111, 117 and 127**

If you are a transfer student, either from within KU, from another university or from a community college, you are not required to take these courses. Instead you will take an elective course or courses that will fulfill the engineering hour requirements for the courses.

CPE 111 has 1 hour of engineering science and 1 hour of other (any elective except physical education courses). CPE 117 counts as one hour of other. CPE 127 counts as one hour of engineering science. The one hour of engineering science is added to the engineering science electives. The one hour of other can be substituted with any course in the university except physical education.

In the case of a student transferring from another engineering department, you may substitute an introductory course for CPE 111 (chemical engineers) or CPE 117 and CPE 127 (petroleum engineers) if it has at least one hour of engineering science. Introductory courses which have engineering science content include ENGR 108 (1/1), AE 245 (3/0) and EECS 101 (1/0) where (#/#) is the credit hours of engineering science and other.

## **12. Foreign Language**

Foreign language courses listed as H or WH count toward the humanities requirement. Courses listed as S or WS count toward the social science requirement. Up to a maximum of six hours listed as U count toward the humanities requirement if you are not a native speaker of that language. A foreign language that is "similar" to your native language is not acceptable.

## B. Placement

KU accepts several kinds of non-traditional earned credit including Advanced Placement, International Baccalaureate, military courses and the College Level Examination Program. Retroactive credit is also offered in foreign-language classes, and ACT/SAT scores may exempt you from certain requirements. Details most relevant to you and the Department are given below. Additional information may be found on KU's Admissions website: [www.admissions.ku.edu/credit/earned.shtml](http://www.admissions.ku.edu/credit/earned.shtml).

### 1. English

Initial enrollment in English should be based on the following criteria:

- If you are **not** in the Honors Program:

| <b>ACT English Score</b> | <b>SAT English Score</b> | <b>Enroll in</b>   |
|--------------------------|--------------------------|--|
| 34-36                    | 650-800                  | Exempt from ENGL 101,<br>ENGL 105 (Freshman Honors<br>English)                               |
| 31-33                    | 600-650                  | Exempt from ENGL 101,<br>ENGL 102 (or English 105, if you<br>pass the Honors Placement Exam) |
| 30 or less               | 600 and below            | ENGL 101   |

- If you are in the Honors Program:

| <b>ACT English Score</b> | <b>SAT English Score</b> | <b>Enroll in</b>  |
|--------------------------|--------------------------|---|
| 31-36                    | 600-800                  | Exempt from ENGL 101<br>ENGL 105 (Freshman Honors<br>English)   |
| 27-30                    | 500-600                  | Exempt from ENGL 101<br>ENGL 102 (students wanting to take<br>ENGL 105 may do so if the Honors<br>Placement Exam is passed) |

ENGL 105 fulfills the requirement for ENGL 101 and 102. Direct placement into ENGL 102 fulfills requirement for ENGL 101 and 102. **No Hours** for ENGL 101 credit are assigned in either case. Students must replace the ENGL 101 hours with another course as chosen by the student with guidance from the academic advisor.

### 2. Mathematics

The Department of Mathematics closely monitors initial enrollment in math courses. If you enroll in a course without meeting the criteria, your math enrollment will be canceled.

- If you have a mathematics ACT score of 28 or above (SAT above 640), you are eligible to enroll in MATH 121 - Calculus I.
- If you have a mathematics ACT score between 22 and 27 (SAT between 540 and 630), you must enroll in MATH 104 – Pre-calculus.
- If you have a Mathematics ACT Score below 22 (SAT below 530), you must enroll in MATH 002.

If you want to take a math course at a higher level than one for which they are eligible, you should contact the Mathematics Department to request a placement test.

### **3. Chemistry**

Students who receive a score of 5 on the Advanced Chemistry Placement Examination need not take CHEM 184 and 188 and will receive 10 hours of credit. Those who receive a score of 3 or 4 will, after Department of Chemistry review and permission, be given credit for CHEM 184. Upon passing a special examination, credit for CHEM 188 may also be given.

#### **C. *Engineering Electives***

At least three hours of engineering elective must be taken within your field of study except in the Chemical Engineering Environmental Option. No more than six hours may be within Department except as noted below.

You should select engineering electives based on your interests. Oftentimes, these electives are only offered once per year or once every three semesters. Therefore, you must plan in advance so that you are able to enroll in the elective of interest.

Note that there are only 11 hours of engineering elective required for the Chemical Engineering - Biomedical option. Three hours of those electives is required to be C&PE 656. Another three hours is recommended but not required, C&PE 651/661.

#### **1. Acceptable Electives**

Petroleum engineering junior and senior level courses C&PE 517, 527, 528, 617, 618, 619, 627, 628, 629 may be taken by students pursuing chemical engineering degrees as engineering electives, if the prerequisites are met. The six-hour maximum discussed under Engineering Electives (Section V, Subsection A, Item 7) does not hold in this case.

Chemical engineering junior and senior level courses C&PE 523, 524, 613, 615, 616, 618, 623, 624 may be taken by petroleum engineering students as engineering electives if the prerequisites are met. The six-hour maximum discussed under Engineering Electives (Section V, Subsection A, Item 7) does not hold in this case.

Other courses which have engineering science or design content that are offered by departments in the School of Engineering may be taken by a C&PE student if the prerequisites of the course are met or by permission of the instructor. These courses may not substantially in whole or part reproduce topics covered in our program. They must broaden your knowledge and/or skill while meeting the engineering science and design requirements.

## 2. Unacceptable Electives

Some engineering courses that are offered by other departments replicate our required courses. If the required courses have been or will be taken, those courses offered by other departments may not be used as engineering electives. Examples follow.

- **ME 312** Engineering Thermodynamics (3 credits) duplicates C&PE 221 Basic Engineering Thermodynamics.
- **ME 512** Introduction to Thermal Engineering (3 credits) is a combination of ME 312 and ME 612 and *may not be used* as an engineering elective.
- **ME 510** and **ME 612** are equivalent to C&PE 511 and C&PE 521, respectively.
- **CMGT 357** Introduction to Engineering Economics duplicates material covered in C&PE 522 and *may not be used* as an engineering elective.

Some courses offered by the School of Engineering do not contain any engineering science or design content. These may not be used as engineering electives. They may be used for 'Other' or MSEHS elective hours, when needed. Examples of these courses are:

- **ENGR 504** Technical Writing is credit for writing for the Kansas Engineer. It *may not be used* as an engineering elective.
- **ENGR 514** Technical/Science Communications to Non Technical Populations (3 credits) *may not be used* as an engineering elective.
- **ENGR 515** Verbal Communications in Engineering *may not be used* as an engineering elective.

Programming courses such as JAVA and C++ are not considered to be broadening and are not acceptable engineering electives.

***D. Humanities & Social Sciences Electives***

The College of Liberal Arts and Sciences evaluates their courses and assigns the designation of H, WH, S, WS, N and U. Those courses designated as H, WH, S or WS are acceptable as a Humanities or Social Sciences Elective. The Undergraduate Catalog is the final authority for the CLAS designation. The key is the first letter. If H appears, it is a humanities. For example, HL is Literature and the Art; so labeled courses are humanities.

Examples of departments that offer courses with these acceptable designations are listed below. In some cases, courses within these departments do not count, e.g. some in Geography. You are advised to read the CLAS designation in the Undergraduate Catalog before enrolling and trying to the course as a Humanities or Social Science Elective.

- African and African-American Studies
- American Studies
- Anthropology
- Classics
- Communications
- Dance
- East Asian Languages & Cultures
- Eastern Civilization
- Economics
- English
- Geography
- History
- History of Art
- Human Development and Family Life
- Humanities and Comparative Literature
- Latin American Area Studies

- Linguistics
- Music History
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Slavic Languages & Literature
- Sociology
- Theatre & Film
- Women's Studies

### ***E. Chemical Engineering Advanced Chemistry Electives***

A minimum of 16 hours of advanced chemistry is required. Advanced chemistry courses deal with changes in composition, structure and properties of matter at an advanced level. We require CHEM 624 (3), CHEM 625 (2) and CHEM 646 (4). At the time of this writing (March 2007), chemistry is changing CHEM 646 content and credit hours. See your advisor.

You have flexibility in choosing the remaining seven (7) hours (8 if you have yet to enroll in CHEM 646). These may all be upper level chemistry including BIOL 600, Biochemistry. Up to four hours may come from the Natural Sciences including physics, biology and geology. These must be designated by the College and Liberal Sciences as N in the Undergraduate Catalog. In addition, you have a menu of courses from other departments which qualify as advanced chemistry. These are listed below.

#### **1. Chemistry**

You may select any chemistry course at 400 level or higher excluding seminars or other courses not having >90% science content.

#### **2. Engineering Courses Acceptable for Advanced Chemistry**

|          |  |
|----------|--|
| C&PE 765 | Corrosion Engineering                          |
| C&PE 657 | Polymer Science & Technology                   |
| CE 770   | Concepts of Environmental Chemistry            |
| CE 771   | Environmental Chemical Analysis                |
| CE 774   | Chemical Principles of Environmental Processes |

#### **3. Engineering Courses with Partial Credit for Advanced Chemistry**

|          |  |
|----------|--|
| C&PE 721 | Chemical. Engineering Thermodynamics (2 of 3 credit hours) |
| C&PE 722 | Kinetics and Catalysis (2 of 3 credit hours)               |
| ME 306   | Science of Materials (2 of 3 acceptable)                   |

#### 4. Other Engineering Courses

The following courses may be acceptable as an advanced Chemistry. A letter from the instructor is required. That letter must describe the chemistry content of the work and indicate the number of hours that can be used as advanced chemistry.

|          |  |
|----------|--|
| C&PE 651 | Undergraduate Problems                       |
| C&PE 661 | Undergraduate Honors Research                |
| C&PE 715 | Topics in Chemical and Petroleum Engineering |
| CE 490   | Special Problems                             |

#### 5. Natural Sciences

Higher level natural science courses as listed below are acceptable electives to fulfill four (4) of the seven (7) possible credit hours. Seminars may not be taken for Advanced Chemistry credit. In special cases, lower level natural science courses are acceptable electives. These are indicated below.

- **Biology** – You may use any biology course designated as N in the timetable. This includes BIOL 100, 101 and 102.
- **Microbiology** – You may use any microbiology course designated as N in the timetable. This includes MCRB 110.
- **Geology** – You may use any geology designated as N. This includes GEOL 101 and 105.
- **Physics** – You may use any physics course at 300 level or higher designated as N. This includes PHSX 313.
- **CE 773** – Biological Principles of Environmental Engineering Processes (2 of 3 credit hours).

## **VI. FOUR-YEAR SCHOLARSHIPS IN CHEMICAL AND PETROLEUM ENGINEERING**

### **A. *General Requirements***

Chemical and Petroleum Engineering scholarships are awarded to entering freshmen with outstanding academic records. They are renewable for up to eight academic (fall/spring) semesters until graduation with a B.S. Degree in Chemical or Petroleum Engineering. The requirements for scholarship retention are:

- You must be continuously enrolled at the University of Kansas for the fall and spring semesters of each academic year. Such enrollment must be in a program leading to the B.S. Degree in either Chemical or Petroleum Engineering.
- You must maintain a cumulative Grade Point Average (GPA) of 3.2 or better. Both your overall GPA and your GPA in engineering courses must meet this criterion. These GPA's are computed for courses completed at the University of Kansas, only.
- You must complete at least twelve (12) credit hours in a semester. Credit hours taken at a college or university other than the University of Kansas can be counted toward this total but the grade points earned are not included when evaluating whether the GPA criterion above has been met. These courses must count toward the degree as specified in the Advising Packet and ARTS form. Departmental courses as specified on the schedule below must be part of this total.

### **B. *Required Course Schedule for Four-Year Scholarship Recipients***

#### **1. Freshman**

C&PE 111 - Fall

C&PE 121 - Spring after freshman year

#### **2. Sophomore**

C&PE 211 - Summer after freshman year or Fall of sophomore year

### **C. *Review, Continuance and Discontinuance***

The Scholarship Committee reviews student progress each semester. If you do not meet the requirements, the scholarship can be discontinued. If through initial enrollment or the add/drop process in the first 4 weeks of the semester, a student's enrollment drops below the 12 credits

identified above, the scholarship may be terminated immediately. This may require the student to repay the scholarship amount to the University. However, a one semester probationary period is normally provided prior to loss of the scholarship if:

- Any semester GPA (either overall or engineering) is less than 3.2.
- The cumulative GPA after two or more semesters (either overall or engineering) falls below 3.2.

The Scholarship Committee will review your progress on scholarship probation after the one semester probationary period. If the condition causing the probation has been corrected, you will be removed from probation. If not, the scholarship will normally be discontinued unless there are mitigating circumstances. In no case will the probation be continued more than two contiguous semesters.

For freshmen, this scholarship will be awarded for at least two semesters unless:

- The first semester GPA is less than 2.5 in courses that count toward the degree, or
- Fewer than 12 credit hours that count toward the degree have been completed in the first semester.
- Enrollment in the second semester is less than 12 credit hours that count toward the degree.

Any student whose scholarship has been discontinued may apply for reinstatement at a later date. The Scholarship Committee will act upon a written request for reinstatement.

## VII. HONORS

### A. *Departmental Honors*

You can earn Departmental Honors in Chemical & Petroleum Engineering by meeting the following criteria:

- Completion of the B.S. degree program in Chemical & Petroleum Engineering with an overall GPA of 3.5 in courses taken at KU
- Completion of C&PE 661, Undergraduate Honors Research, for a minimum of three (3) credit hours with a grade of A or B

You may not enroll in C&PE 661 before the second semester of the junior year in the C&PE program. You are allowed to enroll in C&PE 661 if your overall GPA and engineering GPA in courses taken at KU is 3.5 or higher. Enrollment in C&PE 661 constitutes acceptance as a candidate into the Departmental Honors Program.

Students awarded Departmental Honors will be recognized in the Commencement Program and on the University transcript.

### B. *College of Liberal Arts and Sciences Honors*

You are invited to join the College of Liberal Arts and Sciences Honors Program if:

- You have an ACT composite score of 31 (SAT 1340); or,
- You are a National Merit Finalist; or,
- You are a Summerfield Scholar; or,
- You are a Watkins-Berger Scholar; or,
- You have a strong academic record.

If you want to take honors courses, you should contact the Honors Program at Nunemaker Center, 1506 Engel Road. The Undergraduate Catalog contains additional information regarding requirements.

### C. *Graduation with Distinction*

If you are in the top 10% of the graduating class as measured by the cumulative KU GPA and you have taken at least 64 hours in residence at KU, you are qualified to graduate with distinction. You are qualified for graduation with highest distinction if you are in the top 1/3 of those graduating with distinction.

The list is compiled once per year and includes August, December and May graduates.

## VIII. OTHER TOPICS

### A. *Co-op Program*

#### 1. **Overview**

The Department of Chemical & Petroleum Engineering's Co-op (Cooperative Education) Program is an excellent opportunity for you to obtain industrial experience and perspective while pursuing a degree in chemical engineering.

This highly competitive opportunity is open to all students in the chemical engineering curriculum at any point during their academic study beyond the first semester of the sophomore year. Typically, however, students enter the program after completing C&PE 211, Material & Energy Balances. The number of Co-op positions open during any year depends upon the number of opportunities offered by recruiting companies.

The program is based on cooperative experience in education and industry. The typical Co-op program would have you working for a company for three separate time periods during the study of chemical engineering. The assignments may be at a variety of locations. During these periods, you are away from the KU campus, typically for a semester or semester plus summer. You are on professional assignment with the company but remain a full-time student at KU. During the assignment, the company provides industrial experience and professional pay consistent with your academic background. Assuming continued success, you continue with the company on subsequent Co-op assignments.

#### 2. **Academic Requirements**

In order to remain a full-time student, you would enroll in one (1) hour of ENGR 300 under the supervision of the Co-op adviser during each Co-op period. ENGR 300 does not count as an engineering elective. Therefore, if you were to be away from campus for three separate Co-op time periods, three (3) hours of ENGR 300 are required, in addition to all other requirements for graduation.

A typical Co-op curriculum is found in the Appendix. However, the program is very flexible and may be tailored to meet your needs, the industrial assignments and your goals. Should you opt for a Co-op assignment, you should note that the Co-op program requires, typically, at least one additional year for graduation. The Co-op Advisor and your assigned Advisor are very experienced in tailoring the program to meet your needs. Please feel free to consult with both.

### **3. Application Process**

The application process is the same as that for summer internship and permanent employment. You need to file a resume with the Engineering Career Services using their procedures. This allows you to interview with companies who visit during the fall Career Fair and during the fall interview period. As opportunities are limited and the time is early in the fall semester, you must prepare for interviewing as soon as you arrive back on campus after the summer break. If you do not file a resume with Career Services, you will not be eligible to interview with potential Co-op employers and will miss the opportunity. The Co-op interview typically lasts 20-30 minutes. A plant visit may also be required.

### **4. Advising Requirements**

Once a Co-op assignment is offered, you must modify your Plan of Study to reflect admittance into the Co-op program. However, we encourage you to talk with the Co-op adviser early in the process. Changing to the Co-op adviser is not required but is recommended once the student is in the program.

### **5. Advantages/Disadvantages**

The principal advantage of the Co-op program is that you will gain industrial perspective during your course of study. This experience helps to provide perspective while studying the course material required for graduation. A secondary advantage is that you are paid a professional salary while on assignment. You should note that the host company is able to evaluate the engineering and interpersonal skills during the Co-op assignments which may increase the probability that a permanent job offer is made after graduation.

The principal disadvantage is that at least one additional year is required to complete the chemical engineering degree. This additional year results in additional investment in tuition, living costs and lost post-graduation professional salary (for the one additional year required for the Co-op program). A summer internship does provide similar experience to the Co-op experience, but the internship assignments are also limited.

## ***B. Pre-Medical Program***

### **1. Required Biology and Chemistry Classes**

Within the BSChE program, the Department offers a Pre-Medical option. This option was developed in conjunction with the Pre-Medical program at KU. The requirements within chemical engineering are the same. The notable difference is the emphasis on biology.

BIOL 150 and 152 count as part of the Advanced Science requirement in Chemical Engineering. They are required for admission to medical school. The completion of these two biology courses and the corresponding laboratories fulfills the required biology for admission into medical school. In addition, the CHEM 626 and 627 are required beyond the single semester of organic chemistry required in chemical engineering.

## **2. Recommended Biology Classes**

However, we recommend that students take additional biology before they take the MCAT. In order of importance, these recommended courses are:

Biol 416 [Cell Structure & Function]

Biol 350 [Genetics]

Biol 246 or 646 [Physiology]

In addition, the following courses are recommended but can be taken after the MCAT.

Biol 600 or 636 [Biochemistry]

Biol 247 or 647 [Physiology Laboratory]

Biol 240 [Anatomy]

Biochemistry is strongly recommended as a precursor to the much more difficult course taken in medical school.

## **3. Length of Study**

The course of study (Appendix C) is a sample program which shows what is required to graduate in four years, take some of the recommended biology and be prepared for medical school. Note that summer school is required, assuming no transfer credit from high school. However, this limits your experience and perspective of medicine and engineering. You may want to consider the following:

1. Consider taking five years.
2. Do not take classes in the summer allowing time recover between academic years
3. Use the four summers to get medically-related work experience, e.g.
  - volunteer at emergency room or low income clinic or county health department;
  - shadow a doctor;
  - work in a hospital laboratory / take patient samples;
  - do medical undergraduate research project;
  - become certified as a emergency medical technician or nursing assistant; or,
  - work on a medical mission in the US or other nation.
4. Work as an engineering summer intern.

In approaching your studies, you must want to be a chemical engineer. There are easier paths to follow to earn medical school prerequisites.

### ***C. Professional Registration***

Registration is a process that ultimately identifies an individual as an engineer who has achieved professional excellence and is recognized among his/her peers. It is the legal certification of the ability to practice engineering in the public arena. Professional registration is now becoming a requisite for such things as expert testimony, federal and state reporting, engineering design certification and professional consulting. Consequently, we encourage students to begin the process of seeking professional registration while completing your undergraduate degree.

Professional registration requires passing the Fundamentals of Engineering Examination, a period of four years experience as a practicing engineer and, subsequently, passing the Principles and Practice of Engineering Examination.

The Fundamentals of Engineering Examination is offered two times each year, in the fall and the spring. Juniors are eligible to take the examination in the Spring Semester. Seniors may take it Fall or Spring.

Students are encouraged to take the Fundamentals of Engineering Examination during their junior or senior year at KU while the material covered in the examination is still fresh. A new format was introduced for the FE Exam in October 1996. The examination is subdivided into two sections. The morning examination consists of 120 questions covering the broad range of topics. The afternoon examination (60 questions) is discipline specific for chemical engineers, but covers general subjects for petroleum engineers.

Students who are planning to take the Fundamentals of Engineering Examination will find courses in Statics (CE 201), Strength of Materials (CE 310) and Electrical Circuits, Devices and Systems Circuits (EECS 319) to be valuable engineering electives.

### ***D. Academic Minors***

The engineering school does not have specific academic minors. However, students may earn minor degrees based on the College of Liberal Arts and Sciences requirements. The College of Liberal Arts and Sciences awards Minor Degrees.

If a student believes that he/she has or will earn a minor degree, an application is filed through the School of Engineering. The student must have a 'Minor Advisor'. She or he must sign this application form. The form is returned to the School of Engineering. This will be forwarded to

the College of Liberal Arts and Sciences for evaluation. If the College officials agree, the student will be awarded a Minor Degree upon graduation along with the B.S. Degree.

Minor Degrees are intended to be in an area beyond your normal field of study. Chemical engineering students will not be awarded Minor Degrees in chemistry because this is closely allied with chemical engineering and not viewed as an extension of the student's major field of study.

The minors approved are:

|                                   |                                |                                  |
|-----------------------------------|--------------------------------|----------------------------------|
| African/African-American          | Anthropology                   | Astronomy                        |
| Atmospheric Science               | Chemistry                      | Classics                         |
| Communication Studies             | East Asian Language & Cultures |                                  |
| Economics                         | English                        | European Studies                 |
| French                            | Geography                      | German                           |
| History of Art                    | Italian                        | Linguistics                      |
| Mathematics                       | Philosophy                     | Physics                          |
| Public Service & Civic Leadership | Religious Studies              |                                  |
| Sociology                         | Speech-Language-Hearing        | Slavic Languages and Literatures |
| Women's Studies                   |                                |                                  |

This list of minors is subject to change and extension. Check with the School of Engineering for the complete list.

To obtain a minor, the student must take at least 18 credit hours, 12 of which must be 300 level courses or above. The student must have at least a 2.0 GPA in the minor. If the department or program in the College of Liberal Arts and Sciences has additional requirements for their minor, you must meet those requirements, as well.

No minors are allowed with other professional schools and it is not possible to obtain a minor in a department of engineering.

Consult the College of Liberal Arts and Sciences for the specific requirements for each of these minors.

## **IX. APPENDIX**

The following appendices contain the course requirements and suggested course sequences for the programs listed.

While the faculty has developed a suggested course sequence, you and your advisor will jointly develop your Plan of Study to meet your capabilities and goals.

The Department awards two B.S. degrees, i.e. Chemical Engineering and Petroleum Engineering. The programs in Environmental, Biomedical and Pre-Medical are recommendations for courses to provide emphases in these areas. You may mix and match courses as required to meet your goals.

- A. Chemical Engineering - General***
- B. Chemical Engineering - Biomedical***
- C. Chemical Engineering - Premedical***
- D. Chemical Engineering - Environmental***
- E. Chemical Engineering - Petroleum***
- F. Chemical Engineering - Co-op Program***
- G. Petroleum Engineering***

## A. Chemical Engineering - General

| <b>FRESHMAN YEAR</b> |  |                |
|----------------------|--|----------------|
| <b>FALL</b>          |  |                |
| C&PE 111             | Introduction to the Profession           | 2              |
| CHEM 184             | Foundations of Chemistry I               | 5              |
| ENGL 101             | Composition                              | 3              |
| MATH 121             | Calculus I                               | 5              |
|                      |  | Total 15 hours |
| <b>SPRING</b>        |  |                |
| C&PE 121             | Introduction to Computers In Engineering | 3              |
| CHEM 188             | Foundations of Chemistry II              | 5              |
| ENGL 102             | Composition & Literature                 | 3              |
| MATH 122             | Calculus II                              | 5              |
|                      |  | Total 16 hours |

| <b>SOPHOMORE YEAR</b> |  |                |
|-----------------------|--|----------------|
| <b>FALL</b>           |  |                |
| C&PE 211              | Material & Energy Balances                         | 3              |
| CHEM 624              | Organic Chemistry I                                | 3              |
| CHEM 625              | Organic Chemistry I Lab                            | 2              |
| MATH 223              | Vector Calculus (Option A)                         | 3              |
| MATH 290              | Elementary Linear Algebra (Option A)               | 2              |
| or                    |  |                |
| MATH 220              | Applied Differential Equations (Option B)          | 3              |
| MATH 290              | Elementary Linear Algebra (Option B)               | 2              |
| PHSX 211              | General Physics I                                  | 4              |
|                       |  | Total 17 hours |
| <b>SPRING</b>         |  |                |
| C&PE 221              | Basic Engineering Thermodynamics                   | 3              |
| ENGL ____             | Advanced English Elective                          | 3              |
| MATH 320              | Elementary Differential Equations (Option A)*      | 3              |
| or                    |  |                |
| _____                 | Humanities or Social Sciences Elective (Option B)* | 3              |
| PHSX 212              | General Physics II                                 | 4              |
| _____                 | Advanced Chemistry Elective                        | 3              |
|                       |  | Total 16 hours |

| <b>JUNIOR YEAR</b> |  |                |
|--------------------|--|----------------|
| <b>FALL</b>        |  |                |
| C&PE 511           | Momentum Transfer                                  | 3              |
| C&PE 512           | Process Engineering Thermodynamics                 | 3              |
| C&PE 522           | Economic Appraisal of C&PE Projects                | 2              |
| CHEM 646           | Physical Chemistry I                               | 4              |
| _____              | Humanities or Social Sciences Elective (Option A)* | 3              |
| _____              | or   |                |
| _____              | MSEHS Elective (Option B)*                         | 3              |
| _____              | Engineering Elective                               | 3              |
|                    |  | Total 18 hours |
| <b>SPRING</b>      |  |                |
| C&PE 521           | Heat Transfer                                      | 3              |
| C&PE 523           | Mass Transfer                                      | 4              |
| C&PE 524           | Chemical Engineering Kinetics & Reactor Design     | 3              |
| _____              | Advanced Chemistry Elective                        | 4              |
| _____              | Humanities or Social Sciences Elective             | 3              |
|                    |  | Total 17 hours |

| <b>SENIOR YEAR</b> |  |                |
|--------------------|--|----------------|
| <b>FALL</b>        |  |                |
| C&PE 613           | Chemical Engineering Design I                | 4              |
| C&PE 615           | Introduction to Process Dynamics and Control | 3              |
| C&PE 616           | Chemical Engineering Laboratory I            | 3              |
| _____              | Engineering Elective                         | 3              |
| _____              | Humanities or Social Sciences Elective       | 3              |
|                    |  | Total 16 hours |
| <b>SPRING</b>      |  |                |
| C&PE 623           | Chemical Engineering Design II               | 2              |
| C&PE 624           | Plant & Environmental Safety                 | 3              |
| C&PE 626           | Chemical Engineering Laboratory II           | 3              |
| C&PE ____          | Elective                                     | 3              |
| _____              | Engineering Elective                         | 3              |
| _____              | Humanities or Social Sciences Elective       | 3              |
|                    |  | Total 17 hours |

\*Students may select one of two MATH options. Selecting Option B, MATH 220/290, gives students an additional elective in MATH, science, engineering, humanities or social sciences (MSEHS elective).

132 credit hours required for graduation.

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## B. Chemical Engineering - Biomedical

| <b>FRESHMAN YEAR</b> |  |                |
|----------------------|--|----------------|
| <b>FALL</b>          |  |                |
| C&PE 111             | Introduction to the Profession           | 2              |
| CHEM 184             | Foundations of Chemistry I               | 5              |
| ENGL 101             | Composition                              | 3              |
| MATH 121             | Calculus I                               | 5              |
|                      |  | Total 15 hours |
| <b>SPRING</b>        |  |                |
| C&PE 121             | Introduction to Computers in Engineering | 3              |
| CHEM 188             | Foundations of Chemistry II              | 5              |
| ENGL 102             | Composition & Literature                 | 3              |
| MATH 122             | Calculus II                              | 5              |
|                      |  | Total 16 hours |

| <b>SOPHOMORE YEAR</b> |  |                |
|-----------------------|--|----------------|
| <b>FALL</b>           |  |                |
| C&PE 211              | Material & Energy Balances             | 3              |
| CHEM 624              | Organic Chemistry I                    | 3              |
| CHEM 625              | Organic Chemistry I Lab                | 2              |
| MATH 220              | Applied Differential Equations         | 3              |
| PHSX 211              | General Physics I                      | 4              |
| _____                 | Humanities or Social Sciences Elective | 3              |
|                       |  | Total 18 hours |
| <b>SPRING</b>         |  |                |
| C&PE 221              | Basic Engineering Thermodynamics       | 3              |
| CHEM 626              | Organic Chemistry II Lecture           | 3              |
| MATH 290              | Elementary Linear Algebra              | 2              |
| ENGL _____            | Advanced English Elective              | 3              |
| PHSX 212              | General Physics II                     | 4              |
| _____                 | Engineering Elective                   | 3              |
|                       |  | Total 18 hours |

| <b>JUNIOR YEAR</b> |  |                   |
|--------------------|--|-------------------|
| <b>FALL</b>        |  |                   |
| C&PE 511           | Momentum Transfer                              | 3                 |
| C&PE 512           | Process Engineering Thermodynamics             | 3                 |
| C&PE 522           | Economic Appraisal of C&PE Projects            | 2                 |
| CHEM 646           | Physical Chemistry I                           | 4                 |
| BIOL 100           | Principles of Biology                          | 3                 |
| _____              | Humanities or Social Sciences Elective         | 3                 |
|                    |  | Total 18 hours    |
| <b>SPRING</b>      |  |                   |
| C&PE 521           | Heat Transfer                                  | 3                 |
| C&PE 523           | Mass Transfer                                  | 4                 |
| C&PE 524           | Chemical Engineering Kinetics & Reactor Design | 3                 |
| BIOL 246           | Principles of Human Physiology                 | 3                 |
|                    | or   |                   |
| BIOL 646           | Mammalian Physiology                           | 4                 |
| _____              | Humanities or Social Sciences Elective         | 3                 |
|                    |  | Total 16-17 hours |

| <b>SENIOR YEAR</b> |  |                   |
|--------------------|--|-------------------|
| <b>FALL</b>        |  |                   |
| C&PE 613           | Chemical Engineering Design I                    | 4                 |
| C&PE 615           | Introduction to Process Dynamics and Control     | 3                 |
| C&PE 616           | Chemical Engineering Laboratory I                | 3                 |
| BIOL 600           | Introductory Biochemistry                        | 4                 |
|                    | or   |                   |
| BIOL 658           | Biochemistry I                                   | 3                 |
| _____              | Humanities or Social Sciences Elective           | 3                 |
|                    |  | Total 16-17 hours |
| <b>SPRING</b>      |  |                   |
| C&PE 623           | Chemical Engineering Design II                   | 2                 |
| C&PE 624           | Plant & Environmental Safety                     | 3                 |
| C&PE 626           | Chemical Engineering Laboratory II               | 3                 |
| C&PE 656           | Introduction to Biomedical Engineering           | 3                 |
| C&PE 651           | Undergraduate Problems (or Engineering Elective) | 3                 |
| _____              | Engineering Elective                             | 3                 |
|                    |  | Total 17 hours    |

134 credit hours required for graduation

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### C. Chemical Engineering - Premedical

| FRESHMAN YEAR |  |                |
|---------------|--|----------------|
| FALL          |  |                |
| C&PE 111      | Introduction to the Profession           | 2              |
| CHEM 184      | Foundations of Chemistry I               | 5              |
| ENGL 101      | Composition                              | 3              |
| MATH 121      | Calculus I                               | 5              |
|               |  | Total 15 hours |
| SPRING        |  |                |
| C&PE 121      | Introduction to Computers In Engineering | 3              |
| CHEM 188      | Foundations of Chemistry II              | 5              |
| ENGL 102      | Composition & Literature                 | 3              |
| MATH 122      | Calculus II                              | 5              |
|               |  | Total 16 hours |
| SUMMER        |  |                |
| ENGL ____     | Advanced English Elective                | 3              |
| _____         | Humanities or Social Sciences Elective   | 3              |
|               |  | Total 6 hours  |

| SOPHOMORE YEAR |  |                   |
|----------------|--|-------------------|
| FALL           |  |                   |
| C&PE 211       | Material & Energy Balances                 | 3                 |
| MATH 220       | Applied Differential Equations             | 3                 |
| MATH 290       | Elementary Linear Algebra                  | 2                 |
| CHEM 624       | Organic Chemistry I Lecture                | 3                 |
| CHEM 625       | Organic Chemistry I Lab                    | 2                 |
| BIOL 150       | Principles Molecular and Cellular Biology  | 4                 |
|                |  | Total 17 hours    |
| SPRING         |  |                   |
| C&PE 221       | Basic Engineering Thermodynamics           | 3                 |
| PHSX 211       | General Physics I                          | 4                 |
| BIOL 152       | Principles of Organismal Biology           | 4                 |
| BIOL 246       | Principles of Human Physiology*            | 3                 |
| BIOL 247       | Principles of Human Physiology Laboratory* | 2                 |
|                | or   |                   |
| BIOL 646       | Mammalian Physiology*                      | 4                 |
| BIOL 647       | Mammalian Physiology Laboratory*           | 2                 |
|                |  | Total 16-17 hours |
| SUMMER         |  |                   |
| PHSX 212       | General Physics II                         | 4                 |
|                |  | Total 4 hours     |

134 credit hours required for graduation, 145 credit hours including recommended courses

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| JUNIOR YEAR |  |                |
|-------------|--|----------------|
| FALL        |  |                |
| C&PE 511    | Momentum Transfer                              | 3              |
| C&PE 512    | Process Engineering Thermodynamics             | 3              |
| C&PE 522    | Economic Appraisal of C&PE Projects            | 2              |
| CHEM 646    | Physical Chemistry I                           | 4              |
| BIOL 350    | Principles of Genetics*                        | 3              |
| _____       | Humanities or Social Sciences Elective         | 3              |
|             |  | Total 18 hours |
| SPRING      |  |                |
| C&PE 521    | Heat Transfer                                  | 3              |
| C&PE 523    | Mass Transfer                                  | 4              |
| C&PE 524    | Chemical Engineering Kinetics & Reactor Design | 3              |
| CHEM 626    | Organic Chemistry II                           | 3              |
| BIOL 416    | Cell Structure and Function*                   | 3              |
|             |  | Total 16 hours |
| SUMMER      |  |                |
| _____       | Engineering Elective                           | 3              |
| _____       | Humanities or Social Sciences Elective         | 3              |
|             |  | Total 6 hours  |

| SENIOR YEAR |  |                |
|-------------|--|----------------|
| FALL        |  |                |
| C&PE 613    | Chemical Engineering Design I                | 4              |
| C&PE 615    | Introduction to Process Dynamics and Control | 3              |
| C&PE 616    | Chemical Engineering Laboratory I            | 3              |
| _____       | Engineering Elective                         | 3              |
| _____       | Humanities or Social Sciences Elective       | 3              |
|             |  | Total 16 hours |
| SPRING      |  |                |
| C&PE 623    | Chemical Engineering Design II               | 2              |
| C&PE 624    | Plant & Environmental Safety                 | 3              |
| C&PE 626    | Chemical Engineering Laboratory II           | 3              |
| C&PE 656    | Introduction to Biomedical Engineering       | 3              |
| CHEM 627    | Organic Chemistry II Laboratory              | 2              |
| _____       | Engineering Elective                         | 2              |
|             |  | Total 15 hours |

\*Not required but recommended. This program requires 3 summers to complete. Should students decide not to take the optional biology courses, they can complete the program in 4 years without going to summer school. Summer medically-related internships provide insight and foundation. A five year program without summer school provides opportunity to take advantage of these internships. BIOL 600 or 658 is recommended before entering medical school.

## D. Chemical Engineering - Environmental

| <b>FRESHMAN YEAR</b> |  |                |
|----------------------|--|----------------|
| <b>FALL</b>          |  |                |
| C&PE 111             | Introduction to the Profession           | 2              |
| CHEM 184             | Foundations of Chemistry I               | 5              |
| ENGL 101             | Composition                              | 3              |
| MATH 121             | Calculus I                               | 5              |
|                      |  | Total 15 hours |
| <b>SPRING</b>        |  |                |
| C&PE 121             | Introduction to Computers in Engineering | 3              |
| CHEM 188             | Foundations of Chemistry II              | 5              |
| ENGL 102             | Composition & Literature                 | 3              |
| MATH 122             | Calculus II                              | 5              |
|                      |  | Total 16 hours |

| <b>SOPHOMORE YEAR</b> |  |                |
|-----------------------|--|----------------|
| <b>FALL</b>           |  |                |
| C&PE 211              | Material & Energy Balances   | 3              |
| CHEM 624              | Organic Chemistry I  | 3              |
| CHEM 625              | Organic Chemistry I Lab  | 2              |
| MATH 223              | Vector Calculus (Option A)   | 3              |
| MATH 290              | Elementary Linear Algebra (Option A)   | 2              |
| or                    |  |                |
| MATH 220              | Applied Differential Equations (Option B)  | 3              |
| MATH 290              | Elementary Linear Algebra (Option B)   | 2              |
| PHSX 211              | General Physics I  | 4              |
|                       |  | Total 17 hours |
| <b>SPRING</b>         |  |                |
| C&PE 221              | Basic Engineering Thermodynamics   | 3              |
| CE 477                | Environmental Pollution Control  | 3              |
| MATH 320              | Elementary Differential Equations (Option A)* or<br>Humanities or Social Sciences Elective (Option B)* | 3              |
| PHSX 212              | General Physics II   | 4              |
| CHEM ____             | Advanced Chemistry Elective  | 3              |
|                       |  | Total 16 hours |

\*Students may select one of two MATH options. Selecting Option B, MATH 220/290, gives students an additional elective in MATH, science, engineering, humanities or social sciences (MSEHS elective).

| <b>JUNIOR YEAR</b> |   |                |
|--------------------|---|----------------|
| <b>FALL</b>        |   |                |
| C&PE 511           | Momentum Transfer   | 3              |
| C&PE 512           | Proc. Engineering Thermodynamics  | 3              |
| C&PE 522           | Econ Appraisal of C&PE Projects   | 2              |
| CHEM 646           | Chemistry I   | 4              |
| CE 7XX             | Environmental Principles Elective   | 3              |
| ENGL ____          | Advanced English Elective   | 3              |
|                    |   | Total 18 hours |
| <b>SPRING</b>      |   |                |
| C&PE 521           | Heat Transfer   | 3              |
| C&PE 523           | Mass Transfer   | 4              |
| C&PE 524           | Chemical Engineering Kinetics & Reactor Design                                  | 3              |
| CHEM ____          | Advanced Chemistry Elective   | 4              |
| _____              | Humanities and Social Sciences Elective (Option A) or<br>MSEHS Elective (Opt 2) | 3              |
|                    |   | Total 17 hours |

| <b>SENIOR YEAR</b> |   |                |
|--------------------|---|----------------|
| <b>FALL</b>        |   |                |
| C&PE 613           | Chemical Engineering Design I                                     | 4              |
| C&PE 615           | Introduction to Process Dynamics and Control                      | 3              |
| C&PE 616           | Chemical Engineering Laboratory I                                 | 3              |
| CE 7XX             | Environmental Principles Elective                                 | 3              |
| _____              | Humanities or Social Sciences Elective                            | 3              |
|                    |   | Total 16 hours |
| <b>SPRING</b>      |   |                |
| C&PE 623           | Chemical Engineering Design II                                    | 2              |
| C&PE 624           | Plant & Environmental Safety                                      | 3              |
| C&PE 626           | Chemical Engineering Laboratory II                                | 3              |
| CE 7XX             | Environ. Engineering Topical (Option A) or<br>Elective (Option B) | 3              |
| _____              | Humanities or Social Sciences Electives                           | 6              |
|                    |   | Total 17 hours |

132 credit hours required for graduation.

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## E. Chemical Engineering – Petroleum

| FRESHMAN YEAR |  |                |
|---------------|--|----------------|
| FALL          |  |                |
| C&PE 111      | Introduction to the Profession           | 2              |
| CHEM 184      | Foundations of Chemistry I               | 5              |
| ENGL 101      | Composition                              | 3              |
| MATH 121      | Calculus I                               | 5              |
|               |  | Total 15 hours |
| SPRING        |  |                |
| C&PE 121      | Introduction to Computers In Engineering | 3              |
| CHEM 188      | Foundations of Chemistry II              | 5              |
| ENGL 102      | Composition & Literature                 | 3              |
| MATH 122      | Calculus II                              | 5              |
|               |  | Total 16 hours |

<sup>1</sup>students may take C&PE 117 & 127 – Introduction to the PE Profession

| JUNIOR YEAR |  |                |
|-------------|--|----------------|
| FALL        |  |                |
| C&PE 511    | Momentum Transfer                              | 3              |
| C&PE 512    | Process Engineering Thermodynamics             | 3              |
| C&PE 522    | Economic Appraisal of C&PE Projects            | 2              |
| CHEM 646    | Physical Chemistry I                           | 4              |
| C&PE 517    | Reservoir Engineering I                        | 4              |
|             |  | Total 16 hours |
| SPRING      |  |                |
| C&PE 521    | Heat Transfer                                  | 3              |
| C&PE 523    | Mass Transfer                                  | 4              |
| C&PE 524    | Chemical Engineering Kinetics & Reactor Design | 3              |
| C&PE 527    | Reservoir Engineering II                       | 4              |
| _____       | Humanities or Soc. Science Elective            | 3              |
|             |  | Total 17 hours |

| SOPHOMORE YEAR |  |                |
|----------------|--|----------------|
| FALL           |  |                |
| C&PE 211       | Material & Energy Balances             | 3              |
| CHEM 624       | Organic Chemistry I                    | 3              |
| CHEM 625       | Organic Chemistry I Lab                | 2              |
| MATH 220       | Applied Differential Equations         | 3              |
| MATH 290       | Elementary Linear Algebra              | 2              |
| PHSX 211       | General Physics I                      | 4              |
|                |  | Total 17 hours |
| SPRING         |  |                |
| C&PE 221       | Basic Engineering Thermodynamics       | 3              |
| ENGL_____      | Advanced English Elective              | 3              |
| _____          | Humanities or Soc. Science Elective    | 3              |
| PHSX 212       | General Physics II                     | 4              |
| GEOL 101/3     | Introduction to Geology and Laboratory | 5              |
|                |  | Total 18 hours |

| SENIOR YEAR             |  |                |
|-------------------------|--|----------------|
| FALL                    |  |                |
| C&PE 613                | Chemical Engineering Design I                | 4              |
| C&PE 615                | Introduction to Process Dynamics and Control | 3              |
| C&PE 616                | Chemical Engineering Laboratory I            | 3              |
| _____                   | Engineering Elective                         | 3              |
| _____                   | Humanities or Soc. Science Elective          | 3              |
|                         |  | Total 16 hours |
| SPRING                  |  |                |
| C&PE 623                | Chemical Engineering Design II               | 2              |
| C&PE 624                | Plant & Environmental Safety                 | 3              |
| C&PE 626                | Chemical Engineering Laboratory II           | 3              |
| <sup>1</sup> C&PE _____ | Petroleum Engineering Elective               | 3              |
| _____                   | Advanced Chemistry Elective                  | 3              |
| _____                   | Humanities or Soc. Science Elective          | 3              |
|                         |  | Total 17 hours |

<sup>1</sup>Students must take 3 credits of Petroleum Engineering Courses at the 500 level or ab

132 credit hours required for graduation

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## F. Chemical Engineering - Co-op Program

| FIRST YEAR |  |                |
|------------|--|----------------|
| FALL       |  |                |
| C&PE 111   | Introduction to the Profession           | 2              |
| MATH 121   | Calculus I                               | 5              |
| CHEM 184   | Foundations of Chemistry I               | 5              |
| ENGL 101   | Composition                              | 3              |
|            |  | Total 15 hours |
| SPRING     |  |                |
| C&PE 121   | Introduction to Computers in Engineering | 3              |
| MATH 122   | Calculus II                              | 5              |
| CHEM 188   | Foundations of Chemistry II              | 5              |
| ENGL 102   | Composition & Literature                 | 3              |
|            |  | Total 16 hours |

| SECOND YEAR |                                   |                |
|-------------|-----------------------------------|----------------|
| FALL        |                                   |                |
| C&PE 211    | Materials & Energy Balances       | 3              |
| MATH 220    | Applied Differential Equations    | 3              |
| MATH 290    | Elementary Linear Algebra         | 2              |
| ME 312      | Basic Thermodynamics              | 3              |
| CHEM 624    | Organic Chemistry I               | 3              |
| PHSX 211    | General Physics I                 | 4              |
|             |                                   | Total 18 hours |
| SPRING      |                                   |                |
| ENGR 300    | Co-op Program<br>CO-OP EMPLOYMENT | Total 1 hour   |
| SUMMER      |                                   |                |
| PHSX 212    | Physics II                        | 4              |
|             |                                   | Total 4 hours  |

| THIRD YEAR |  |                |
|------------|--|----------------|
| FALL       |  |                |
| C&PE 511   | Momentum Transfer                      | 3              |
| C&PE 512   | Process Engineering Thermodynamics     | 3              |
| CHEM 625   | Organic Chemistry I Lab                | 2              |
| CHEM 646   | Physical Chemistry I                   | 4              |
| C&PE 522   | Econ Appraisal                         | 2              |
|            | Humanities or Social Sciences Elective | 3              |
|            |  | Total 17 hours |

| THIRD YEAR – (continued) |  |                |
|--------------------------|--|----------------|
| SPRING                   |  |                |
| C&PE 521                 | Heat Transfer                                  | 3              |
| C&PE 523                 | Mass Transfer                                  | 4              |
| C&PE 524                 | Chemical Engineering Kinetics & Reactor Design | 3              |
| _____                    | Humanities or Social Sciences Elective         | 3              |
| _____                    | Advanced Chemistry Elective                    | 4              |
|                          |  | Total 17 hours |
| SUMMER                   |  |                |
| ENGR 300                 | Co-op Program<br>CO-OP EMPLOYMENT              | Total 1 hour   |

| FOURTH YEAR |  |                |
|-------------|--|----------------|
| FALL        |  |                |
| C&PE 615    | Introduction to Process Dynamics and Control | 3              |
| C&PE _____  | Elective                                     | 3              |
| _____       | MSEHS Elective                               | 3              |
| ENGL _____  | Advanced English Elective                    | 3              |
| CHEM _____  | Advanced Chemistry Elective                  | 4              |
|             |  | Total 16 hours |
| SPRING      |  |                |
| ENGR 300    | Co-op Program<br>CO-OP EMPLOYMENT            | Total 1 hour   |

| FIFTH YEAR |   |                |
|------------|---|----------------|
| FALL       |   |                |
| C&PE 613   | Chemical Engineering Design I           | 4              |
| C&PE 616   | Chemical Engineering Laboratory I       | 3              |
| _____      | Engineering Elective                    | 3              |
| _____      | Humanities and Social Sciences Elective | 3              |
| _____      | Humanities and Social Sciences Elective | 3              |
|            |   | Total 16 hours |
| SPRING     |   |                |
| C&PE 623   | Chemical Engineering Design II          | 2              |
| C&PE 624   | Plant & Environmental Safety            | 3              |
| C&PE 626   | Chemical Engineering Laboratory II      | 3              |
| _____      | Engineering Electives                   | 3              |
| _____      | Engineering Electives                   | 3              |
|            |   | Total 14 hours |

The Co-op Option is very flexible. This is an example. The student works with the Co-op Advisor to tailor the program to the student's needs.

132 credit hours required for graduation

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## G. Petroleum Engineering

| <b>FRESHMAN YEAR</b> |   |                |
|----------------------|---|----------------|
| <b>FALL</b>          |   |                |
| C&PE 117             | Introduction to Petroleum Engineering Profession I  | 1              |
| CHEM 184             | Foundations of Chemistry I                          | 5              |
| ENGL 101             | Composition   | 3              |
| MATH 121             | Calculus I  | 5              |
|                      |   | Total 14 hours |
| <b>SPRING</b>        |   |                |
| C&PE 127             | Introduction to Petroleum Engineering Profession II | 1              |
| C&PE 121             | Introduction to Computers in Engineering            | 3              |
| CHEM 188             | Foundations of Chemistry II                         | 5              |
| ENGL 102             | Composition & Literature                            | 3              |
| MATH 122             | Calculus II   | 5              |
|                      |   | Total 17 hours |

| <b>SOPHOMORE YEAR</b> |  |                |
|-----------------------|--|----------------|
| <b>FALL</b>           |  |                |
| C&PE 217              | Introduction to Petroleum Drilling Engineering | 2              |
| ME 312                | Basic Engineering Thermodynamics               | 3              |
| MATH 220              | Applied Differential Equations                 | 3              |
| MATH 290              | Elementary Linear Algebra                      | 2              |
| PHSX 211              | General Physics I                              | 4              |
| CHEM 622              | Organic Chemistry                              | 3              |
|                       |  | Total 17 hours |
| <b>SPRING</b>         |  |                |
| C&PE 517              | Reservoir Engineering I                        | 4              |
| CE 201                | Statics  | 2              |
| GEOL 101              | Introduction to Geology                        | 3              |
| GEOL 103              | Fundamentals of Geology Laboratory             | 2              |
| MATH 526              | Applied Mathematical Statistics I              | 3              |
| PHSX 212              | General Physics II                             | 4              |
|                       |  | Total 18 hours |

| <b>JUNIOR YEAR</b> |   |                |
|--------------------|---|----------------|
| <b>FALL</b>        |   |                |
| C&PE 511           | Momentum Transfer                       | 3              |
| C&PE 527           | Reservoir Engineering II                | 4              |
| C&PE 619           | Petroleum Engineering Lab I             | 2              |
| C&PE 522           | Economic Appraisal of C&PE Projects     | 2              |
| CE 310             | Strength of Materials                   | 4              |
| ENGL ____          | Advanced English Elective               | 3              |
|                    |   | Total 18 hours |
| <b>SPRING</b>      |   |                |
| C&PE 521           | Heat Transfer                           | 3              |
| C&PE 629           | Petroleum Engineering Lab II            | 2              |
| C&PE 528           | Well Logging                            | 3              |
| GEOL 331           | Sedimentology and Surface Processes     | 4              |
| _____              | Humanities and Social Sciences Elective | 3              |
|                    |   | Total 15 hours |

| <b>SENIOR YEAR</b> |   |                |
|--------------------|---|----------------|
| <b>FALL</b>        |   |                |
| C&PE 617           | Drilling & Well Completion                            | 3              |
| C&PE 618           | Secondary Recovery                                    | 4              |
| GEOL 535           | Petroleum & Subsurface Geology (Fall even years only) | 4              |
| EECS 315           | Electric Circuits and Machines                        | 3              |
| _____              | Humanities or Social Sciences Electives               | 3              |
|                    |   | Total 17 hours |
| <b>SPRING</b>      |   |                |
| C&PE 627           | Petroleum Production                                  | 3              |
| C&PE 628           | Petroleum Engineering Design                          | 3              |
| _____              | Basic Science or Engineering Elective                 | 3              |
| _____              | Humanities or Social Sciences Elective                | 3              |
| _____              | Humanities or Social Sciences Electives               | 3              |
|                    |   | Total 15 hours |

131 credit hours required for graduation.

Revised March 2007 (CSH)

**H. ACADEMIC PROGRAM PLANNING FORM**

Name \_\_\_\_\_ KUID \_\_\_\_\_

Semester: Fall \_\_\_\_\_ Spring \_\_\_\_\_ Summer \_\_\_\_\_

Major \_\_\_\_\_ BS MS PhD DE  
(Circle one)

| Dept. | Course Number | Course Title | Credit Hours | Notes |
|-------|---------------|--------------|--------------|-------|
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |
|       |               |              |              |       |

Alternate Course Selections

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Total Credit Hours \_\_\_\_\_

Excess hours approval \_\_\_\_\_

In consultation with an advisor, I have chosen these courses based on my program of study. I understand I am responsible for selection of these courses and for knowing degree requirements for my major.

Student's signature \_\_\_\_\_ Date \_\_\_\_\_

Advisor's signature \_\_\_\_\_ Date \_\_\_\_\_

If you plan to graduate after completion of the semester in which you are now enrolling, fill out an application for degree in the dean's office as soon as your advising hold is released. May graduates should do this no later than Dec 1; July and December graduates by May 1.

|                    |
|--------------------|
| Advisor's Comments |
|--------------------|