

# **Academic Advising Handbook**

**Department of Chemical & Petroleum Engineering**

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University of Kansas  
Lawrence, Kansas 66045-7609**



March 2003 Edition

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## 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 two days. 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.

If you choose not to be advised during the Department advising period, the release of the ‘Advising Hold’ may take up to seven days. Please schedule your advising time early in the advising period.

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.

**Faculty Advisors**

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*(Please direct all corrections, suggestions and comments to C. S. Howat at the above email address.)*

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### III. 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 you 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 prior to meeting with your advisor.

##### 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 both you and your advisor
- A record that documents notes, agreements, acknowledgements and drops made by you and your advisor
- 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, to plan future semesters and to 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 and you return your advising folder to the Department office.

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 unanticipated 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 or for those with extracurricular time responsibilities, 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 or other activity. 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 campus for non-Lawrence resident students is large, e.g. from Topeka to campus;
- 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 7, 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.

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 semester. However, the restrictions and implications change as the semester progresses.

During the first Drop Period, you may drop a class with your advisor's agreement without the course appearing on your transcript.

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

During the last Drop Period, you may drop a class only by petition. You fill out the Drop Form as you would for the second drop period. Your instructor of record must assign a W or WF. You must also petition the Associate Dean of the School of Engineering. A formal petition is required stating your reasons for withdrawal. A failing grade is not a justifiable reason. If the Associate Dean agrees with your petition, you will be allowed to withdraw with your instructor's assessment appearing on your permanent transcript. If she or he does not agree, you must remain in the course.

In order to add or drop a course, you must see your advisor. Your advisor will review your plan and assess the impact on your Plan of Study. Once you have discussed the add/drop and understand the impact, your advisor will sign you add/drop slip. The online system for add/drop for Fall 2003 is not in place at the time of this writing. It is likely that there will be a 'Drop Hold' of some type that will need to be released. By Fall 2003, the Department Advisors and Staff will know the procedure.

## IV. CURRICULUM

### A. *General Requirements*

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

The requirements for graduation are spelled out in the Undergraduate Catalogue of the university. Specifically, for chemical and petroleum engineering, the requirements are:

- 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.

In addition, the School of Engineering imposes the following 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 four 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. C&PE 121, 211 and 221 are generally offered in the summer session, as well.

### **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 123 - Calculus III (5) and MATH 320-Differential Equations (3).

The second option consists of MATH 121 - Calculus I (5), MATH 122 - Calculus II (5) and MATH 250 - Mathematics of Engineering Systems (5). 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.

MATH 250 (Mathematics of Engineering Systems) is a 5-hour class that is team-taught by a mathematics professor and an engineering professor. Concurrent enrollment in AE 250, CE 250, C&PE 250, EECS 250, EPHX 250, or ME 250 is required, so it is necessary to list both line numbers on the enrollment form and to enroll in both numbers when you are online. MATH 250 is not open to students who have taken MATH 123, MATH 143, MATH 320 and/or MATH 321.

Your selection of your mathematics option is up to you. MATH 123 covers linear algebra and multivariable calculus and is chosen by students who want to continue develop mathematical skills from the traditional classical viewpoint. When MATH 123 is taken, MATH 320 (3 credit hours), Elementary Differential Equations, must be taken. MATH 250 has an engineering applications approach and is, therefore, narrower in breadth than the MATH 123/320 (143/321) approach.

While the Chemical Engineering – Biomedical, Chemical Engineering - Premedical and Chemical Engineering – Petroleum curricula show the MATH 250 option, 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**

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 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 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

### 1. English

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

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

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

- If you are in the Honors Program:

ACT English Score	SAT English Score	Enroll in
31-36	600-800	Exempt from ENGL 101 ENGL 105 (Freshman Honors English)
27-30	500-600	Exempt from ENGL 101 ENGL 102 (students wanting to take ENGL 105 may do so if the Honors 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 and 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 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 IV, 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 IV, 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. Examples of acceptable courses are included on the

following list. Course listings offered by other Departments change, from time to time. Consult your Advisor if the course is not listed.

COURSE #	COURSE TITLE	ENGR SCI	ENGR DES	OTHER	TOTAL
AE 241	Private Flight Course	1			1
CE 201	Statics	2			2
CE 300	Dynamics	3			3
CE 301	Statics & Dynamics	5			5
CE 310	Strength of Materials	5			5
CE 311	Strength of Materials	3			3
CE 477	Environ. Pollution Control	2	1		3
CE 770	Concepts of Environ. Chemistry	2			2
CE 771	Environ. Chemical Analysis	1			1
CE 772	Phys. Principles of Environ. Engr. Proc.	3			3
CE 773	Biol. Princ. of Environ. Processes	3			3
CE 774	Chem. Princ. of Environ. Processes	3			3
CE 776	Contaminant Transport	3			3
CE 777	Industrial Waters and Wastes	3			3
CE 778	Hydrometeorology	3			3
C&PE 517	Reservoir Engr. I	3	1		4
C&PE 527	Reservoir Engr. II	3	1		4
C&PE 627	Petroleum Production	3			3
C&PE 651	Undergraduate Problems		Variable		
C&PE 655	Corrosion Engineering	2	1		3
C&PE 656	Biomedical Engr.	3			3
C&PE 657	Polymer Sc. & Tech.	3			3
C&PE 658	Semiconductor Proc.	3			3
C&PE 701	Methods of Chemical and Petroleum Calculations	3			3
C&PE 715	Topics in C&PE		3		3
C&PE 721	ChE Thermo	3			3
C&PE 722	Kinetics & Catalysis	3			3
C&PE 731	Conv. Heat and Momen. Transfer	3			3
C&PE 732	Adv. Transport II	3			3
C&PE 771	Adv. Res. Engr.	3			3
C&PE 778	Opt. of Engr. Des.	2			3
C&PE 795	Enhanced Oil Recovery	3			3
C&PE 798	Phase Equilibria	3			3

COURSE #	COURSE TITLE	ENGR SCI	ENGR DES	OTHER	TOTAL
EECS 148	Algorithmic Problem Solving	2	1		3
EECS 213	Circuits	4.5	0.5		5
EECS 240	Digital Design I	2	2		4
EECS 248	Structured Programming	2	1		3
EECS 319	Basic Circuits	4			4
ME 306	Science of Materials	3			3
ME 328	Computer Graphics	3			3

The following courses count as engineering elective only if enrolled in the ROTC or related programs.

NAVY 101	Intro. to Naval Ships Systems I	3			3
NAVY 184	Intro. to Naval Ships Systems II	3			3
NAVY 300	Navigation & Operations I	3			3
NAVY 304	Navigation & Operations II	3			3

## 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.
- **EMGT 367** Introduction to Engineering Economics duplicates material covered in C&PE 522 and *may not be used* as an engineering elective.

Other 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.

- **ENGR 504** Technical Writing is credit for writing for the Kansas Engineer and *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.

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

The following is a list of the Humanities and Social Sciences courses offered by the University. These count toward the HSS Elective requirements. All are three (3) credit hour courses unless otherwise noted. The University departments modify their listing from time to time. You are encouraged to scan the Undergraduate catalog for courses that are available. Also, consult the online Timetable to determine which courses are offered in any coming semester.

##### **1. African and African-American Studies**

AAAS	104	The Peoples of Africa	S
AAAS	105	Introduction to African History	H
AAAS	106& 116	The Black Experience in the Americas	H
AAAS	300	African Traditional Religion & Thought	H
AAAS	301	Portrait of a Third-World Nation: Haiti	H
AAAS	305	Modern African History	H
AAAS	306	The Black Experience in the U.S. Since Emancipation	H
AAAS	310	Women of Africa Today	S
AAAS	315	Women and Islam	H
AAAS	330	Black Leadership	H
AAAS	332	Introduction to African Literature	H
AAAS	333	Introduction to Caribbean Literature	H
AAAS	335	Introduction to Southern African Literature	H
AAAS	340	Women in Contemporary African Literature	H
AAAS	355	African Theatre & Drama	H
AAAS	356	African American Theatre & Drama	H
AAAS	360	Introduction to West African History	H

##### **2. American Studies**

AMS	100&101	Understanding America	H
AMS	110&112	The American People	S
AMS	200	The American Dream	H
AMS	290	Varieties of Religious Experience in America: Past and Present	H
AMS	292	Topics and Problems on_____	H
AMS	300	Understanding America	H
AMS	310	American Culture, 1600-1876	H

AMS	312	American Culture, 1877-present	H
AMS	330	American Society	H
AMS	340	Black leadership	H
AMS	390	Geography of the US & Canada	S

### 3. Anthropology

ANTH	100	General Anthropology	S
ANTH	106	Introductory Linguistics	S
ANTH	108&109	Intro. To Cultural Anthropology (3-4)	S
ANTH	110&111	Intro. To Archaeology (3-4)	H
ANTH	160	The Varieties of Human Experience	S
ANTH	161	The Third World: Anthropological Approaches	S
ANTH	190	Peoples of Africa	S
ANTH	220	The Ethnology of Art	S
ANTH	293	Myth, Legend and Folk Beliefs in East Asia	H
ANTH	300	General Anthropology	S
ANTH	301	Anthropology Through Films	S
ANTH	308	Intro. To Cultural Anthropology (3-4)	S
ANTH	310	Introduction to Archaeology (3-4)	H
ANTH	313	New Discoveries in Archaeology	S
ANTH	315	The Prehistory of Art	S
ANTH	317	Prehistory of Europe	S
ANTH	318	Prehistory of Kansas	S
ANTH	320&321	Language in Culture and Society	S
ANTH	362	Peoples of Southeast Asia	S
ANTH	364	Peoples of Japan and Korea	S
ANTH	365	Japanese People Through Film	S
ANTH	366	The Life Cycle in Japanese Culture & Lit.	H
ANTH	368	The Peoples of China	S
ANTH	369	Vietnam: Identity and Conflict	S
ANTH	370	Peoples and Cultures of the Pacific	S
ANTH	376	North American Indians	S
ANTH	378	Contemporary North American Indians	S
ANTH	379	Folk Cultures of Latin America	S
ANTH	380	Peoples of South America	S

### 4. Classics

CLSX	148&149	Greek & Roman Mythology	H
CLSX	151&152	Archaeological Discovery	H
CLSX	230	Greek Literature & Civilization	H
CLSX	232	Word Power: Greek & Latin Elements in English	H
CLSX	240	Roman Literature & Civilization	H
CLSX	301	Greek Art and Culture	H

CLSX	302	Roman Art and Culture	H
CLSX	315	Women in Ancient Art & Society	H
CLSX	330	Greek Literature and Civilization (Honors)	H
CLSX	332	Scientific Word Power: Greek & Latin Elements in the Vocabulary of Science	H
CLSX	340	Roman Literature and Civilization (Honors)	H
CLSX	384	The Rise of Greek Tragedy	H

### **5. Communications**

COMS	235	Intro. To Rhetoric & Social Influence	H
COMS	238	Cases in Persuasion	H
COMS	244	Intro. To Interpersonal Com. Theory	S
COMS	246	Intro. To Intercultural Communication	S
COMS	310	Introduction to Organizational Comm.	S
COMS	332	The Rhetorical Tradition	H

### **6. Dance**

DANC	330	Intro. To World Dance	H
DANC	460	Dance History: Research & Reconstruction	H

### **7. East Asian Languages & Cultures**

EALC	105&108	Living Religions of the East	H
EALC	106	Understanding China and Japan	S
EALC	130	Myth, Legend and Folk Belief in East Asia	H
EALC	136	The Japanese Tradition	H
EALC	220	Asian Autobiographies	H
EALC	231	Introduction to: _____ (1 to 3 hours)	H
EALC	310	The Chinese Novel	H
EALC	312	Traditional Japanese Literature in Translation	H
EALC	314	Traditional Chinese Literature in Translation	H
EALC	316	Modern Japanese Literature in Translation	H
EALC	318	Modern Chinese Literature in Translation	H
EALC	330	Chinese Culture	H
EALC	331	Studies In: _____ (1 to 3 hours)	H

### **8. Eastern Civilization**

ECIV	104	Eastern Civilization	H
ECIV	105	Eastern Civilization, Honors	H

### **9. Economics**

ECON	142&143	Principles of Microeconomic	S
ECON	144&145	Principles of Macroeconomics	S
ECON	382	Studies in the Economic Development of African	

		Countries	S
ECON	505	History of Economic Analysis	S
ECON	510	Energy Economics	S
ECON	515	Income Distribution and Inequality	S
ECON	520	Microeconomics	S
ECON	522	Macroeconomics	S

## 10. English

ENGL	203	Topics in Reading & Writing	H
ENGL	209	Introduction to Fiction	H
ENGL	210	Introduction to Poetry	H
ENGL	211	Introduction to Drama	H
ENGL	300	The Bible, the Classics and Modern Literature	H
ENGL	308	Interpretation of Literature	H
ENGL	309	The British Novel	H
ENGL	310	Legend and Fantasy	H
ENGL	312	Major British Writers to 1800	H
ENGL	314	Major British Writers after 1800	H
ENGL	315	Summer Institute in Britain	H
ENGL	316	Introduction to Major American Writers	H
ENGL	320	American Literature I	H
ENGL	322	American Literature II	H
ENGL	323	Twentieth Century Literature & Culture	H
ENGL	324	Contemporary Authors	H
ENGL	325	Recent Popular Literature	H
ENGL	326	Introduction to African Literature	H
ENGL	327	Studies in 20 <sup>th</sup> Century Drama	H
ENGL	331	Chaucer	H
ENGL	332	Shakespeare	H
ENGL	334	Major Authors: _____	H
ENGL	337	Introduction to U.S. Latino/a Literature	H
ENGL	338	Introduction to African-American Literature	H
ENGL	339	Introduction to Caribbean Literature	H
ENGL	340	Topics in U.S. Ethnic Literature: _____	H
ENGL	351	Fiction Writing I	H
ENGL	352	Poetry Writing	H
ENGL	353	Screenwriting	H
ENGL	354	Playwriting	H
ENGL	360	Advanced Composition	H
ENGL	385	The Development of Modern English	H
ENGL	387	Introduction to the English Language	H
ENGL	405	The Comic Script	H
ENGL	406	The Tragic Spirit	H

ENGL	408	The Spirit of Romance	H
ENGL	433	The Bible as Literature	H
ENGL	466	Literature for Children	H

**NOTE:** ENGL 362 is **NOT** a Humanities/Social Science course

## 12. Geography

GEOG	100	Culture Areas of the Western World	S
GEOG	102&103	Principles of Human Geography	S
GEOG	111	Maps and Mapping (4)	H
GEOG	351	Human Geography of Africa	S
GEOG	377	Urban Geography	S
GEOG	379	Topics in Cultural Geography	S
GEOG	390	Geography of the United States & Canada	S
GEOG	396	China's Geographies	S
GEOG	397	Geography of Kansas and the Plains	S
GEOG	591	Geography of Latin America	S

NOTE: GEOG 104,105 & 107 are **NOT** Humanities/Social Science Courses.

## 13. History- All are Humanities

(See Undergraduate Catalog for a complete list.)

## 14. History of Art

HA	100&103	Intro. To Art History	H
HA	101	Art History I, (Honors)	H
HA	102	Art History II, (Honors)	H
HA	150	Art History I: Ancient & Medieval Art	H
HA	151	Art History II: Renaissance to Modern Art	H
HA	261	Intro. To Modern Art	H
HA	265	Intro. To Asian Art	H
HA	267	Art and Culture of Japan	H
HA	268	Art and Culture of China	H
HA	300	Intro. To Art History	H
HA	315	The Prehistory of Art	S
HA	370	American Art	H
HA	376	West African Art	H
HA	380	History of Photography	H
HA	455	19 <sup>th</sup> -Century European Art	H
HA	462	European Art, 1900-1945	H
HA	463	Art Since 1945	H
HA	470	American Art, Colonial to Civil War	H
HA	471	American Art, 1860-1900	H
HA	472	American Art, 1900-1945	H
HA	482	Japanese Painting	H

<b>15. Human Development and Family Life</b>			
HDFL	140	Intro. To Principles of Behavior	S
HDFL	150&151	Community Leadership	S
HDFL	160&161	Intro. To Child Behavior and Development	S
HDFL	222	Children in Modern Society	S
HDFL	288	Intro. To Marriage & Family Relationships	S
<b>16. Humanities and Comparative Literature</b>			
HWC	104	Humanities I – Ancient Greece(4)	H
HWC	108	Humanities II – Ancient Rome (4)	H
HWC	130	Myth, Legend & Folk Belief in East Asia	H
HWC	204	Western Civilization I	H
HWC	205	Western Civilization II	H
HWC	300	Studies In: _____	H
HWC	304	Masterpieces of World Literature I	H
HWC	305	Studies in Narrative	H
HWC	308	Masterpieces of World Literature II	H
HWC	310	Studies in War and Peace	H
HWC	312	Masterpieces of World Literature III	H
HWC	330	Humanities III- Middle Ages (4)	H
HWC	338	Humanities IV – The Modern Era (4)	H
HWC	340	The Renaissance	H
HWC	350	The Enlightenment	H
<b>17. Latin American Area Studies</b>			
LAA	100	Latin American Culture & Society	H
<b>18. Linguistics</b>			
LING	101	Language and Communication	H
LING	104	The Nature of Language	S
LING	106&107	Introductory Linguistics	S
LING	110	Language and Mind	S
LING	305	Introduction to Phonetics	S
LING	320&321	Language in Culture and Society	S
<b>19. Music History</b>			
MHST	136/336	Masterworks of Music	H
MHST	298	Introduction to Jazz	H
MHST	299	American Popular Song	H
MHST	300	Jazz Styles	H
MHST	301	Great Innovators of Jazz	H
MHST	302	The Broadway Musical	H

MHST 306 Introduction to Contemporary Music H

**20. Philosophy –All are Humanities**

(See Undergraduate Catalog for a complete list.)

**21. Political Science**

POLS	110&111	Intro. To U.S. Politics	S
POLS	150&151	Intro. To Comparative Politics	S
POLS	170&171	Intro. To International Politics	S
POLS	210	Contemporary Issues in U.S. Politics	S
POLS	301	Intro. To Political Theory	S
POLS	370	Contemporary Issues in International Politics	S
POLS	410	U.S. Government and Politics	S
POLS	412	Government of Kansas	S

**22. Psychology**

PSYC	104&105	General Psychology	S
PSYC	120&121	Personality	S
PSYC	318	Cognitive Psychology	S
PSYC	333	Child Psychology	S
PSYC	350	Abnormal Psychology	S
PSYC	360	Social Psychology	S
PSYC	405	The Mental Health of Children	S
PSYC	406	Individual Differences	S

**23. Religious Studies**

REL	104&105	Search for Meaning	H
REL	106&108	Living Religions of the East	H
REL	107	Living Religions of the West	H
REL	124&125	Understanding the Bible	H
REL	126	Introduction to Judaism	H
REL	171&172	Religion in American Society	H
REL	311	Hebrew Scriptures	H
REL	315	History & Literature of Early Christianity	H
REL	320	History of Judaism in the West	H
REL	321	History of Judaism in the East	H
REL	325	Introduction to Judaism	H
REL	339	History of Religion in America	H

**24. Slavic Languages & Literature**

SLAV	140&141	Intro. To Russian Culture	H
SLAV	144&145	Survey of Russian Literature in Translation	H
SLAV	148&149	Intro. Slavic Folklore	H

SLAV	240&241	Intro. to the Languages & Peoples of Russia & East-Central Europe	H
SLAV	390	Slavic Folk Culture: _____	H

### 25. Sociology

SOC	104&105	Elements of Sociology	S
SOC	110&112	The American People	S
SOC	130&131	Comparative Societies	S
SOC	132	American Society, Honors	S
SOC	150&151	Self and Society	S
SOC	160&161	Social Problems & American Values	S
SOC	170	Conflict and Its Regulation	S
SOC	220	Sociology of Families	S
SOC	273	Women in Society	S
SOC	304	Principles of Sociology	S

### 26. Theatre & Film

TH&F	100	Introduction to the Theatre	H
TH&F	283	Introduction to the Film Medium	H
TH&F	380	American Popular Culture	H
TH&F	381	History of the Silent Film	H
TH&F	382	History of American Sound Film	H

### 27. Women's Studies

WS	201	U.S. Women Today: An Interdisciplinary Introduction	S
WS	310	Women of Africa Today	S
WS	320	From Goddesses to Witches	H
WS	321	Women's History in Europe	H
WS	330	Women in Contemporary African Literature	H

## *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).

You have flexibility in choosing the remaining seven (7) hours. 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 N in the Timetable. 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).

## V. 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 or Summer 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 your 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, your 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 towards the degree, or
- Fewer than 12 credit hours that count towards the degree have been completed in the first semester.
- Enrollment in the second semester is less than 12 credit hours that count towards 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.

## VI. 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 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.

## VII. 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 the 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. 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 you 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.

You are encouraged to take the Fundamentals of Engineering Examination during you 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.

### **C. *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 awards Minor Degrees.

If you believe that you have or will earn a minor degree, an application is filed through the School of Engineering. You 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 for evaluation. If College officials agree, you will be awarded a Minor Degree upon graduation along with your B.S. Degree.

Note that 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, you must take at least 18 credit hours, 12 of which must be 300 level courses or above. You 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.

## VIII. APPENDIX

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

Note that 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

FRESHMAN YEAR		
FALL		
C&PE 111	Intro. 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	Intro. 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

SOPHOMORE YEAR		
FALL		
C&PE 211	Material & Energy Balances	3
CHEM 624	Organic Chemistry I	3
CHEM 625	Organic Chemistry I Lab	2
MATH 123	Calculus III (Opt. 1)*	
	Or	
MATH 250	Mathematics of Eng. Systems (Opt. 2)*	5
PHSX 211	General Physics I	4
		Total 17 hours
SPRING		
C&PE 221	Basic Engineering Thermodynamics	3
ENGL ____	Advanced English Elective	3
MATH 320	Elementary Differential Equations (Opt. 1)*	
	Or	
	Humanities or Social Sciences Elective (Opt. 2)*	3
PHSX 212	General Physics II	4
	Advanced Chemistry Elective	3
		Total 16 hours

\*Students may select one of two MATH options. Selecting option 2, MATH 250, gives students an additional elective in MATH, science, engineering, humanities or social sciences (MSEHS elective).

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
	Humanities or Social Sciences Elective (Opt. 1)*	
	or	
	MSEHS Elective (Opt. 2)*	3
	Engineering Elective	3
		Total 18 hrs.
SPRING		
C&PE 521	Heat Transfer	3
C&PE 523	Mass Transfer	4
C&PE 524	Kinetics & Reactor Design	3
	Advanced Chemistry Elective	4
	Humanities or Social Sciences Elective	3
		Total 17 hrs.

SENIOR YEAR		
FALL		
C&PE 613	Chemical Engineering Design I	4
C&PE 615	Intro. to Process Dynamics & Control	3
C&PE 616	Chemical Engineering Lab I	3
	Engineering Elective	3
	Humanities or Social Sciences Elective	3
		Total 16 hrs.
SPRING		
C&PE 623	Chemical Engineering Design II	2
C&PE 624	Environmental & Plant Safety	3
C&PE 626	Chemical Engineering Lab II	3
C&PE ____	Elective	3
	Engineering Elective	3
	Humanities or Social Sciences Elective	3
		Total 17 hrs.

132 credit hours required for graduation.

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## B. Chemical Engineering - Biomedical

<b>FRESHMAN YEAR</b>		
<b>FALL</b>		
C&PE 111	Intro. 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	Intro. 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 250	Mathematics of Eng. Systems	5
PHSX 211	General Physics I	4
		Total 17 hours
<b>SPRING</b>		
C&PE 221	Basic Engineering Thermodynamics	3
CHEM 626	Organic Chemistry II Lecture	3
ENGL ____	Advanced English Elective	3
PHSX 212	General Physics II	4
_____	Engineering Elective	2
_____	Humanities or Social Sciences 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	Econ. Appraisal of C&PE Projects	2
CHEM 646	Physical Chemistry I	4
PHCH 625	Pharmacokinetics	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	Kinetics & Reactor Design	3
C&PE 651	Undergrad. Probs. (or Engr. Elective)	2-3
BIOL 305	Human Physiology	
	or	
BIOL 646	Mammalian Physiology	3-4
		Total 17 hours

<b>SENIOR YEAR</b>		
<b>FALL</b>		
C&PE 613	Chemical Engineering Design I	4
C&PE 615	Introduction o Process Dynamics & Control	3
C&PE 616	Chemical Engineering Lab I	3
BIOL 600	Intro. to Biochemistry	3
_____	Humanities or Social Sciences Elective	3
		Total 16 hours
<b>SPRING</b>		
C&PE 623	Chemical Engineering Design II	2
C&PE 624	Environmental & Plant Safety	3
C&PE 626	Chemical Engineering Lab II	3
C&PE 656	Intro. to Biomedical Engineering	3
_____	Engineering Elective	3
_____	Humanities or Social Sciences Elective	3
		Total 17 hours

134 credit hours required for graduation

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### C. Chemical Engineering - Premedical

FRESHMAN YEAR		
<b>FALL</b>		
C&PE 111	Intro. to the Profession	2
MATH 121	Calculus I	5
CHEM 184	Foundations of Chemistry I	5
ENGL 101	Composition	3
		Total 15 hours
<b>SPRING</b>		
C&PE 121	Intro. 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
<b>SUMMER</b>		
BIOL 152	Principles of Organismal Biology	4
		Total 4 hours

SOPHOMORE YEAR		
<b>FALL</b>		
C&PE 211	Material & Energy Balances	3
MATH 250	Mathematics of Engineering Systems	5
CHEM 624	Organic Chemistry I Lecture	3
CHEM 625	Organic Chemistry I Lab	2
PHSX 211	General Physics I	4
		Total 17 hours
<b>SPRING</b>		
C&PE 221	Basic Engineering Thermodynamics	3
BIOL 150	Principles of Molecular & Cellular Biology	4
PHSX 212	General Physics II	4
BIOL 646	Mammalian Physiology Lecture*	4
BIOL 647	Mammalian Physiology Lab*	1
		Total 16 hours
<b>SUMMER</b>		
CHEM 626	Organic Chemistry II Lecture	3
CHEM 627	Organic Chemistry II Lab	2
		Total 5 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. Students who take the optional courses but prefer not to go to summer school can extend their course of study to a fifth year consisting of one or two additional semesters.

134 credit hours required for graduation, 144 credit hours including recommended courses

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JUNIOR YEAR		
<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
BIOL 416	Cell Structure & Function*	3
CHEM 646	Physical Chemistry	4
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	Kinetics & Reactor Design	3
BIOL 404	Intro. to Genetics*	3
_____	Humanities or Social Sciences Elective	3
_____	MCAT Exam in April	3
		Total 16 hours
<b>SUMMER</b>		
_____	Engineering Elective	3
_____	Humanities or Social Sciences Elective	3
		Total 6 hours

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

## D. Chemical Engineering - Environmental

FRESHMAN YEAR		
<b>FALL</b>		
C&PE 111	Intro. 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	Intro. 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

SOPHOMORE YEAR		
<b>FALL</b>		
C&PE 211	Material & Energy Balances	3
CHEM 624	Organic Chemistry I	3
CHEM 625	Organic Chemistry I Lab	2
MATH 123	Calculus III (Opt. 1)* or	
MATH 250	Mathematics of Eng. Systems (Opt. 2)*	5
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 (Opt. 1)* or	
_____	Humanities or Social Sciences Elective (Opt. 2)*	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 2, MATH 250, gives the student an additional elective in MATH, science, engineering, humanities or social sciences (MSEHS elective).

JUNIOR YEAR		
<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	Kinetics & Reactor Design	3
CHEM _____	Advanced Chemistry Elective	4
_____	Humanities and Social Sciences Elective (Opt 1) or	
_____	MSEHS Elective (Opt 2)	3
		Total 17 hours

SENIOR YEAR		
<b>FALL</b>		
C&PE 613	Chemical Engineering Design I	4
C&PE 615	Intro. to Process Dynamics & Control	3
C&PE 616	Chemical Engineering Lab 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	Environmental & Plant Safety	3
C&PE 626	Chemical Engineering Lab II	3
CE 7YY	Environ. Engineering Topical (Opt 1) or	
C&PE _____	Elective (Opt. 2)	3
_____	Humanities or Social Sciences Electives	6
		Total 17 hours

131 credit hours required for graduation.

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## E. Chemical Engineering – Petroleum

FRESHMAN YEAR		
FALL		
C&PE 111	Intro. 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	Intro. 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 hrs.
SPRING		
C&PE 521	Heat Transfer	3
C&PE 523	Mass Transfer	4
C&PE 524	Kinetics & Reactor Design	3
C&PE 527	Reservoir Engineering II	4
_____	Humanities or Soc. Science Elective	3
		Total 17 hrs.

SOPHOMORE YEAR		
FALL		
C&PE 211	Material & Energy Balances	3
CHEM 624	Organic Chemistry I	3
CHEM 625	Organic Chemistry I Lab	2
MATH 250	Mathematics of Eng. Systems	5
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	Intro. to Process Dynamics & Control	3
C&PE 616	Chemical Engineering Lab I	3
_____	Engineering Elective	3
_____	Humanities or Soc. Science Elective	3
		Total 16 hrs.
SPRING		
C&PE 623	Chemical Engineering Design II	2
C&PE 624	Environmental & Plant Safety	3
C&PE 626	Chemical Engineering Lab II	3
<sup>1</sup> C&PE _____	Petroleum Engineering Elective	3
_____	Advanced Chemistry Elective	3
_____	Humanities or Soc. Science Elective	3
		Total 17 hrs.

<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

<b>FIRST YEAR</b>			
<b>FALL</b>			
C&PE 111	Intro. to the Profession		2
MATH 121	Calculus I		5
CHEM 184	Foundations of Chemistry I		5
ENGL 101	Composition		3
			Total 15 hours
<b>SPRING</b>			
C&PE 121	Intro. 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

<b>SECOND YEAR</b>			
<b>FALL</b>			
C&PE 211	Materials & Energy Balances		3
MATH 250	Mathematics of Engineering Systems		5
CHEM 624	Organic Chemistry I		3
CHEM 625	Organic Chemistry I Lab		2
PHSX 211	General Physics I		4
			Total 17 hours
<b>SPRING</b>			
CO-OP EMPLOYMENT			
<b>SUMMER</b>			
C&PE 221	Basic Engineering Thermodynamics		3
PHSX 212	Physics II		4
			Total 7 hours

<b>THIRD YEAR</b>			
<b>FALL</b>			
C&PE 511	Momentum Transfer		3
C&PE 512	Process Engineering Thermodynamics		3
CHEM 646	Physical Chemistry I		4
C&PE 522	Econ Appraisal		2
	Humanities or Social Sciences Elective		3
			Total 15 hours
<b>SPRING</b>			
C&PE 521	Heat Transfer		3
C&PE 523	Mass Transfer		4
C&PE 524	Kinetics & Reactor Design		3
	Humanities or Social Sciences Elective		3
	Advanced Chemistry Elective		4
			Total 17 hours
<b>SUMMER</b>			
CO-OP EMPLOYMENT			

<b>FOURTH YEAR</b>			
<b>FALL</b>			
C&PE 615	Intro. to Process Dynamics and Control		3
C&PE ____	Elective		3
	Humanities and Social Sciences Elective		3
ENGL ____	Advanced English Elective		3
CHEM ____	Advanced Chemistry Elective		4
			Total 16 hours
<b>SPRING</b>			
CO-OP EMPLOYMENT			

<b>FIFTH YEAR</b>			
<b>FALL</b>			
C&PE 613	Chemical Engineering Design I		4
C&PE 616	Chemical Engineering Lab I		3
	Engineering Elective		3
	Humanities and Social Sciences Elective		3
			Total 13 hours
<b>SPRING</b>			
C&PE 623	Chemical Engineering Design II		2
C&PE 624	Environmental & Plant Safety		3
C&PE 626	Chemical Engineering Lab II		3
	Engineering Electives		6
	Humanities and Social Sciences Elective		3
			Total 17 hours

132 credit hours required for graduation

Revised July 2000

## G. Petroleum Engineering

FRESHMAN YEAR		
<b>FALL</b>		
C&PE 117	Intro. to the PE 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	Intro. to the PE Profession II	1
C&PE 121	Intro. 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

SOPHOMORE YEAR		
<b>FALL</b>		
C&PE 211	Material & Energy Balances	3
MATH 123	Calculus III (Opt. 1)*	
	Or	
MATH 250	Mathematics of Engineering Systems (Opt. 2)*	5
PHSX 211	General Physics I	4
_____	English Advanced (Humanities designated)	3
_____	Humanities and Social Sciences Elective	3
		Total 18 hours
<b>SPRING</b>		
CE 201	Statics	2
C&PE 221	Basic Engineering Thermodynamics	3
GEO 101	Intro. to Geology	5
MATH 320	Elementary Differential Equations (Opt. 1)* or	
MSEH _____	MATH Elective (Opt. 2)*	3
PHSX 212	General Physics II	4
		Total 17 hours

\*Students may select one of two MATH options. Selecting option 2, MATH 250, gives students an additional elective in MATH, science, engineering, humanities or social sciences (MSEHS elective).

JUNIOR YEAR		
<b>FALL</b>		
CE 310	Strength of Materials	4
C&PE 511	Momentum Transfer	3
C&PE 517	Reservoir Engineering I	4
C&PE 522	Economic Appraisal of C&PE Projects	2
CHEM 622	Organic Chemistry	3
		Total 16 hours
<b>SPRING</b>		
EECS 319	Basic Electrical Circuits	4
C&PE 521	Heat Transfer	3
C&PE 527	Reservoir Engineering II	4
C&PE 528	Well Logging	3
GEO 331	Sedimentology	4
		Total 18 hours

SENIOR YEAR		
<b>FALL</b>		
C&PE 617	Drilling & Well Composition	3
C&PE 618	Waterflooding	4
C&PE 619	Petroleum Engineering Lab I	2
GEO 535	Petroleum & Subsurface Geology (Fall even years only)	4
_____	Humanities or Social Sciences Electives	6
		Total 19 hours
<b>SPRING</b>		
C&PE 627	Petroleum Production	3
C&PE 628	Petroleum Engineering Design	3
C&PE 629	Petroleum Engineering Lab II	2
_____	Basic Science or Engineering Elective	3
_____	Humanities or Social Sciences Elective	3
		Total 14 hours

133 credit hours required for graduation.

Revised July 2000

**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
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