

# **ChE Graduate Student Handbook**

(Revised February 2017)

## I. Introduction

The goal of this document is to compile as well as formalize the policies and procedures of the graduate program of the Department of Chemical Engineering at Texas Tech. This document complements the rules of the Graduate School, all of which must be met to obtain the degree.

## Doctor of Philosophy Program

## II. Coursework and Basic Requirements

- 1) All Ph.D. students, including those with prior MS degrees are required to take the following 5 core courses (**15 credits**):  
Advanced Chemical Engineering Techniques (CHE 5310), Advanced Chemical Engineering Thermodynamics (CHE 5321), Digital Computation for Chemical Engineers (CHE 5323), Fluid Transport Principles and Analysis (CHE 5312) and Reaction Kinetics (CHE 5343).
- 2) The 5 core courses must be completed with a cumulative GPA of 3.0 or above in the first 2 years. If these requirements are not met, the student can retake the course(s) and must obtain a B or above in the course(s).
- 3) In addition to the core courses, *at least* four elective courses need to be taken by graduate students. The graduate students must select these courses in consultation with their thesis advisor. Graduate courses in other departments which are unrelated to the thesis work may only be taken upon approval of the thesis advisor.
- 4) The PhD students are required to enroll in a seminar course (CHE 7121, CHE 7122, CHE 7123, or CHE 7124) each long semester. The credits from the seminar courses are counted towards the degree plan.
- 5) Ph.D. students are required to take research credits (CHE 7000). Topical names to the research courses are provided by the thesis advisor to be included in the degree plan.
- 6) Ph.D. students need to have 12 dissertation credits (CHE 8000) – 3 of these 12 must be from the semester in which the student defends.
- 7) In addition to the coursework, as part of the graduate training, PhD students are expected to give at least one public oral presentation on their research before their thesis defense. It is recommended that PhD students publish 4-6 peer-reviewed journal articles from their dissertation.
- 8) Ph.D students are required to have a minimum of 72 credits by the time of thesis defense. Below is the typical break-up of credit hours towards the degree plan.

Core courses:	15 credits
Course electives:	12 credits (minimum)
Seminar courses:	8 credits
Research:	25 credits (titles to be provided in degree plan for all but 6 credits)
Dissertation:	12 credits

### **III. Advisor Assignment**

The process of advisor assignment will proceed as follows:

- 1) In the fall semester, the faculty members interested in taking new students will give presentations on their research topics to the new students.
- 2) The first year students are required to meet with a minimum of three faculty members whose projects they are interested in.
- 3) Following these meetings, the students will fill out their top 3 choices in the *Faculty Advisor Assignment Document* (provided in the Appendix) and submit it to the graduate advisor. Students should not submit potential thesis advisor names that they have not met with.
- 4) Using this list and feedback from the faculty, the graduate committee will make a recommendation for the advisor assignments.
- 5) The advisor assignments are discussed in the faculty meeting and will be certified by a vote of the entire faculty; assignments are generally finalized by mid-November.
- 6) A *Student-Advisor Commitment Document* (provided in the Appendix) will be signed by both the assigned graduate student and the advisor, and kept in the student's file.
- 7) In order to facilitate a fair advisor assignment process, the students and faculty will follow the rules above. The exception being, if the students are specifically admitted to work for a particular advisor. In such a scenario, the advisor's name will be mentioned in the admission offer letter.

### **IV. Selection of Dissertation Committee**

- 1) Students must select their dissertation committee at the start of their qualifying examination in consultation with their thesis advisor.
- 2) The thesis committee should consist of the following: committee chair (thesis advisor), at least two faculty members with full time appointment in chemical engineering, at least one external committee member from another department at TTU. All of these committee members should hold a tenure-track faculty position in the TTU System.
- 3) Occasionally, a thesis project might require an additional committee member from either academia, industry or a national laboratory. This committee member must hold a Ph.D. or M.D. degree in engineering or science or closely related area and should be approved by the graduate advisor and the graduate school. For this purpose, the thesis committee chair (student's advisor) should provide a one paragraph justification for the need to select a committee member from outside of TTU.

### **V. Teaching Assistant (TA) Duties**

- 1) Each Ph.D. student is required to perform TA duties for 3 semesters. The TAs typically work 5-8 hrs/wk on average. TA responsibilities include maintaining office hours, grading, conducting discussions, proctoring exams, delivering substitute lectures, developing and helping students with projects, and/or supervising, maintaining, and developing undergraduate teaching laboratories.

- 2) It is possible that some students might have to TA more than 3 times due to departmental needs and funding levels. In this case, the student and advisor should meet and discuss this possibility.

## **VI. Ph.D. Qualifying Exam**

- 1) The qualifying exam is to be taken after the student has completed all of the core courses with a cumulative GPA of 3.0.
- 2) The qualifying exam should be completed before the end of the third year of the student.
- 3) Per current format, the qualifying exam consists of an independent project that is assigned by the student's advisor. The problem assigned to students is different from previous research conducted. The student is given 4 to 6 weeks to work on the problem and then submit a report to the committee. This is followed by a presentation and defending the work in front of the committee (typically a week after the submission of the report).
- 4) The outcomes of the qualifying exam could be: *Pass*, *Redefend* and *Fail*. Students who fail the qualifying exam are ineligible to pursue the PhD but are eligible to obtain a terminal MS degree.
- 5) Upon passing the qualifying exam, the student is admitted to PhD candidacy and needs to submit the *Qualifying Exam Report* (see Appendix) to the Graduate School. At this point, the degree plan should be submitted to the Graduate School. The degree plan should contain the courses to be taken in fulfillment of PhD requirements with names provided for ChE 7000 courses and the plan should be signed by the thesis supervisor and the graduate advisor. See the Appendix for an example. In addition, the thesis advisor should send a memo to the graduate school, cc'ing the graduate advisor, stating that the student passed the qualifying exam and including the date of the exam and the committee members in attendance.
- 6) It is recommended that the PhD students meet with their dissertation committee on an annual basis after passing their qualifying exam to report research progress and receive feedback.

## **VII. Dissertation Defense**

- 1) A student planning to graduate must file in the Graduate School's office a "Statement of Intention to Graduate" at the beginning of the semester of intended graduation. A list of deadlines, including the date for filing the "Statement of Intent to Graduate," can be found on the Graduate School website ([www.gradschool.ttu.edu](http://www.gradschool.ttu.edu)).
- 2) Once the graduate school is notified of the intent to graduate, the student should contact the dissertation committee members to identify a time slot suitable for everyone. Final oral examinations should not be scheduled during inter-term breaks – if the committee agrees to an exam between terms, it is the student's and/or advisor's responsibility to identify the Dean's Representative and let the Graduate School know who that is.
- 3) The Graduate School must be notified of the time of the final oral examination at least three weeks in advance. The Graduate School will then find a Dean's Representative to attend the final examination. In the event that there is less than three weeks notification, the student and/or thesis advisor should identify a Dean's Representative and let the Graduate School know the time of the exam and the identified Dean's Representative.

- 4) A copy of the dissertation (in printed or electronic form, as requested by the particular committee member) should be given to each committee member at least three weeks before the thesis defense. It is expected that the printed copy should be in a “professional” format. For example, a paper copy that is held together by a paper clip is considered unacceptable.
- 5) A printed notice of the dissertation defense (abstract, time and place) should be posted in prominent places in the department. In addition, the department should also be notified by an email. Both notices must be placed at least one week prior to defense.
- 6) The dissertation defense will consist of 3 parts: oral presentation by the candidate, open question session and “closed” question session where only the thesis committee members are present.

## **Master of Science (thesis) and Master of Science (non-thesis) programs**

Students pursuing the MS (thesis) degree require a total of 30 credits to graduate while students pursuing the MS (non-thesis) degree require a total of 36 credits to graduate. The credit hour breakup of these degree plans is as specified below (degree plan for the BS/MS program can be found in the Appendix).

### **I. Coursework**

- 1) All students pursuing an MS degree are required to take the following 5 core courses (**15 credits**): Advanced Chemical Engineering Techniques (CHE 5310), Advanced Chemical Engineering Thermodynamics (CHE 5321), Digital Computation for Chemical Engineers (CHE 5323), Fluid Transport Principles and Analysis (CHE 5312) and Reaction Kinetics (CHE 5343).
- 2) The students need to maintain a cumulative GPA of 3.0 annually.
- 3) The 30-credit degree plan for MS Thesis:
  - Core courses: 15 credits
  - Course electives: 6 credits (minimum)
  - Seminar courses: 3 credits
  - Thesis Research: 6 credits
  - Thesis defense needs to be passed
- 4) The 36-credit degree plan for MS non-Thesis:
  - Core courses: 15 credits
  - Course electives: 12 credits (minimum)
  - Seminar courses: 3 credits
  - Research: 6 credits
  - Comprehensive exam needs to be passed. The faculty advisor with whom the non-thesis students take their 6 research credits will provide the comprehensive exam. The exam format could include a written report and a presentation.

### **II. Advisor assignment**

The students pursuing MS degrees need to contact faculty members whose area of research they are interested in, identify advisors and inform the graduate committee.

### **III. MS Thesis Committee Selection**

- 1) The thesis committee should consist of the following: committee chair (thesis advisor) and at least one other faculty member with a full time appointment in chemical engineering. All of these committee members should hold a tenure-track faculty position at TTU.
- 2) Occasionally, a thesis project might require an additional member from either academia, industry or a national laboratory. This additional committee member must hold a Ph.D. degree in engineering or science and should be approved by the graduate advisor and the graduate school. For this purpose, the thesis committee chair (student's advisor) should provide a one paragraph justification for the need to select a committee member from outside of TTU.

### **IV. Teaching Assistant (TA) Duties**

- 1) No teaching assistant duties are mandatory for the MS and BS/MS students.

### **V. Thesis Defense**

- 1) Thesis defense is to be initiated by contacting the graduate school. A defense cannot take place in the absence of a representative of the graduate school Dean.
- 2) Once graduate school is notified, student should contact the thesis committee members to identify a time slot suitable for everyone.
- 3) A copy of the thesis (in printed or electronic form, as requested by the particular committee member) should be given to each committee member at least one week before the thesis defense. It is expected that the printed copy should be in a "professional" format. For example, a paper copy that is held together by a paper clip is considered unacceptable.
- 4) A printed notice of the thesis defense (abstract, time and place) should be posted in the prominent places in the department. In addition, the department should also be notified by an email. Both notices must be placed at least one week prior to defense.
- 5) The thesis defense will consist of 3 parts: oral presentation by the candidate, open question session and "closed" question session where only the thesis committee members are present.

## **APPENDIX**



TEXAS TECH UNIVERSITY

Edward E. Whitacre Jr.  
College of Engineering™

### FACULTY ADVISOR ASSIGNMENT DOCUMENT

This is the signature sheet for incoming graduate students for the Fall Semester, 2013. The students are to use this sheet to visit with faculty who are potentially taking graduate students. Each student must visit with a minimum of three faculty members, though they may visit with more. They are to then list three faculty members in order of preference with whom they would like to work on their Ph.D. degree. Once the students have provided their preferences, the faculty meets to decide the actual pairings of students and faculty. The deadline for meeting with faculty is October 31, 2011. The completed form needs to be returned to Prof. Vanapalli by Nov 1, 2013 at 2:00 PM. Decisions will be made most likely by Nov 12.

\_\_\_\_\_ Student's name

\_\_\_\_\_ Faculty signature 1

\_\_\_\_\_ Faculty signature 2

\_\_\_\_\_ Faculty signature 3

\_\_\_\_\_ Faculty signature 4

\_\_\_\_\_ Faculty signature 5

#### Student Preferences:

\_\_\_\_\_ **Preference 1.**

\_\_\_\_\_ **Preference 2.**

\_\_\_\_\_ **Preference 3.**





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## STUDENT-ADVISOR COMMITMENT DOCUMENT

We \_\_\_\_\_ (student's name) and \_\_\_\_\_ (Ph.D.  
advisor's name) agree to work as student and advisor towards the student's Ph.D. degree in  
Chemical Engineering at Texas Tech University, beginning in the Spring semester of 2013.  
We agree to mutually work towards the achievement of excellence in this endeavor.

\_\_\_\_\_  
Student name

\_\_\_\_\_  
date

\_\_\_\_\_  
Advisor name

\_\_\_\_\_  
date



## Qualifying Exam Report

Student Name: \_\_\_\_\_

Student R Number: \_\_\_\_\_

Department/College: \_\_\_\_\_

Date: \_\_\_\_\_

The Department/College recommends student:

- Be admitted to candidacy and **successfully** completed the Qualifying Exam
- NOT** be admitted to candidacy and was unsuccessful on the Qualifying Exam

\_\_\_\_\_  
Printed Name of Chair of Committee

\_\_\_\_\_  
Signature of Chair of Committee

Mail to:

Enrollment Management Team  
The Graduate School  
M.S. 1030

**TEXAS TECH UNIVERSITY–THE GRADUATE SCHOOL  
PROGRAM FOR THE DOCTORAL DEGREE**

One copy of this form must be submitted to the Graduate School for approval no later than the beginning of the second year of doctoral work.

Date \_\_\_\_\_ Office Use Only: GRE/GMAT \_\_\_\_\_ Catalog \_\_\_\_\_ Deadline \_\_\_\_\_

Full legal name \_\_\_\_\_ Student's I.D.# \_\_\_\_\_

Current mailing address (include zip code) \_\_\_\_\_

Degree sought Ph.D Major Chemical Engineering Minor (if declared) \_\_\_\_\_ Expected Graduation Date \_\_\_\_\_

Previous Degree(s) \_\_\_\_\_ Institution(s) \_\_\_\_\_ Year(s) Awarded \_\_\_\_\_

Doctoral advisory committee chair: \_\_\_\_\_

Dissertation title (if known at this time, otherwise list area of dissertation research): \_\_\_\_\_

Indicate proposed enrollment pattern for residence year: \_\_\_\_\_

Coursework (prefix and number as it appears in catalog or on official transcript):

<u>Major</u> 45-hr. min. (60 or more hours if no minor)	<u>Minor</u> 15 hr. min. (if declared)	<u>Tool or</u> <u>Language</u> (if required)	<u>Transfer</u> <u>Course#*</u> <u>Institution</u>	TTU equiv.#*
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ChE-5310 (3) Advanced ChE Techniques				
ChE-5312 (3) Fluid Transport Principle and Analysis				
ChE-5321 (3) Advanced ChE Thermodynamics				
ChE-5323 (3) Digital Computation				
ChE-5343 (3) Reaction Kinetics				
ChE-53xx (3) Elective				
ChE-53xx (3) Elective				
ChE-53xx (3) Elective				
ChE-53xx (3) Elective				
ChE-7000 (5) Topics in Polymer Physics 1 or Topics in Bioengineering 1 or similar				
ChE-7000 (5) Topics in Polymer Physics 2 or Topics in Bioengineering 2 or similar				
ChE-7000 (5) Experimental Methods in Polymers 1 or Computational Methods in Bioengineering 1 or similar				
ChE-7000 (4) Experimental Methods in Polymers 2 or Computational Methods in Bioengineering 2 or similar				
ChE-7000 (6) Research				
ChE-7121 (1 x 8 = 8) Seminar (or other seminar)				
ChE-8000 (12) Doctor's Dissertation				

\*In order for transfer courses to be entered on the TTU transcript, courses must be given the TTU equivalent number. For example, MGMT 630 at TAMU may be equivalent to MGT 5371 at TTU. Please indicate when course was (or will be) taken and provide an official transcript to the Graduate School. No more than 30 hours of an earned master's degree from another institution may be transferred. Grades from transfer courses will not appear on TTU transcripts.

\_\_\_\_\_  
Signature of Graduate Advisor of major department

\_\_\_\_\_  
Signature of Graduate Advisor of minor dept.(if declared)

\_\_\_\_\_  
Graduate Dean

\_\_\_\_\_  
Date

Approved [ ]

Conditional Approval [ ]

Not Approved [ ]

Remarks or Conditions of Approval: \_\_\_\_\_

Approval of this form by the Dean of the Graduate School merely indicates that the proposed program is acceptable; it carries no assurance of the applicant's attainment of a degree. Changes to this program may be made only with the approval of the department concerned and the Graduate School, using the form available in the Graduate School. Conditions for approval for admission to candidacy must be met before the proposed semester of graduation. Revised 5/14/02.

# Bachelor of Science and Master of Science in Chemical Engineering-Thesis Option (156 hrs\*\*\*)

## First Year

<b>Fall</b>	CHEM 1307/1107 Prin. Chem. I		CH E 1121 Ch E Seminar	MATH 1451 Calc I	ENGL 1301 Ess. Coll. Rhetoric	HIST 2300† Amer. Hist. I
<b>Spring</b>	CHEM 1308/1108 Prin. Chem. II	PHYS 1408 Prin. Phys. I	CH E 1305 Eng. Anal.	MATH 1452 Calc II	ENGL 1302 Adv. Coll. Rhetoric	HIST 2301† Amer. Hist. II

## Second Year

<b>Fall</b>	CHEM 3305/3105 Org. Chem. I	PHYS 2401 Prin. Phys. II	CH E 2410 Chem. Proc.	MATH 2450 Calc III		POLS 1301‡ Amer. Govt. I
<b>Spring</b>	CHEM 3251, 3301, 3351, 3306/3106, or 4311 Chem. Elect.*		CH E 2421 Thermo. I	MATH 3350 Adv. Math Engr. I	CHE 2306 Expo. of Tech Info	ART x3xx Visual/Perf Arts**

## Third Year

<b>Fall</b>	CHEM3306/3106, 3341/3141, or 3310 Chem. Elect.*	CH E 3315 Fluid Mech.	CH E 3322 Thermo. II	CH E 3326 Heat Transfer		POLS 2302‡ Amer. Govt. II
<b>Spring</b>	CHEM 3308/3108 Phys. Chem. II	CH E 3330 Eng. Mat. Sci.	CH E 3341 Mass-Trans. Oper.	CH E 3232 Transport Lab	CHE 3323 Reaction Eng.	IE 2311 Engr. Econ. Analysis (Behavior)

## Fourth Year

<b>Fall</b>	CHEM 3107 Chem. Elect.*	CH E 53xx Grad Core+	CH E 53xx Grad Core+	CH E 4232 Unit Oper. Lab	CH E 4353 Process Ctrl.	CH E 4122 CH E Review.
<b>Spring</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Core+	CH E 53xx Grad Core+	CHE 4356 Process Safety	CH E 4555 Proc. Des. & Sim.	HUM x3xx Hum/Mltltl**
<b>Summer</b>	RESEARCH (CHE 5000 or paid)					

## Fifth Year

<b>Fall</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Core+	CH E 53xx Grad Elect++	CH E 53xx Grad Elect++		
<b>Spring</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Elect++	CH E 53xx Grad Elect++	CH E 6000 Masters Thesis	THESIS DEFENSE	
<b>Summer</b>	CH E 6000 Masters Thesis (if needed)					

## Typical break-up of credits towards degree plan (36 credits)

Grad Core Courses: 15 credits

Grad Elective Courses: 12 credits

Grad Seminar Courses: 3 credits

Independent Study: 6 credits

Comprehensive exam over independent study project.

**CH E Electives:**

CH E 4000 - Special Problems in Chem. Engineering  
CH E 4340 - Polymer Processing  
CH E 4341 - Polymerization Engineering  
CH E 4342 - Polymer Physics and Engineering  
CH E 4344 - Polymers/Materials Laboratory  
CH E 4345 - Dyn. of Polymeric and Nonlinear Fluids  
CH E 4346 - Polymer Viscoelasticity  
CH E 4363 - Biochemical Engineering  
CH E 4364 - Ch E Applications in Biological Systems  
CH E 4365 - Biotransport  
CH E 4366 - Biomicrofluidics  
CH E 4372 - Engineering Experimentation  
CH E 4381 - Numerical Techniques for Ch E Problems  
CH E 4384 - Process Dynamics and Auto Control  
CH E 4385 - Bioprocess Control

**\* CHEM Electives:**

8 hours total: 6 lecture, 2 hours of lab

Chemistry courses listed for electives are suggestions only

**Graduate Courses:**

+ 5 required core courses

CH E 5310- Adv. Chemical Engineering Techniques

CH E 5312- Fluid Transport Prin. and Analysis

CH E 5321- Adv. Chem. Eng. Thermodynamics

CH E 5323- Dig. Computation for Chem. Engineers

CH E 5343- Reaction Kinetics

++ Electives as recommended by graduate mentor

\*\*\* up to 162 hours if research hours are taken in 4<sup>th</sup> and 5<sup>th</sup> year summer sessions.

For CH E course descriptions, [click here](#).

**† U.S. History Requirement (6 hrs):**

HIST 2300 and 2301 will fulfill the U.S. History requirement. However, HIST 3310 and HIST 3323 can also be applied to this requirement.

**‡ Political Science Requirement (6 hrs):**

POLS 1301 and 2302 will fulfill the political science requirement. If a student earns an A or B in POLS 1301, any upper-level Political Science course listed in the core curriculum section of the current catalog can be substituted for POLS 2302.

**‡ Foreign Language Requirement:**

One year (or the equivalent) of a single foreign language at the college level fulfills this requirement. Two years of credit in a single language in high school can be substituted.

**\*\* Humanities, Visual/Performance Arts, and Behavior/Multicultural Electives:**

Courses should be selected from the core curriculum course lists in the undergraduate bulletin in order to meet core curriculum requirements. One course should be chosen that simultaneously appears on the Multicultural list and on either the Humanities, or Visual/Performing Arts.

Otherwise an additional course will be needed.

## Bachelor of Science and Master of Science in Chemical Engineering Non-Thesis Option (161 hrs)

### First Year

<b>Fall</b>	CHEM 1307/1107 Prin. Chem. I		CH E 1121 Ch E Seminar	MATH 1451 Calc I	ENGL 1301 Ess. Coll. Rhetoric	HIST 2300† Amer. Hist. I
<b>Spring</b>	CHEM 1308/1108 Prin. Chem. II	PHYS 1408 Prin. Phys. I	CH E 1305 Eng. Anal.	MATH 1452 Calc II	ENGL 1302 Adv. Coll. Rhetoric	HIST 2301† Amer. Hist. II

### Second Year

<b>Fall</b>	CHEM 3305/3105 Org. Chem. I	PHYS 2401 Prin. Phys. II	CH E 2410 Chem. Proc.	MATH 2450 Calc III		POLS 1301‡ Amer. Govt. I
<b>Spring</b>	CHEM 3251, 3301, 3351, 3306/3106, or 4311 Chem. Elect.*		CH E 2421 Thermo. I	MATH 3350 Adv. Math Engr. I	CHE 2306 Expo. of Tech Info	ART x3xx Visual/Perf Arts**

### Third Year

<b>Fall</b>	CHEM3306/3106, 3341/3141, or 3310 Chem. Elect.*	CH E 3315 Fluid Mech.	CH E 3322 Thermo. II	CH E 3326 Heat Transfer		POLS 2302‡ Amer. Govt. II
<b>Spring</b>	CHEM 3308/3108 Phys. Chem. II	CH E 3330 Eng. Mat. Sci.	CH E 3341 Mass-Trans. Oper.	CH E 3232 Transport Lab	CH E 3323 Reaction Eng.	IE 2311 Engr. Econ. Analysis (Behavior)

### Fourth Year

<b>Fall</b>	CHEM 3107 Chem. Elect.*	CH E 53xx Grad Core+	CH E 53xx Grad Core+	CH E 4232 Unit Oper. Lab	CH E 4353 Process Ctrl.	CH E 4122 CH E Review.
<b>Spring</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Core+	CH E 53xx Grad Core+	CHE 4356 Process Safety	CH E 4555 Proc. Des. & Sim.	HUM x3xx Hum/Mltl†**
<b>Summer</b>	RESEARCH (CHE 5000)					

### Fifth Year

<b>Fall</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Core+	CH E 53xx Grad Elect++	CHE 5000 Research		COMPREHENSIVE EXAM
<b>Spring</b>	CH E 7121 Grad Seminar	CH E 53xx Grad Elect++	CH E 53xx Grad Elect++	CH E 53xx Grad Elect++		

### Typical break-up of credits towards degree plan (36 credits)

Grad Core Courses:            15 credits

Grad Elective Courses:       12 credits

Grad Seminar Courses:       3 credits

Research Study:                6 credits

Comprehensive exam needs to be passed.

**CH E Electives:**

CH E 4000 - Special Problems in Chem. Engineering  
CH E 4340 - Polymer Processing  
CH E 4341 - Polymerization Engineering  
CH E 4342 - Polymer Physics and Engineering  
CH E 4344 - Polymers/Materials Laboratory  
CH E 4345 - Dyn. of Polymeric and Nonlinear Fluids  
CH E 4346 - Polymer Viscoelasticity  
CH E 4363 - Biochemical Engineering  
CH E 4364 - Ch E Applications in Biological Systems  
CH E 4365 - Biotransport  
CH E 4366 - Biomicrofluidics  
CH E 4372 - Engineering Experimentation  
CH E 4381 - Numerical Techniques for Ch E Problems  
CH E 4384 - Process Dynamics and Auto Control  
CH E 4385 - Bioprocess Control

**\* CHEM Electives:**

8 hours total: 6 lecture, 2 hours of lab  
Chemistry courses listed for electives are suggestions only

**Graduate Courses:**

+ 5 required core courses  
CH E 5310- Adv. Chemical Engineering Techniques  
CH E 5312- Fluid Transport Prin. and Analysis  
CH E 5321- Adv. Chem. Eng. Thermodynamics  
CH E 5323- Dig. Computation for Chem. Engineers  
CH E 5343- Reaction Kinetics  
++ Electives as recommended by graduate mentor

For CHE course descriptions, [click here](#).

**† U.S. History Requirement (6 hrs):**

HIST 2300 and 2301 will fulfill the U.S. History requirement. However, HIST 3310 and HIST 3323 can also be applied to this requirement.

**‡ Political Science Requirement (6 hrs):**

POLS 1301 and 2302 will fulfill the political science requirement. If a student earns an A or B in POLS 1301, any upper-level Political Science course listed in the core curriculum section of the current catalog can be substituted for POLS 2302.

‡ **Foreign Language Requirement:** One year (or the equivalent) of a single foreign language at the college level fulfills this requirement. Two years of credit in a single language in high school can be substituted.

**\*\* Humanities, Visual/Performance Arts, and Behavior/Multicultural Electives:**

Courses should be selected from the core curriculum course lists in the undergraduate bulletin in order to meet core curriculum requirements. One course should be chosen that simultaneously appears on the Multicultural list and on either the Humanities, or Visual/Performing Arts.

Otherwise an additional course will be needed.