IOWA STATE UNIVERSITY

Department of Chemical and Biological Engineering

Undergraduate Student Booklet

2016-2017 Catalog

che-advising@iastate.edu
http://www.cbe.iastate.edu/current-students/guides-and-handbooks

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IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

College of Engineering
Department of Chemical
and Biological Engineering
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Dear Undergraduate Students:

Welcome to Iowa State University. We are delighted to have you join Cyclone Nation as a student in the Department of Chemical and Biological Engineering (CBE).

As a CBE undergraduate, you will be part of a diverse and vibrant department with over one hundred years of excellence in engineering education. We provide a supportive and stimulating environment that combines talented students, a diverse faculty, excellent facilities and a rich research and teaching tradition. Graduates from our department have gone on to do great things while pursuing careers in the chemical industry, pharmaceuticals, food production, microelectronics, health care, law, academics, and many others.

Thank you for "choosing your adventure" at Iowa State. We encourage you to explore our student organizations, undergraduate research opportunities, study abroad programs, and more.

Welcome to CBE. We strive to make your college experience enjoyable and rewarding.

Go Cyclones,

Andrew C. Hillier

Andrew C. Hillier
Wilkinson Professor and Chair
Department of Chemical and Biological Engineering

Introduction

This booklet has been prepared to help you plan your program in chemical engineering at Iowa State University and is intended to guide you through the chemical engineering curriculum, to describe various opportunities and options, and to relay important policies and procedures. Other information sources are:

- Academic Departments at ISU
  http://www.iastate.edu/depts
- College of Engineering
  http://www.engineering.iastate.edu
- Course Equivalency Guide
  http://www.admissions.iastate.edu/equiv/index.php
- Department of Chemical and Biological Engineering
  http://www.cbe.iastate.edu
- Experimental (###X) Course Descriptions
  http://www.registrar.iastate.edu/faculty-staff/courses/explistings
- General Catalog (curriculum and course information)
  http://catalog.iastate.edu
- ISU Information Handbook (academic regulations)
  http://policy.iastate.edu
- ISU Academic Calendar
  http://www.registrar.iastate.edu/calendar
- ISU Academic Information Technologies
  http://www.it.iastate.edu
- ISU Registrar Forms
  http://www.registrar.iastate.edu/forms
- Pre-Health Information
  http://www.las.iastate.edu/pre-health
- Pre-Law Information
  http://www.las.iastate.edu/pre-law
- Schedule of Classes
  http://classes.iastate.edu
- Scholarship Information
  http://www.financialaid.iastate.edu
  http://www.engineering.iastate.edu/student-services/scholarships
  http://www.fastweb.com
  http://federalstudentaid.ed.gov
  http://www.finaid.org
- Student Answer Center
  http://financialaid.iastate.edu/sac
- Student Organizations
  http://sodb.stuorg.iastate.edu
- Tuition and Fees
  http://www.registrar.iastate.edu/fees
- Writing Center
  http://new.dso.iastate.edu/wmc

Part 1: General Information

The Profession of Chemical Engineering

Chemical engineering is an exciting and diverse profession with a tremendous range of occupations and opportunities. Chemical engineers have always been proud of their flexibility. A solid and very general technical background enables them to work effectively in and adapt quickly to many different fields.

The chemical engineer is an expert at dealing with the chemical and physical changes of matter and with the conversion of energy. Most chemical engineers use this knowledge in jobs that involve the application of chemical research to the production of chemical materials and products. This entails product development and market research; economic feasibility studies; research; development and design of chemical processes; design of process equipment; supervision of the construction, start-up, operation, and maintenance of chemical plants; and process improvement for pollution control and energy conservation.

Chemical engineers are employed in a wide variety of industries: petroleum and gas, chemicals, minerals and metals; glass and ceramics; plastics and resins; soap and detergents; cosmetics; rubber and tire; food production; fertilizer and agricultural chemicals; nuclear energy; photographic products; microchip manufacturing; missile and space; synthetic fibers and textiles; paint, paper, and cellulose; pharmaceuticals; and process equipment manufacture. Additionally, chemical engineers are involved in areas such as private consulting, government, higher education, applied physics, manufacturing, applied mathematics, biochemistry, medicine, patent law, food processing, pollution monitoring and prediction, sales, and industrial management. All of these are in addition to the already wide range of types of jobs traditionally thought of as chemical engineering jobs.

Chemical and Biological Engineering Facilities

Sweeney Hall houses classrooms, computer laboratories, research and teaching laboratories, and departmental and staff offices.

Department Administration

The department office and the office of the Department Chair are located in 2114 Sweeney Hall. The department office telephone number is 515-294-7642. The Mike and Jean Steffenson Student Services Center is located in 2162 Sweeney Hall; the telephone number is 515-294-7643.

Undergraduate Student Lounge

You have a place to study in 0107 Sweeney. Comfortable seating, tables with chairs, a phone, and several computers are available in this room. The code to unlock the door can be requested from the staff in 2162 Sweeney Hall.

Computer Labs and Work Spaces

The Department of Chemical and Biological Engineering has a growing list of computer resources available to undergraduate students. The department has several computer labs devoted to undergraduate student use. Rooms 0104, 1123, 1150, and 3114 Sweeney Hall are open to all chemical engineering students; however, rooms 1123 and 1150 are reserved for classes several hours during the week. Additionally, 3149 Sweeney Hall is a laptop computer lab that is available when not in use by a class. 2123 Sweeney Hall is also available as a collaborative space for students. Other labs across campus also offer computers for general use.

Release of Student Information

The department routinely receives requests from graduate schools to provide names of potential candidates to aid them in their recruitment. We will provide such lists using directory information, unless you request that we not include you in such releases. We do not release individual GPA information unless the student has authorized the organization to request it. You may request exclusion by setting your information release preferences in AccessPlus.

Advising

Our Mission

Academic advising is an intentional, collaborative relationship based on trust and mutual respect. This relationship promotes the student's development of competence, autonomy, and sound decision-making skills. The goal of academic advising is an individualized academic experience for each student developed through a mentoring relationship.

The primary point of contact for most advising questions will be your academic adviser. The academic advising staff will help you with the class registration process; Degree Audit corrections; answering questions about ISU, the College of Engineering, and departmental policies and procedures; handling class scheduling difficulties, and guiding you to campus resources. You also will visit your academic adviser each semester for guidance regarding class registration and to receive your current Registration Access Number (RAN). See the ISU Academic Calendar for registration advising dates.

Shortly after enrolling in CH E 202, you will be assigned to a faculty mentor. At this time, you will also complete your Plan of Study (POS) which you should attempt to complete before meeting with your faculty mentor. Visit with your faculty mentor to discuss progress and goals, select electives that support your plan of study, generate career goals, learn more about the profession of chemical engineering, gain assistance in applying to graduate school, and for any other issue that requires faculty expertise.

You are expected to plan your POS for a more intentional college experience. Degree Audits (DA) show your progress toward completing degree requirements and are available in AccessPlus at any time to you or your academic adviser.

See your faculty mentor for:	**See your adviser for**:
Developing an elective package	Registering for courses
Information about the profession	Adding or dropping a course
Career and profession questions	Information about degree requirements
Working on a plan of study	Resolving course scheduling problems
Discussing undergraduate independent study projects	Registering a co-op or internship
Obtaining a recommendation letter	Providing copies of forms and department publications
Learning about graduate school	Guidance to campus and community resources

Academic Integrity

It is imperative that society be able to rely upon the integrity of the members of our profession. At the university, faculty members expect you to follow high ethical standards in your academic work. Rules and procedures regarding actions that constitute academic dishonesty are included in the Iowa State University Information Handbook. These apply to all students. In addition, the chemical engineering faculty have adopted the following policy statement, which applies in chemical engineering courses.

Faculty members expect that work submitted in your name be entirely your own work. You should not copy assignments, exams, quizzes, computer programs, etc. from others or allow copying of your work. It is usually permissible to discuss homework assignments with other students, unless your instructor specifies to the contrary. For examinations and quizzes, a stricter standard is imposed. For exams and quizzes the presumption, unless otherwise stated, is no discussion, no use of notes, no use of books or journals, and no use of work of others. If in a particular instance the instructor wishes to modify any part of the department policy, you will be so informed in writing.

Please refer to the Dean of Students Office's Academic Misconduct policy at the following link:
http://www.studentconduct.dso.iastate.edu/academic/students

American Institute of Chemical Engineers (AIChE) Code of Ethics

Members of the American Institute of Chemical Engineers shall uphold and advance the integrity, honor, and dignity of the engineering profession by: being honest and impartial and serving with fidelity their employers, their clients, and the public; striving to increase the competence and prestige of the engineering profession; and using their knowledge and skill for the enhancement of human welfare. To achieve these goals, members shall:

- Hold paramount the safety, health and welfare of the public and protect the environment in performance of their professional duties
- Formally advise their employers or clients (and consider further disclosure, if warranted) if they perceive that a consequence of their duties will adversely affect the present or future health or safety of their colleagues or the public
- Accept responsibility for their actions, seek and heed critical review of their work and offer objective criticism of the work of others
- Issue statements or present information only in an objective and truthful manner.
- Act in professional matters for each employer or client as faithful agents or trustees, avoiding conflicts of interest and never breaching confidentiality
- Treat fairly and respectfully all colleagues and co-workers, recognizing their unique contributions and capabilities
- Perform professional services only in areas of their competence
- Build their professional reputations on the merits of their services
- Continue their professional development throughout their careers, and provide opportunities for the professional development of those under their supervision
- Never tolerate harassment
- Conduct themselves in a fair, honorable, and respectful manner

Part 2: Curriculum and Requirements

Outcomes of the Program

The chemical engineering program should produce graduates that have:

- An ability to apply knowledge of mathematics, science and engineering
- An ability to design and conduct experiments as well as to analyze and interpret data
- An ability to design a chemical engineering system, component or process to meet desired needs
- An ability to function on multi-disciplinary teams
- An ability to identify, formulate, and solve chemical engineering problems
- An understanding of professional and ethical responsibility
- The ability to communicate effectively
- The broad education necessary to understand the impact of chemical engineering solutions in a global and societal context
- Recognition of the need for and an ability to engage in lifelong learning
- A knowledge of contemporary issues
- The ability to use the techniques, skills and modern engineering tools necessary for engineering practice
- Demonstrated thorough grounding in chemistry and a working knowledge of advanced chemistry such as organic, inorganic, physical, analytical, materials chemistry, or biochemistry
- A working knowledge, including safety and environmental aspects, of material and energy balances applied to chemical processes; thermodynamics of physical and chemical equilibria; heat, mass and momentum transfer; chemical reaction engineering; continuous and stage-wise separation operations; process dynamics and control; process design; and appropriate modern experimental and computing techniques
- An ability to function as engineers in an international setting
- An ability to function as professional engineers in the industries related to chemical engineering
- An ability to pursue research and advanced studies in chemical engineering or in related fields such as medicine, law, and business

Basic Program Requirements

Engineering students are required to complete the following courses as a condition of enrollment in engineering courses at the 200-level or above. The general requirement is to complete the engineering Basic Program with a grade point average of 2.00 or better. Transfer credits are not included in the Basic Program grade point average. The basic program courses are:

MATH 165, MATH 166	CHEM 177 (or CHEM 167)
ENGL 150, ENGL 250	PHYS 221
ENGR 101, CH E 160	LIB 160

Students are to complete the basic program prior to enrolling in 200-level engineering courses. For transfer students, enrollment is permitted for no more than two semesters prior to satisfying the basic program requirements. Certain waivers and substitutions are possible for transfer students and should be discussed with your academic adviser as early as possible. Basic Program requirements and exceptions are listed under the College of Engineering Curricula in the ISU Catalog (http://catalog.iastate.edu/collegeofengineering).

Please note:

1. It may be possible to substitute transfer credit for CH E 160 if the coursework contains both engineering problem-solving and computer programming experience.
2. CHEM 167 can substitute for CHEM 177; see your adviser for successful transition into CHEM 178.
3. See the ISUComm Foundation webpage for more information on English placement: http://www.engl.iastate.edu/isucomm/foundation-2/placement-engl-150/.

Note The highlighted text above was revised July 8, 2016 and differs from printed copies of this booklet that were distributed in June 2016.****

Core Course Requirement

The College of Engineering requires that each student must have a minimum GPA of 2.00 in a group of 200-level and above courses to meet graduation requirements. The chemical engineering faculty have designated the following chemical engineering courses as core courses for this requirement: CH E 202, CH E 210, CH E 310, CH E 325, CH E 356, CH E 357, CH E 358, CH E 381, CH E 382, CH E 420, CH E 421, CH E 426, and CH E 430. The Degree Audit available in AccessPlus will show this grade point average each semester under Chemical Engineering Core. Transfer credits will be included in this average. The cumulative GPA is based upon all courses, excluding transfer courses. This means the grade point average will be based upon those courses that were actually taken at Iowa State University.

Biochemistry Requirement

Chemical engineering students are encouraged to take BBMB 301 during a fall semester when a chemical engineering section of the course is offered.

Social Science and Humanities (SSH) Electives

Both Iowa State University and industry want our graduates to be well-rounded professionals who can interact with their coworkers, business clients, and society. Social Science and Humanities (SSH) electives are an important part of your chemical engineering degree program. These courses can help you develop or expand skills necessary to achieve success within both industry and society. The CBE department defines SSH electives as non-technical, non-skilled based courses that help students to develop a love for lifelong learning, foster critical thinking, and expand their worldview. An approved list of SSH electives is listed on pages 9-11.

Using Independent Study (490) courses as SSH electives requires **prior** approval by your adviser and the CBE Curriculum Committee. Consult with your adviser for courses not on the SSH list, such as Honors Seminars, experimental courses, or other courses that you think might qualify.

SSH requirements include:

- Minimum of 15 credits from the list of approved courses
- At least 6, but no more than 9, credits must be in the same department

U.S. Diversity (USDiv) and International Perspectives (IP) Requirements

A similar Iowa State University and CBE department goal is to prepare you to meet the challenges of responsible citizenship and effective professional roles in a culturally diverse global community. To help achieve this goal, all undergraduate students must fulfill graduation requirements in two areas: U.S. Diversity (USDiv) and International Perspectives (IP). The focus of the USDiv requirement is the multicultural society of the United States. Courses used to meet the requirement provide students with insights that enhance their understanding of diversity among people in the U.S. The focus of the IP requirement is the global community. Its objective is to promote your understanding of cultural diversity and interdependence on a global scale.

Many approved SSH electives also fulfill either the USDiv or IP requirement. The list of approved SSH electives (see pages 9-11) has notations if a course meets the USDiv or IP requirement. For a more complete listing of USDiv and IP courses, refer to the following webpages:

- USDiv Course Listing: http://www.registrar.iastate.edu/students/div-ip-guide/usdiversity-courses
- IP Course Listing: http://www.registrar.iastate.edu/students/div-ip-guide/IntlPerspectives-current

The IP requirement may be alternatively fulfilled by completing one of the following:

- An international work experience (e.g. co-op or internship) involving a stay in a foreign country of three weeks or greater in duration.
- An approved study abroad experience involving a stay in a foreign country of three weeks or greater in duration.
- An approved study abroad experience that is three or more credits.

Note: International students are exempt from the IP requirement.

Approved Social Science and Humanities Course List

Dept Course #	US Div	Int'l Persp
A M D		
165	X	
257		
354		X
356		
362		X
372		X
467		
Acct (Accounting)		
215		
AESHM		
342	X	
379	X	
421		X
Af Am		
All courses except 490		
201	X	
325		X
330	X	
334	X	
347	X	
350	X	
353	X	
354	X	
460	X	
473	X	
Agron		
342		X
450		
Am In		
All courses except 490		
210	X	
240	X	
310	X	
315	X	
320	X	
322	X	
323		X
328	X	
332	X	
342	X	
346	X	
426	X	
Anthr		
201		X
202		
220		X
230		X
306		X
307		
308		
309		X
313		X
315	X	
320	X	
321		
322	X	
323		X
332	X	
333	X	
336		X
340		X

Dept Course #	US Div	Int'l Persp
Anthr cont.		
411		X
418		X
444		X
450		
Arch		
221		X
222		X
271		
321	X	
420	X	
422		X
423		X
424		
425		
426	X	
427		X
ArtGr		
388	X	
Art H		
All courses except 490		
280		X
281		X
292	X	
382		X
384		X
395	X	
481		X
494	X	
Biol		
173		
307	X	
Ch E		
391		X
Cl St		
All courses except 480 & 490		
273		X
275		X
353		X
372		X
373		X
374		X
376		X
394		X
Com Dis		
286	X	
ComSt		
310		X
323	X	

Dept Course #	US Div	Int'l Persp
C R P		
270	X	
291		X
293		
376		
417		
484		
491		
CJ St		
240		
241		
320		
332		
340		
341		
351		
352		
402		
403		
Dance		
270		
360		
Dsn S		
181		
183		
221		X
222		X
274	X	
280		X
281		X
291		X
292	X	
293		
321	X	
371		
373		X
382		X
383		
385		
395	X	
396		
417		
481		X
484		
487		
489		
491		
494	X	
Econ		
101		
102		
301		
302		
312		
320		
321	X	
344		

Dept Course #	US Div	Int'l Persp
Econ cont.		
353		
355		X
362		
370		X
376		
378	X	
380		
385		X
455		X
480		
Engr		
320		X
327		
Engl		
201		
219		
225		
226		
227		
228		
237		
240	X	
260		
275		
330		
335 - 396 inclusive		
340	X	
344	X	
345	X	
346	X	
347	X	
349	X	
352	X	
353		X
354		X
370		X
374		X
375		X
376		X
389		X
420		
422	X	
440		
441		
445		
450		
460		

Dept Course #	US Div	Int'l Persp
Env S		
160		
173		
201		
220		X
293		
320		
334		
342		X
345		X
355		
380		
382		
383		
384		X
442		
450		X
460		
472		
484		
491		
FS HN		
342		X
Geron		
373		
377	X	
378	X	
Hist		
All courses except 490 & 495		
201		X
202		X
207		X
240	X	
280		X
281		X
284		X
323		X
336		X
337		X
338		X
339		X
341		X
353	X	
354	X	
374		X
380	X	
383		X
386	X	
389		X
390		X
421		X
422		X

Dept Course #	US Div	Int'l Persp
Hist cont.		
473	X	
HD FS		
102		
227		
239	X	
240	X	
249	X	
270		
276	X	
367		
373		
377	X	
378	X	
479		
H Sci		
150	X	
Int St		
235		X
430		X
JI MC		
101		
401		
460		
461		
462		
464		
474		X
476		X
477	X	
L A		
272	X	
274	X	
371		
373		X
LAS		
211	X	
322	X	
325	X	
328X	X	
385		X

Dept Course #	US Div	Int'l Persp
Ling		
119		X
219		
286	X	
305		
309		X
413		
420		
422	X	
463		X
Mgmt		
370		
371		
414		
419		
471		
472	X	
Mat E		
220		X
391	X	
M E		
220		X
484		X
Music		
102		X
302		
304	X	
383		X
384		X
472	X	
473		
475		
476		
Phil		
All courses except 207 & 490		
235	X	
338	X	
Pol S		
All courses except 301,475, & 490		
241		X
251		X
315		X
333	X	
347		X
349		X
350		X
354		X
385	X	
452		X

Dept Course #	US Div	Int'l Persp
Psych		
101		
230		
280		
310		
313		
314		
346	X	
347	X	
348		
360		
380		
381		
383		
401		
413		
450		
460		
484		
488		X
Relig		
All courses except 490 & 499		
205		X
210	X	
242		X
323		X
328	X	
333		X
334	X	
336	X	
340		X
342	X	
352		X
355		X
356		X
358		X
376		X
384		X
453		X
Soc		
All courses beyond 130 except 202, 302, 412, 460, 464, & 490		
220		X
235	X	
327	X	
328	X	
330	X	
331	X	
332	X	
345		X
411		X
Sp Cm		
212		
305		
312		
323	X	
350		
417		

Dept Course #	US Div	Int'l Persp
T SC		
220		X
341		
342		X
343		
474		X
Thtre		
106		
110		
465		
466		
U St		
321	X	
W S		
All courses except 258, 490, 491, & 499		
160	X	
201	X	
203	X	
205	X	
222	X	
301		X
302	X	
307	X	
321	X	
323	X	
327	X	
328	X	
333	X	
336	X	
338	X	
340	X	
342	X	
345	X	
346	X	
350	X	
352	X	
370		X
374		X
380	X	
385	X	
386	X	
422	X	
444		
494	X	

Dept Course #	US Div	Int'l Persp
W LC		
All WLC courses except 490 & 499 for all curricula. NOTE: Students may not use grammar, conversational, or composition courses in the native language.		
WLC 119		X
WLC 270		X
WLC 484		X
Arabc		
102		X
201		X
ASL		
101	X	
102	X	
275	X	
Chin		
102		X
201		X
202		X
301		X
302		X
304		X
320		X
370		X
378		X
Czech		
102		X
201		X
202		X
Frnch		
102		X
201		X
202		X
301		X
304		X
305		X
320		X
326		X
340		X
370		X
378		X
476		X

Dept Course #	US Div	Int'l Persp
Ger		
102		X
201		X
202		X
301		X
302		X
304		X
305		X
320		X
330		X
370		X
371		X
375		X
378		X
395		X
476		X
Greek		
102		X
201		X
332		X
Latin		
102		X
201		X
332		X

Dept Course #	US Div	Int'l Persp
Rus		
102		X
201		X
202		X
301		X
304		X
314		X
370		X
375		X
378		X
395		X
Span		
102		X
195		X
201		X
202		X
295		X
301		X
303		X
304		X
314		X
321		X
322		X
323		X
324		X
326		X
330		X
331		X
332		X
333		X
351		X
352		X
354		X
370		X
395		X
440		X
401		X
441		X
445		X
463		X

###X – Experimental course; see http://www.registrar.iastate.edu/faculty-staff/courses/explistings for description & scheduled offering.

Completing your Plan of Study (POS)

The purpose of planning your chemical engineering degree is to allow you to determine what courses/programs/activities will help you meet your goals in a timely manner.

On the chemical engineering flowchart (pg. 14), cross off courses that you already have completed and circle the courses in which you are currently enrolled. Complete the Plan of Study (POS) form on the next page by following the steps below:

1. Completely fill out the heading.

2. List credits that can be used to meet degree requirements that were earned before entering ISU (transfer, AP, test out, etc.) in the first semester block. Label this semester as "TR" for transfer.

3. List any transfer course that needed to be evaluated in the "Approved Course Substitutions" with the ISU course number that it was evaluated as being "equivalent to" or as a "substitute for."

4. The next Semester block would be your first term at ISU. Label it appropriately (e.g., "F16" for Fall 2016; "S17" for Spring 2017; or either "SS17" or "1'17" for Summer 2017). List all courses taken that term. Do this for each term through the current term.

5. Continue listing courses that you plan to take for future terms, checking off each course on your flowchart as you list it on the POS form. This will help you to account for each requirement without listing the requirement more than once.

6. List each elective course on the right column under the requirement that it will meet. Do this as you list the course in the term that you will take the course.

7. Keep in mind/make sure:
   A. Courses are available during the term that you have scheduled them
   B. Credit loads for each semester are within acceptable limits ($\leq$18 credits per semester, or $\leq$21 for Honors Program)
   C. All course prerequisites are satisfied
   D. All curriculum requirements for graduation are satisfied.

8. Discuss your POS with your faculty mentor.

CHEMICAL ENGINEERING CURRICULUM PLAN of Study

_________ Catalog

Name ______________ ID# ______________ Entry Term ________ GRAD TERM ________ Date ________

Honors ☐ Bio-Option ☐ Double Degree w/ __________ Double Major w/ __________ Minor in __________

STUDENT OBJECTIVE:

Start with *applicable* transfer courses, fill in the courses prior to ISU, have taken, currently taking, and plan to take.
Label terms as TR (transfer, AP, CLEP); F16; S17; 1'17 (summer), etc.
Make sure: 1. Courses are available in the term that you schedule them (e.g., ChE 392 is summer-only).
2. All course prerequisites and all curriculum requirements for graduation are satisfied.

APPROVED COURSE SUBSTITUTIONS

______ for ______	______ for ______	______ for ______
______ for ______	______ for ______	______ for ______

SEMESTER ______	CR	SEMESTER ______	CR	SEMESTER ______	CR
Total		Total		Total	

SEMESTER ______	CR	SEMESTER ______	CR	SEMESTER ______	CR
Total		Total		Total	

SEMESTER ______	CR	SEMESTER ______	CR	SEMESTER ______	CR
Total		Total		Total	

SEMESTER ______	CR	SEMESTER ______	CR	SEMESTER ______	CR
Total		Total		Total	

SEMESTER ______	CR	SEMESTER ______	CR	SEMESTER ______	CR
Total		Total		Total	

☐ **ChE 392 is the 4-cr. Unit Ops lab held each June in Oviedo, Spain that subs for ChE325/426.**

ADVISING NOTES:

ELECTIVES

SSH

INT'L PERSPECTIVE (3 CR)

______ ___Cr
______ ___Cr

US DIVERSITY (3 CR)

______ ___Cr
______ ___Cr

SINGLE DEPT. (6-9 CR)

______ ___Cr
______ ___Cr
______ ___Cr

OTHER SSH COURSES

______ ___Cr
______ ___Cr
______ ___Cr
Total ______ (15 Cr)

TECHNICAL

COMMUNICATION

______ ___Cr
Total ______ (3 Cr)

ADVANCED CHEMISTRY

______ ___Cr
______ ___Cr
______ ___Cr
Total ______ (3 Cr)

STATISTICS

______ ___Cr
Total ______ (3 Cr)

CHEMICAL ENGINEERING

______ ___Cr
______ ___Cr
Total ______ (6 Cr)

ENGINEERING

______ ___Cr
______ ___Cr
Total ______ (3 Cr)

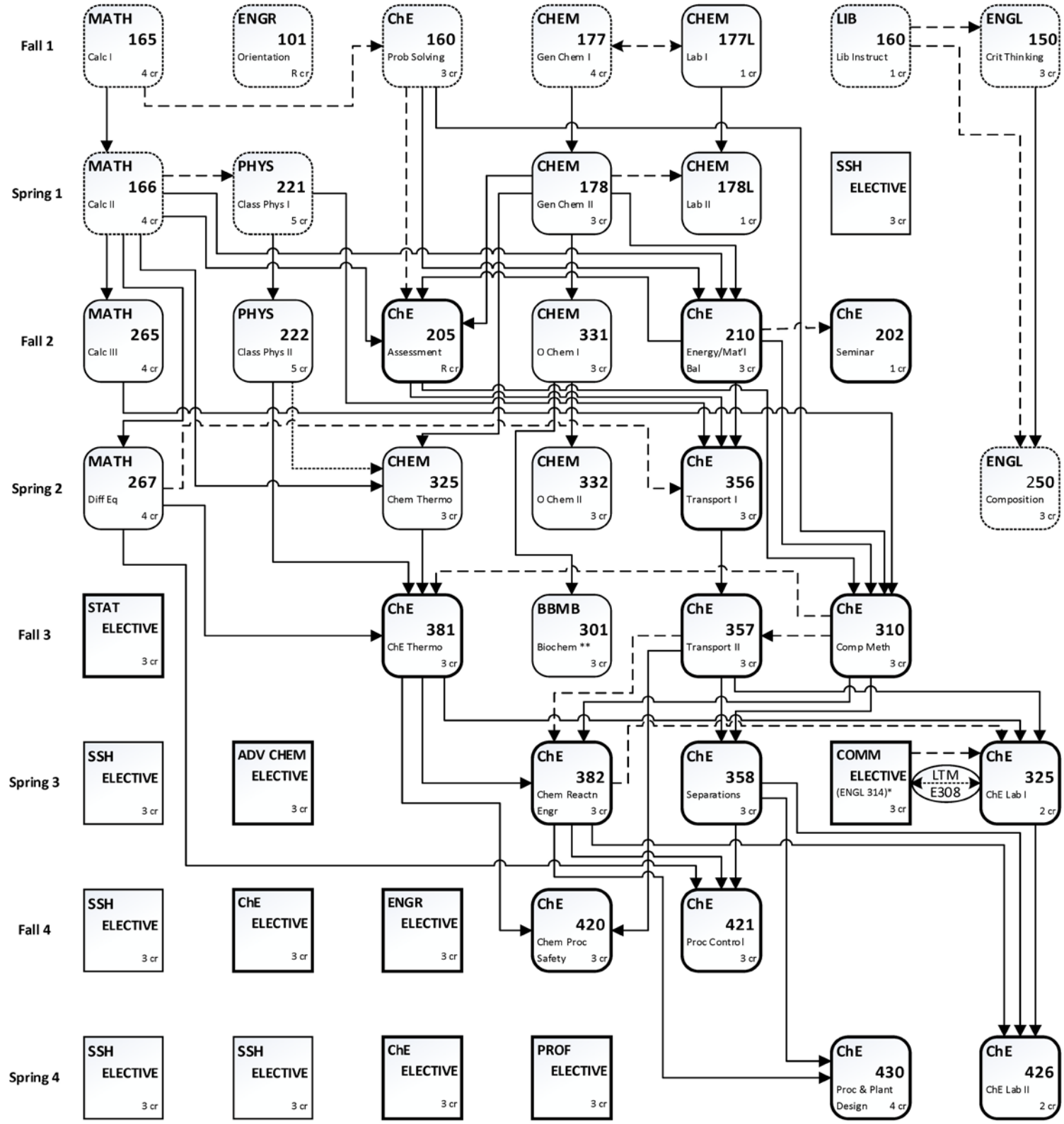
PROFESSIONAL

______ ___Cr
______ ___Cr
______ ___Cr
Total ______ (3 Cr)

Student Signature

Faculty Mentor Signature

CHEMICAL ENGINEERING FLOWCHART, 2016-2017 (129 CREDITS)



Undergraduate Curriculum in Chemical Engineering

2016-17 Catalog
Total Credits = 129

First Year (32)

Fall Semester (16)

4	+	MATH 165	Calculus I
3	+	ENGL 150	Crit. Think. & Comm.
4	+	CHEM 177	General Chemistry I
1		CHEM 177L	General Chemistry I Lab
3	+	CH E 160	Chem. Engr. Problems
R	+	ENGR 101	Engineering Orientation
1	+	LIB 160	Information Literacy

Spring Semester (16)

4	+	MATH 166	Calculus II
3		CHEM 178	General Chemistry II
1		CHEM 178L	General Chemistry II Lab
5	+	PHYS 221	Intro. to Physics I
3			SSH Elective

Second Year (32)

Fall Semester (16)

3	*	CH E 210	Material & Energy Bal.
4		MATH 265	Calculus III
5		PHYS 222	Intro. to Physics II
3		CHEM 331	Organic Chemistry I
1	*	CH E 202	Seminar
R		CH E 205	Assessment

Spring Semester (16)

3	*	CH E 356	Transport Phenomena I
4		MATH 267	Differential Equations
3		CHEM 332	Organic Chemistry II
3		CHEM 325	Chemical Thermodynamics
3	+	ENGL 250	Written/Oral/Vis/Elect. Comp.

Third Year (32)

Fall Semester (15)

3	*	CH E 310	Computational Methods in ChE
3	*	CH E 357	Transport Phenomena II
3	*	CH E 381	ChE Thermodynamics
3	^	BBMB 301	Biochemistry
3			Statistics Elective

Spring Semester (17)

3			Communication Elective } ☆
2	*	CH E 325	ChE Laboratory I } ☆
3	*	CH E 358	Separations
3	*	CH E 382	Chemical Reaction Engr
3			Chemistry Elective
3			SSH Elective

Fourth Year (33)

Fall Semester (15)

3	*	CH E 421	Process Control
3	*	CH E 420	Chemical Process Safety
3			Engineering Elective
3			ChE Elective
3			SSH Elective

Spring Semester (18)

4	*	CH E 430	Process and Plant Design
2	*	CH E 426	ChE Laboratory II
3			Professional Elective
3			ChE Elective
3			SSH Elective
3			SSH Elective

+ Basic Program – must earn a minimum 2.00 GPA and must be completed before enrolling in the 1st 200-level ENGR course. English may be taken concurrently.
* CH E Core – must earn a minimum 2.00 GPA, including transfer credits
☆ LTM E308 consists of taking specific sections of ENGL 314 and CH E 325 together
^ ChE students are strongly encouraged to take BBMB 301 during the fall semester

Electives

The chemical engineering curriculum provides considerable flexibility, which allows you to tailor the curriculum to meet your own needs. The elective requirements are in social sciences/humanities and in technical areas including communication.

You are strongly encouraged to take the LTM E308 learning community that integrates the writing component of ENGL 314 with the lab reports in CH E 325. This provides you with the advantage of extra help with your written reports and joint assignments that are submitted to both classes.

The chemical engineering curriculum includes 21 credits of technical electives, which provide students the opportunity to develop a deeper understanding of additional areas of science and engineering. You are encouraged to carefully plan your elective choices. Elective planning should be done in consultation with your faculty mentor and the choices must be clearly identified on your curriculum Plan of Study (POS).

Technical electives can be selected to develop a breadth of knowledge or to establish an "area of emphasis." For example, you may wish to take a broad range of courses to prepare for graduate school. Alternatively, you may wish to focus your studies to develop a stronger background in an area of emphasis, such as biochemical engineering or solid state materials processing. Suggestions for several additional areas of emphasis are listed on pages 18-20. Your faculty mentor also can assist you in preparing an emphasis not currently listed on those pages. Be sure to plan early enough to permit taking necessary prerequisites. **No more than six credits total of CH E 490 or other STEM departmental independent/research study may be counted toward technical electives.**

Table I – Electives

	MINIMUM CREDITS
Social Science & Humanities electives: (see pages 9-11)	**15**
Technical Electives	**21**
Communications electives: ENGL 309, ENGL 312, ENGL 314, or JL MC 347	3
Advanced Chemistry electives: AGRON 320; BBMB 404, 405, 411, 420, 461 ; CE 420 or ENSCI 459; CHEM 211, 211L, 301, 316, 316L, 321L, 322L, 324, 331L or 333L, 332L or 334L, 401L, 402; FS HN 311, 311L, 410	3
Statistics electives: STAT 305, 231, 341, 342, 401, 495, 496, MAT E 316	3
Chemical Engineering electives: These include CH E 406, 408, 415, 440, 447**, and any other 300+ CH E course not specified as required in the curriculum	6
Engineering electives: Any 300+ engineering course outside of chemical engineering that does not repeat material in required ChE courses nor on SSH list. Approved exceptions: AER E 261, B M E 220, CPR E 281, EE 201, EM 274, and MAT E 273 Consult mentor for approval.	3
Professional electives: 300+ Physical Science, Life Science, Engineering, Statistics, Mathematics, or Computer Science not on SSH list Approved exceptions: MATH 207, MICRO 201, 201L, and those approved for Engineering & Advanced Chem electives.	3

* Courses not allowed as Technical Elective due to content overlap with required CH E courses: AE 316/BSE 316, 402, 411; AER E 446, EM 378, MAT E 311, ME 332, 335, 411, 421, 436, 475.

** Only one of Ch E 447 or Mat E 351 may count toward graduation.

Undergraduate Curriculum in Chemical Engineering
Biological Engineering Option

2016-2017 Catalog
Total Credits = 129

First Year (32)

Fall Semester (16)

4	+	MATH 165	Calculus I
3	+	ENGL 150	Crit. Think. & Comm.
4	+	CHEM 177	General Chemistry
1		CHEM 177L	General Chemistry Lab
3	+	CH E 160	Chem. Engr. Problems
R	+	ENGR 101	Engineering Orientation
1	+	LIB 160	Information Literacy

Spring Semester (16)

4	+	MATH 166	Calculus II
3		CHEM 178	General Chemistry
1		CHEM 178L	General Chemistry Lab
5	+	PHYS 221	Intro. to Physics I
3			SSH Elective

Second Year (32)

Fall Semester (16)

3	*	CH E 210	Material & Energy Bal.
4		MATH 265	Calculus III
5		PHYS 222	Intro. to Physics II
3		CHEM 331	Organic Chemistry I
1	*	CH E 202	Seminar
R		CH E 205	Assessment

Spring Semester (16)

3	*	CH E 356	Transport Phenomena I
4		MATH 267	Differential Equations
3		CHEM 332	Organic Chemistry II
3		CHEM 325	Chemical Thermodynamics
3	+	ENGL 250	Written/Oral/Vis/Elect. Comp.

Third Year (32)

Fall Semester (15)

3	*	CH E 310	Computational Methods in ChE
3	*	CH E 357	Transport Phenomena II
3	*	CH E 381	ChE Thermodynamics
3			Statistics Elective
3	^	BBMB 301	Biochemistry **or**
		BBMB 404	Biochemistry I **or**
		BIOL 313	Principles of Genetics

Spring Semester (17)

3			Communication Elective } ☆
2	*	CH E 325	ChE Laboratory I
3	*	CH E 358	Separations
3	*	CH E 382	Chemical Reaction Engr
3			SSH Elective
3		BBMB 420	Physiological Chemistry **or**
		BBMB 405	Biochemistry II **or**
		BIOL 314	Molecular Cell Biology

Fourth Year (33)

Fall Semester (15)

3	*	CH E 421	Process Control
3	*	CH E 420	Chemical Process Safety
3			ENGR Elective
3			CH E Elective
3			SSH Elective

Spring Semester (18)

4	*	CH E 430	Process and Plant Design
2	*	CH E 427	Biological Engr Laboratory
3			Professional Elective
3			CH E Elective
3			SSH Elective
3			SSH Elective

+ Basic Program – must earn a minimum 2.00 GPA and must be completed before enrolling in the 1st 200-level ENGR course. English may be taken concurrently.
* CH E Core – must earn a minimum 2.00 GPA, including transfer credits.
☆ LTM E308 consists of taking specific sections of ENGL 314 and CH E 325 together
^ ChE students are strongly encouraged to take BBMB 301 during the fall semester

Biological Engineering Option

You may enhance your academic preparation for the growing opportunities in the biological-related industries by adding the biological engineering option to the standard chemical engineering program. In addition to the elective choices listed in Table II below, you may replace BBMB 301 with BBMB 404 and BBMB 405 or BIOL 313 and BIOL 314. BBMB 405 can be used to meet the Chemistry Elective; BIOL 314 can be used to meet the Professional Elective requirements. CH E 426 may be replaced by CH E 427.

Table II – Electives for Biological Engineering Option

	MINIMUM CREDITS
Social Science & Humanities electives: (see pages 9-11)	**15**
Technical Electives	**21**
Communications electives: ENGL 309, 312, 314, or JL MC 347	3
Advanced Chemistry electives: BBMB 405, 411, 420, 451	3
Statistics electives: STAT 305, 231, 341, 342, 401, 495, 496, or MAT E 316	3
Chemical Engineering electives: CH E 415, 440, 542, 562	6
Engineering electives: B M E (Approved), BRT 501, CE 421, ABE 380, ABE480, MSE 580	3
Professional electives: CH E 415, 440, 542, 562, 490 **OR** one **APPROVED** course from: 300+ Life Science (BIOL 314), CHEM, FS HN, or BBMB (not BBMB 301) and not on SSH list	3

Suggested Emphases for Technical Electives

Listed below are courses that you may consider taking as part of your group of electives for a desired career path. These lists are not exhaustive, and sometimes more courses are suggested than a student has time to take. You should work closely with your faculty mentor to choose an appropriate set of electives to suit your individual career goals.

Note: Prerequisites and co-requisites are listed in parentheses after each course name. Co-requisites are signified with an asterisk (*).

General Graduate School Preparation

Chemistry/Professional Electives
- CHEM 324 (3) Introductory Quantum Mechanics (CHEM 178, MATH 166, PHYS 222 recommended)

CH E/Professional Electives
- CH E 408 (3) Surface and Colloid Chemistry (CH E 381)
- CH E 415 (3) Biochemical Engineering (CH E 357, CH E 382 recommended, and CHEM 331)
- CH E 447 (3) Polymers and Polymer Engineering (CH E 382 and CHEM 331 or MatE 351) – only CH E 447 or MAT E 351 can be used to meet degree requirements
- CH E 490 (variable) Research/Independent Study
- CH E 545 (3) Analytical and Numerical Methods (CH E 358 and MATH 267)
- CH E 500-level courses

Engineering Elective
- EE 201 (4) Electric Circuits (*MATH 267 and *PHYS 222)
- EM 274 (3) Statics of Engineering (*MATH 166; PHYS 221)

Professional Electives
- MATH 207 (3) Matrices and Linear Algebra (2 semesters of calculus)
- MATH 385 (3) Introduction to Partial Differential Equations (MATH 265 and MATH 267)

General Industrial Preparation

Advanced Chemistry Elective
- CHEM 211/211L (2/2) Quantitative and Environmental Analysis/Lab (*CHEM 178)
- CHEM 301 (2) Inorganic Chemistry (CHEM 324)

CH E/Professional Electives
- CH E 406 (3) Environmental Chemodynamics (CH E 381 and *CH E 358)
- CH E 408 (3) Surface and Colloid Chemistry (CH E 381)
- CH E 415 (3) Biochemical Engineering (CH E 357, CH E 382 recommended, and CHEM 331)
- CH E 447 (3) Polymers and Polymer Engineering (CH E 382 and CHEM 331 or MAT E 351) – only CH E 447 or MAT E 351 can be used to meet degree requirements

Engineering/Professional Electives
- IE 305 (3) Engineering Economic Analysis (Math 166)
- EM 274 (3) Statics of Engineering (*MATH 166; PHYS 221)

Biochemical Engineering

Chemistry/Professional Electives
- BBMB 404 (3) Biochemistry I (CHEM 332) (recommend to replace BBMB 301)
- BBMB 405 (3) Biochemistry II (BBMB 404)
- BBMB 420 (3) Physiological Chemistry (CHEM 332, Biol 314) – Only credit from either BBMB 404 & 405 or BBMB 420, not both, may be applied to graduation

CH E/Professional Electives
- CH E 415 (3) Biochemical Engineering (CH E 357, CH E 382 recommended, and CHEM 331)
- CH E 562 (3) Bioseparations (CH E 357)

Engineering/Professional Electives
- CE 421 (3) Environmental Biotechnology (CE 326)

Professional Elective
- MICRO 201 (2) General Microbiology (one semester of college-level biology)
- B R T 540 (3) Bioprocessing and Bioproducts (CE 326 or equivalent, MATH 165, CHEM 177, BIOL 173 or 211 or higher, senior or graduate classification)
- BRT 501 (3) Fundamentals of Biorenewable Resources

Biomedical Engineering

Chemistry/Professional Electives
- BBMB 404 (3) Biochemistry I (CHEM 332) (recommend to replace BBMB 301)
- BBMB 405 (3) Biochemistry II (BBMB 404)

CH E/Professional Electives
- CH E 415 (3) Biochemical Engineering (CH E 357, CH E 382 recommended, and CHEM 331)
- CH E 440 (3) Biomedical Applications of Chemical Engineering (ChE 210, MATH 266, and Phys 222)
- CH E 562 (3) Bioseparations (CH E 357)

Engineering/Professional Electives
- EE 201 (4) Electric Circuits (*MATH 267 and *PHYS 222)
- B M E 220 (3) Introduction to Biomedical Engineering (Biol 212, ChE 160, Math 166, Chem 178, Phys 222)
- B M E 341 (3) BioMEMs and Nanotechnology (B M E 220)
- B M E 352 (3) Molecular, Cellular, and Tissue Biomechanics (B M E 220, EM 324, MAT E 273)
- B M E 450 (3) Biosensing (B M E 220)

Professional Electives
- BIOL 313 (3) Principles of Genetics (BIOL 211, 211L, 212, and 212L)
- BIOL 314 (3) Principles of Molecular Cell Biology (BIOL 212)

Environmental Science and Engineering

Chemistry/Professional Electives
- CE 420 (3) Environmental Engineering Chemistry (CE 326 and CHEM 178)

CH E/Professional Electives
- CH E 406 (3) Environmental Chemodynamics (CH E 381 and * CH E 358)
- CH E 408 (3) Surface and Colloid Chemistry (CH E 381)

Engineering/Professional Electives
- CE 326 (3) Principles of Environmental Engineering (CHEM 177 or 178, MATH 166, and *EM 378)
- CE 421 (3) Environmental Biotechnology (CE 326)
- CE 428 (3) Water and Wastewater Treatment Plant Design (CE 326)
- CE 528 (3) Solid and Hazardous Waste Management (CE 326, junior or higher standing)

Professional Electives
ENV SCI 324 (3) Energy and the Environment

Food Engineering

Chemistry/Professional Electives
FS HN 311 (3) Food Chemistry (CHEM 231/231L or CHEM 331/331L, and *BBMB 301)
CH E/Professional Electives
CH E 408 (3) Surface and Colloid Chemistry (CH E 381)
CH E 415 (3) Biochemical Engineering (CH E 357, CH E 382 recommended, and CHEM 331)
Engineering/Professional Electives
A B E 451 (3) Food and Bioprocess Engineering (ABE 216 and ChE 357, or FS HN 351 and MATH 267)
Professional Electives
FS HN 412 (4) Food Product Development (FS HN 311 or FS HN 411)
FS HN 420 (3) Food Microbiology (MICRO 201 or MICRO 302)
FS HN 421 (3) Food Microbiology Laboratory (MICRO 201/201L or 302/302L, *FS HN/MICRO 420)
FS HN 471 (3) Food Processing I (MICRO 201 or MICRO 302, FS HN 351 or AE 451 or CH E 357, CHEM 177)
FS HN 472 (3) Food Processing II (FS HN 351 or AE 451 or CH E 357)

Materials Science

CH E/Professional Electives
CH E 440 (3) Biomedical Applications of Chemical Engineering (CH E 210, MATH 266, PHYS 222)
CH E 447 (3) Polymers and Polymer Engineering (CH E 382 and CHEM 331 or MAT E 351) – only CH E 447 or MAT E 351 can be used to meet degree requirements
Chemistry/Professional Electives
CHEM 301 (2) Inorganic Chemistry - non-metals (CHEM 324)
MAT E 454 (3) Polymer Composites and Processing (MAT E 351)
Engineering Elective
MAT E 273 (3) Principles of Materials Science and Engineering (CHEM 177, MATH 165)
Professional Elective
PHYS 321 (3) Introduction to Modern Physics I (PHYS 222 and *MATH 266)

Biomedical Engineering Minor

The Biomedical Engineering Minor is open to all undergraduate engineering students at Iowa State University. This minor will provide students with a foundation of core biology and engineering concepts relevant to further study in biomedical engineering. In addition, students will receive an introduction to the application of engineering principles to biomedical problems from a multidisciplinary perspective as well as the applications within the majors of the participating departments. See the Biomedical Engineering Minor Program webpage for complete details:

http://www.engineering.iastate.edu/bioengineering/

Policies

Transfer Credits

1. By departmental policy, only transfer grades of "C" and higher are accepted for curriculum requirements.
2. A maximum of 65 credits from a 2-year school can be applied to degree requirements.
3. The last 32 credits of the degree program must be earned at Iowa State University. Exceptions may be granted in special cases. Speak with your adviser for more information.
4. Transfer students with transfer credits in chemical engineering core courses must earn at least 15 semester credits in Iowa State University courses in this category at the 300-level or above to qualify for the B.S. degree in chemical engineering.

Academic Warning or Probation

If you are on Academic Warning or Probation based upon the grades you earned in the fall or spring semester, you must complete an Academic Intervention Self-Assessment as soon as possible (available on AccessPlus). Once this is complete, you must meet with your academic adviser no later than the 10th class day of the subsequent semester to discuss the obstacles that have impacted your academic success. A registration hold for the next semester will be placed on your account until you meet with your adviser.

English Proficiency Requirement

Beyond the completion of the freshman composition courses, ENGL 150 and ENGL 250, certification of English proficiency is the responsibility of the student's major department. In chemical engineering, certification is accomplished by successful completion of the communication elective (ENGL 309, ENGL 312, ENGL 314, or JL MC 347).

Students whose first language is not English must pass an English proficiency examination before taking ENGL 150. A student not passing the exam must enroll each semester in a special English program until the minimum standards are met. This English program is designed to improve English skills resulting in increased success in coursework.

Chem 201

Students who take Chem 201 (and get credit for Chem 177, 177L, and 178L) must take another approved Advanced Chemistry course to complete the remaining three credits of chemistry (i.e. from Chem 178). This course should be selected from the Advanced Chemistry Elective list.

Graduation Requirements

You are able to obtain a copy of your Degree Audit at any time in AccessPlus. You should check each semester to ensure that each course taken or transferred is properly applied to the correct curricular category. Ask your academic adviser to make any necessary corrections to your Degree Audit to ensure everything is correct by the semester preceding your expected term of graduation. Students will need to fill out an Application for Graduation (available on AccessPlus) at the same time as registering for the term they plan to graduate. The applications will be accepted during the registration period for the graduation term.

See the following webpage for more information: http://www.graduation.iastate.edu/undergrad

Pass-Not Pass Policy

A maximum of nine Pass-Not Pass semester credits may be used to meet graduation requirements. Courses offered on a Satisfactory-Fail basis may not be taken on a Pass-Not Pass basis.

Pass-Not Pass credits can be applied toward requirements for a B.S. degree in chemical engineering only if the course is specified in the curriculum as a social science and humanities elective or is a course not used in the degree program. Pass-Not Pass credits are not acceptable for technical elective courses or for courses used to satisfy the U.S. Diversity or International Perspectives requirements.

Prerequisites and Co-requisites

Prerequisites and co-requisites for chemical engineering courses should always be followed as they are listed in a student's catalog year. If a student does not meet the necessary prerequisites or co-requisites for a chemical engineering course, then they must complete a "Request to Waive a Prerequisite/Co-requisite" form. This form can be found on the CBE website: http://www.cbe.iastate.edu/files/2012/10/Prerequisite-Waiver-Form.pdf.

The Iowa State University Catalog lists the prerequisites and co-requisites for every course. For some of the technical electives listed on pages 18 through 20, prerequisites and co-requisites may apply only to students in that specific area of study. Prerequisites may be waived by the course instructor if the course is being taken by someone outside of that department's curriculum. *Always consult with your course instructor about waiving any prerequisites for your technical electives.*

Part 3: Opportunities for Undergraduates

International Studies in Chemical and Biological Engineering

There are numerous international programs and experiences available to chemical engineering students. Through these programs you have the opportunity to:

- Study for 1-2 semesters at prominent chemical engineering departments in Europe, Asia, or Australia
- Participate in a 5-6 week summer school course in Oviedo, Spain
- Gain international work experience with a global corporation in conjunction with an academic exchange

Iowa State University has several points of contact when it comes to international programs and experiences. Both Engineering International Programs and Iowa State's Study Abroad Center are great resources for students who are consider an international experience. Visit with these departments' websites or go in person to get the most up to date information about programs you are interested in.

- Engineering International Programs: http://www.engineering.iastate.edu/studyabroad/
- Study Abroad Center: http://www.studyabroad.iastate.edu/

University of Oviedo Summer Laboratory Program

The CBE department has a summer study program in Oviedo, Spain, available to juniors, seniors, and qualified sophomores involving a chemical engineering laboratory course. This 5-week program offers the opportunity to complete a lecture and laboratory course at the University of Oviedo and to compare the technical and cultural aspects of the U.S. and Spain. Ample opportunities to travel in Europe are available for those deciding to do so. Students from University of Wisconsin-Madison also participate in the Oviedo program.

Iowa State students who participate in this program earn seven semester credits in CH E 391 and CH E 392, which apply toward the B.S. requirements (four credits substitute for CH E 325 and CH E 426 and three credits may apply to the SSH requirement). The credits are given on the basis of participating in the following:

- An orientation course (CH E 391) during spring semester at Iowa State;
- Lectures attended and laboratory experiments performed during a five-week program at the University of Oviedo;
- Visits to Spanish chemical engineering departments, research laboratories, and manufacturing facilities, mostly during the third week of the program.

For application deadlines, cost information, or any other question about the program, please contact Dr. Stephanie Loveland: 2052 Sweeney Hall; 515-294-3024.

International University Exchanges

The CBE department administers several university exchanges with international universities. The mutual exchange agreements involve several of the leading chemical engineering departments in Europe, Australia, and Asia. Students generally attend for one to two semesters, perhaps with a travel period coordinated with the university schedules. Coursework is sufficiently similar at these universities so that students are able to continue their degree program at Iowa State without interruption.

The programs are organized according to Iowa State procedures established through the Iowa State University Study Abroad Center. This includes:

- Applying for the program at specific dates (see each program below)
- Registering and paying tuition and fees as if remaining at ISU, but selecting course work at the international university
- Paying no fees at the international university, but providing your own transportation and living costs
- Receiving credit for the courses towards your degree

Specific arrangements for each program differ slightly; contact the program coordinator for each exchange.

Visit the Engineering International Programs website, http://www.engineering.iastate.edu/studyabroad, or email eip@iastate.edu for general questions about study abroad and the application process. Below is a list of institutions where ISU chemical engineering students have studied at previously.

- National University of Singapore
- University College London — England
- University of Limerick — Ireland
- Swiss Federal Institute of Technology — Lausanne, Switzerland
- Bogaziçi University (BU) — Istanbul, Turkey
- Middle East Technical University (METU) — Ankara, Turkey

Honors Program

Students with high ability and clear educational objectives are encouraged to investigate the opportunities offered by the university Honors Program. The Honors Program emphasizes the development of individualized programs of study to meet the needs of students who have demonstrated the ability and maturity to assume more than the usual degree of responsibility for their education. The Honors Program also offers the opportunity to take Honors courses and Honors seminars, to make arrangements to take almost any course for Honors credit, and to carry out individual projects of an original, scholarly nature. Graduation as a member of the Honors Program is noted on the student's diploma, permanent record, and in the commencement program.

An undergraduate student who has a cumulative grade point average of 3.50 or greater may apply for the program during the second semester of residence or thereafter. A student must participate for a minimum of 48 credit hours. Students with lower grade point averages may be admitted providing they appear to have unusual potential or have demonstrated outstanding scholastic ability in other ways. Transfer students also have the opportunity to join the Honors Program provided they meet the necessary requirements.

More information about the program can be obtained from Dr. Eric Cochran, 1035 Sweeney Hall; Dr. Kurt Hebert, 3133 Sweeney Hall; Dr. Jim Hill, 3155 Sweeney Hall; Dr. R. Dennis Vigil, 3037 Sweeney Hall; or Dr. Surya Mallapragada, 2031 Sweeney Hall; who all serve as mentors to chemical engineering students in the Honors program.

Information can also be obtained from the Honors Program Office in the Jischke Honors Building or via the Honors website: http://www.honors.iastate.edu/.

Undergraduate Research Program and Independent Study

Students may participate in a special undergraduate research program or may pursue independent study through CH E 490. These opportunities may be particularly valuable for students planning to obtain an advanced degree or for students desiring work in a specific industry.

Examples of CH E 490 projects include:

- Literature studies/reviews
- Completion of the American Institute of Chemical Engineers Student Design Contest Problem
- Setting up a laboratory experiment

Students select these projects by consulting with individual faculty members, who then serve as the project supervisor. Election of course and topic must be approved in advance by project supervisor and adviser with the completion of a CH E 490 Study Proposal form available for download at http://www.cbe.iastate.edu/current-students/forms. Upon completion of the project, students must submit a written report to the faculty coordinator. Participation in regional student AIChE chapter meetings is also anticipated for outstanding contributions. **No more than six credits total of CH E 490 or other departmental independent/research study may be counted towards technical electives.**

Honors Program students may participate by registering for CH E 490H and completing an Honors Project Approval Form, which is available for download at http://www.engineering.iastate.edu/engrhonors/forms/.

American Institute of Chemical Engineers (AIChE)

The professional society for chemical engineering is the American Institute of Chemical Engineers (AIChE). Iowa State University has a very active student chapter, which has gained national recognition through recent awards for its program and leadership and awards won in student paper contests at regional meetings. More than one third of the undergraduates in chemical engineering are members of the student chapter.

The objectives of the chapter are to promote the professional development of its members and to contribute to the development of chemical engineering at Iowa State. Membership provides the opportunity to meet other chemical engineering students and the members of the faculty, to learn about the professional experiences of others, and to discuss employment and career possibilities.

Meetings will normally be held in the evening at Sweeney Hall. Event information is made available through a member email list and the ISU AIChE Facebook group. Other activities include attending the regional AIChE conference and participating on the Chem-E-Car team. Club officers present an update to the department at the CBE Awards Banquet.

The best time to sign up for membership is at the AIChE fall picnic. Membership dues are collected each semester. If you have any questions about the student chapter, feel free to contact any of the officers listed on the AIChE website. We are looking forward to seeing you at the meetings.

Chapter website: http://aiche.cbe.iastate.edu

National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE)

NOBCChE offers diverse programs designed to foster professional development and encourage students to pursue careers in science and technical fields. Also, the club provides industrial chemical companies with an avenue for better selection of prospective applicants.

Adviser: Derrick Rollins – CH E

Omega Chi Epsilon

Omega Chi Epsilon, Chemical Engineering Honor Society, recognizes and promotes high scholarship, original investigation, and professional service in chemical engineering. The honor society was formed at the University of Illinois in 1931. The Beta Chapter was formed at Iowa State in 1932 and went inactive in 1937. The local chapter was reactivated in 1966. The current national membership includes more than 20,000 men and women from 67 chapters.

To be considered for membership, juniors must have a minimum 3.25 GPA and seniors a minimum 3.00 GPA. Eligible students also must have completed six credits of chemical engineering courses. In addition, members must possess traits of personality and leadership that make them most likely to succeed in their chosen fields. Initiation ceremonies are held during fall semester. The chapter organizes a number of service activities throughout the year, including: hosting student-faculty Friday After Classes (FACs), hosting the department's spring picnic, providing student representatives for departmental committees, and sponsoring the Omega Chi Epsilon Outstanding Senior Award given at the CBE department banquet.

Adviser: Zengyi Shao

Chapter Website: http://www.engineering.iastate.edu/oxe/

Other Honor Societies

There are a number of other honor societies available to chemical engineering students in addition to Omega Chi Epsilon. Some of them are listed below. Unless otherwise stated, membership is university-wide and available to undergraduates.

Society	Restrictions	Qualities Recognized
Alpha Lambda Delta	Freshmen	Scholarship
Cardinal Key	Seniors	Leadership, service, scholarship
Mortar Board	Juniors	Scholarship, leadership, service
Phi Eta Sigma	Freshmen	Scholarship
Phi Kappa Phi	All-University	Scholarship
Tau Beta Pi	Engineering College	Scholarship, character

Employment and Scholarship Opportunities

Each year the College of Engineering, through its Scholarships and Awards Committee, offers awards to engineering students. Various companies, trade associations, and individuals donate these awards. More information is available online at http://www.engineering.iastate.edu/student-services/scholarships. These awards are based primarily on academic performance and university involvement. The Office of Student Financial Aid, 0210 Beardshear Hall or http://www.financialaid.iastate.edu, handles scholarships based on financial need.

To be considered for a College of Engineering Scholarship, the applicant must have attended Iowa State University for a period of one semester prior to spring semester and must have at least two semesters remaining in which to use the award starting in the fall semester. The number of scholarships available for freshmen is limited, so the majority of the awards are made for use during the student's junior or senior years. **Applications must be submitted online and are normally due by February 1.**

For additional information, contact Jane Stowe at 294-9295/jmstowe@iastate.edu or engineeringscholarships@iastate.edu

Employment opportunities for students include, but are not limited to the following:

- Undergraduate research assistants
- CBE Student Assistants
- Peer Mentors

For additional information, contact Kim in 2162 Sweeney Hall.

Co-ops and Internships

Co-op and internship experiences provide an opportunity for students enrolled in chemical engineering to gain practical experience while working toward their B.S. degrees. Such work arrangements are with companies located throughout the U.S., but the majority are in Iowa and Minnesota. The College of Engineering hosts a career fair during both the fall and spring semesters so that students can meet with representatives from companies and agencies that offer co-ops and internships. Engineering Career Services maintains an up-to-date listing of co-op, internship, and job opportunities.

Eligible Iowa State engineering students who accept co-op or internship positions can register these experiences so that they show up on the student's transcript. Deadlines, eligibility requirements, and registration instructions are located on the Engineering Career Services webpage: http://www.engineering.iastate.edu/ecs/internships/how-to-register/.

Advantages of the program are that students:

- ❖ Increase competitive edge for full-time employment
- ❖ Enhance career exploration and clarification of professional goals
- ❖ Develop greater responsibility and self-confidence
- ❖ Improve interpersonal and communication skills
- ❖ Create a process of development, assessment, and continuous professional growth
- ❖ Maintain full-time student status without tuition and fees
- ❖ Reflect work experience on transcript
- ❖ Earn money to help cover their college expenses
- ❖ Complement classroom learning with practical work experience

Disadvantages include:

- ❖ Loss of continuity in some course sequences because of the periodic interruption of work
- ❖ Possible limitations in participating in some outside activities
- ❖ Lengthening of program

For additional information, speak with your adviser or contact Engineering Career Services http://www.engineering.iastate.edu/ecs; 515 294-2540.