CHEMICAL ENGINEERING

Student Handbook

www.d.umn.edu/che

This ChE Student Handbook does not supersede information found on the UMD web pages or published catalogues.

18 August 2011 Edition
Welcome to the Department of Chemical Engineering (ChE) at the University of Minnesota Duluth (UMD). Your goal is to earn a baccalaureate of science professional degree in chemical engineering (B.S.Ch.E.). We will make every effort to help you along your way; however, it is essential to recognize that Chemical Engineering is a rewarding, as well as demanding profession, both intellectually and technically. This is necessarily reflected in the undergraduate curriculum, particularly in the junior and senior years (upper division).

Initially declaring chemical engineering as a major, and merely passing courses, does not guarantee that you will graduate with a degree in chemical engineering. You will be required to apply for admission to the upper division professional program (see section 2.3) after about two years, whereby your ability to meet the demands of our advanced courses will be assessed.

The department has a faculty and staff dedicated to student learning and success. Most department, faculty, and staff offices and labs are located in the Engineering Building on the UMD campus.

<table>
<thead>
<tr>
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<th>Phone: (218) 726-7126</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
<td>Duluth, MN 55812-3025</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ChE Faculty/Staff</th>
<th>Position</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
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</table>
This ChE Student Handbook contains important information on department policies, people, programs, activities, traditions, organization, resources, etc. The ChE Department reserves the right to alter or eliminate any policies or content of this handbook at any time. This information does not supersede policy and procedure of the University of Minnesota Duluth, provided at www.d.umn.edu.

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<td>Do we require a personal computer? ...................................................</td>
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<td>Are there any student employment opportunities in the department? .......</td>
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<td>Sample Application for Admission to Professional ................................</td>
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<td>7.4</td>
<td>Sample Student Reference Request Form ....... ..................................</td>
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<td>7.5</td>
<td>Example Engineering Scholarship Application ....... ..........................</td>
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<td>7.6</td>
<td>Letter to Parents ..............................................................................</td>
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</tr>
<tr>
<td>7.7</td>
<td>Plan for My College Experience ......................................................</td>
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1 Introduction to Chemical Engineering @ UMD

1.1 Our Vision

The Department of Chemical Engineering at UMD strives for nationally recognized excellence in engineering education and research by using modern, hands-on, and active learning experiences to prepare undergraduate students for professional success, and to hold paramount the safety, health and welfare of the public, and to protect the environment in performance of their professional duties.

1.2 Our Mission

The Department of Chemical Engineering at UMD produces engineers with a strong foundation of technical, communication, teamwork, and problem-solving skills required for professional success, who:

1. Pursue careers where they apply their engineering and problem solving skills.
2. Pursue advanced studies or other forms of continuing education.
3. Value their UMD chemical engineering education and endorse the program and its students.

1.3 Learning Outcomes

The Chemical Engineering Department will produce graduates who:

a) Are able to apply their learned knowledge from mathematics, science, and engineering.
b) Have the ability to design, build, and conduct engineering experiments, as well as to analyze and interpret the information obtained from the experiment.
c) Have the ability to design a process, system, or component.
d) Have the ability to function on multidisciplinary teams.
e) Have the ability to identify, formulate, and solve engineering problems.
f) Have an understanding of professional and ethical responsibility.
g) Have the ability to communicate effectively in writing and speaking in formal and informal settings.
h) Have the broad education necessary to understand the impact of engineering solutions in a global and societal context.
i) Recognize the need for, and have the ability to engage in life-long learning.
j) Have knowledge of contemporary chemical engineering issues.
k) Have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

1.4 Your Responsibility

Chemical Engineering is a rigorous, intellectually, and technically demanding discipline. Your aim is to learn, not just trade performance for a grade. We provide a student learner-centered environment that gives you the tools to take responsibility for your own learning.
2 B.S.Ch.E. Degree Requirements

Students may declare a chemical engineering major as freshmen or sophomore lower division students, but must demonstrate adequate preparation before being allowed to register for upper division chemical engineering courses at the ChE 31XX level and higher.

2.1 Typical Program of Study

The following table shows a typical four-year schedule for students beginning in Math 1296 Calculus I, which is a co requisite for ChE 1011 Introduction to Chemical Engineering. Your own schedules may vary depending on the number of credits transferred to UMD and the number of credits completed each semester. Work with your advisor to plan for any potential changes due to summer course work, transfer credits, study-abroad, or coop.

Options for technical electives allow students to tailor the program to their specific areas of interest:

- Complete at least eight credits of advanced chemistry in addition to Chem 2541 and 2543. Courses must be CHEM 25xx (or higher) and may not be satisfied with CHEM 4184, 4185, or 4634.
- Complete at least 10 credits of science or engineering electives, subject to department approval. Technical electives must be 2xxx or higher; only one 2xxx course is allowed (Biol 1012 Gen. Bio II may be used for the 2xxx technical elective); at least one course must be 4xxx or higher; maximum of three credits of COOP and internship credits allowed; may not be used to satisfy advanced chemistry elective requirements.
- Complete at least three credits of writing at the WRIT 31XX level (or higher).
- Complete at UMD of at least half of the 3xxx and higher courses required for the degree. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
- A 2.00 minimum GPA in all work attempted at UMD; 2.00 minimum GPA in all work, including transfer credits; successful completion of 75% of all work attempted.
- A 2.00 minimum GPA in all courses taken in the chemical engineering major, including required courses in related fields. The GPA requirement applies to all courses in the major taken at UMD calculated separately and to all courses in the major when transfer credits are included.
- Transfer students must substitute a 2xxx (or higher) technical elective for ChE 1011.
### Chemical Engineering Typical Program of Study

<table>
<thead>
<tr>
<th>Year 1 - Fall Semester</th>
<th>Cr</th>
<th>Year 1 - Spring Semester</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE 1011 Intro to Chemical Engineering *</td>
<td>3</td>
<td>CS 1121 Intro to Visual Basic programming</td>
<td>3</td>
</tr>
<tr>
<td>Chem 1153 General Chemistry I</td>
<td>4</td>
<td>Chem 1155 General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>Chem 1154 General Chemistry Lab I</td>
<td>1</td>
<td>Chem 1156 General Chemistry Lab II</td>
<td>1</td>
</tr>
<tr>
<td>Writ 1120 College Writing</td>
<td>3</td>
<td>Math 1297 Calculus II</td>
<td>5</td>
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<tr>
<td>Math 1296 Calculus I</td>
<td>5</td>
<td>Phys 2011 General Physics I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
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</tbody>
</table>

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<th>Year 2 - Fall Semester</th>
<th>Cr</th>
<th>Year 2 - Spring Semester</th>
<th>Cr</th>
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<tbody>
<tr>
<td>ChE 2111 Material and Energy Balances</td>
<td>3</td>
<td>ChE 2121 ChE Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Chem 2541 Organic Chemistry I</td>
<td>3</td>
<td>ChE 3031 Computational Methods in ChE</td>
<td>3</td>
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<tr>
<td>Chem 2543 Organic Chemistry Lab I</td>
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<td>Chem 254X (or higher) Elective</td>
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<tr>
<td>Math 3280 Differential Equations</td>
<td>4</td>
<td>Science or Engineering 2XXX (or higher) Elective</td>
<td>3-4</td>
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<tr>
<td>Phys 2012 General Physics II</td>
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<td>Category 6 Liberal Education Elective**</td>
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<tr>
<td>ChE 2011 Design of Experiments</td>
<td>3</td>
<td>ChE 3112 Heat and Mass Transfer</td>
<td>3</td>
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<tr>
<td>ChE 3111 Fluid Mechanics</td>
<td>3</td>
<td>ChE 3231 Properties of Engineering Materials</td>
<td>3</td>
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<tr>
<td>ChE 3241 Principles of Particle Technology</td>
<td>3</td>
<td>ChE 4402 Process Dynamics Control</td>
<td>3</td>
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<tr>
<td>ChE 254X (or higher) Chemistry elective</td>
<td>3-4</td>
<td>Science or Engineering 3XXX (or higher) elective</td>
<td>3-4</td>
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<tr>
<td>WRIT 31XX (or higher) Elective</td>
<td>3</td>
<td>Category 7 Liberal Education Elective**</td>
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<td><strong>Total</strong></td>
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<th>Year 4 - Spring Semester</th>
<th>Cr</th>
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<tbody>
<tr>
<td>ChE 3211 ChE Laboratory I</td>
<td>3</td>
<td>ChE 4211 ChE Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>ChE 4111 Separations</td>
<td>3</td>
<td>ChE 4502 ChE Design II</td>
<td>4</td>
</tr>
<tr>
<td>ChE 4301 Chemical Reaction Engineering</td>
<td>3</td>
<td>Science or Engineering 4XXX (or higher) elective</td>
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<tr>
<td>ChE 4501 ChE Design I</td>
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<td>Category 9 Liberal Education Elective**</td>
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<td>Category 8 Liberal Education Elective**</td>
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<td>Category 9 or 10 Liberal Education Elective**</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>Total</strong></td>
<td><strong>16-17</strong></td>
</tr>
</tbody>
</table>

* ChE 2001 Introduction to Environmental Engineering may be substituted for ChE 1011. Transfer students after year 2 must substitute an additional 2xxx (or higher) technical elective for ChE 1011.

** You may complete Liberal Education Electives from Categories 6 through 10 in any order.
2.2 Prerequisite Flow Chart

BSChE degree program courses build up from prerequisites (bottom to top, left to right).

<table>
<thead>
<tr>
<th>Lower Division Program</th>
<th>Professional Program</th>
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<tbody>
<tr>
<td><strong>Year 1</strong></td>
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<td><strong>Spring</strong></td>
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</tr>
<tr>
<td>[ ] = Prereq</td>
<td></td>
</tr>
<tr>
<td>+ = or higher</td>
<td></td>
</tr>
<tr>
<td>x = elective</td>
<td></td>
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<tr>
<td></td>
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<tr>
<td>Chem 1154* Gen Chem Lab I (1) [1 yr HS Chem]</td>
<td></td>
</tr>
<tr>
<td>Chem 1156* Gen Chem Lab II (1) [Chem 1151]</td>
<td>Chem 3031 Comp Meth (3) [Chem 2111, Math 3280, (coreq Chem 2112)]</td>
</tr>
<tr>
<td>Chem 2541 O-Chem I (3) [Chem 1152]</td>
<td>Chem 3111 Fluids (3) [Math 3280, (coreq Chem 2111)]</td>
</tr>
<tr>
<td>Che 4501 ChE Design I (4) [coreq ChE 4111, 4301, Writ 31xx]</td>
<td>Che 4402 Proc Control (3) [ChE 3031, (coreq ChE 2121, ChE 3112), Phys 2012]</td>
</tr>
<tr>
<td>Che 4111 Lab II (3) [ChE 3112, (coreq 2111, Chem 2223, Writ 31xx)]</td>
<td>Che 4211 Lab II (3) [ChE 3112, 4111, 4301, and (coreq 4402)]</td>
</tr>
<tr>
<td>Che 4502 ChE Design II (4) [ChE 4501, (coreq 3231, 4402)]</td>
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<tr>
<td>Che 1011# Intro to ChE (3) [HS Chem and (coreq Math 1296)]</td>
<td>CS 1121 Intro to Vis Basic (3) [HS Algebra]</td>
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<tr>
<td></td>
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<tr>
<td>Writ 1120 College Writing (3) (any time first two years)</td>
<td>Phys 2011 Physics I (4) [Math 1296]</td>
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<td></td>
<td></td>
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<tr>
<td>Chem 1153* Gen Chem I (4) [1 yr HS Chem]</td>
<td>Chem 1155* Gen Chem II (4) [Chem 1151]</td>
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<tr>
<td></td>
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<tr>
<td>Category 9/10 1xxx+ Lib Ed Elective (3)</td>
<td>Category 7 1xxx+ Liberal Ed Elective (3)</td>
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</table>
# or ChE 2001 | * or Honors General Chemistry | ^ may not be satisfied with Chem 3184, 4632 | + or higher

- 4 -
2.3 Upper Division Professional Program

Chemical Engineering at UMD is a professional degree program that requires admission to the professional program before taking ChE 3111 (or higher) level courses in Chemical Engineering.

Students must complete the majority of the program's lower division requirements (freshman and sophomore years), including CHE 2111, CHEM 2541, MATH 3280, and PHYS 2012, before applying for admission to the professional program (upper division junior and senior years). Successful completion of CHE 2111 (with a grade of C+ or better) is also required for admission to the professional program. Admission is based upon the assessment of your potential to be successful in the upper division courses. Admission is competitive and applicants are admitted on a space-available basis, with priority determined by the cumulative GPA in engineering, physics, mathematics, and chemistry.

- Apply online for admission to the upper division professional program. (www.d.umn.edu/che/studentAdvising/upperDivisionApp.html)
- Application forms are also available in the ChE office, 176 Engr (see attachment in the appendix).
- We advise unsuccessful applicants to find a new major better suited to their aptitude and interests. Help with selecting an alternative major is available in the college student affairs office.

2.4 Transfer Students

Transfer students with an associate’s degree, or who have completed most of the lower division courses, may be granted temporary permission to register for a limited set of upper division courses. Work with your advisor to plan your schedule for the remaining program requirements at UMD. In addition, be aware that:

- Transfer students at the Junior or Senior level are required to take a 2XXX or higher level technical elective in place of ChE 1011 Introduction to Chemical Engineering.
- Transfer students must apply for admission to the professional program after completing ChE 2111 with a grade of C+ (or higher).

2.5 Liberal Education Requirements

A minimum of 35 credits of liberal education are required. Many of our required major courses automatically satisfy categories one through five as shown in the following table. You may complete Liberal Education courses in categories 6 through 10 in any sequence. Talk to upper division students for liberal education course recommendations.

<table>
<thead>
<tr>
<th>Lib Ed Category</th>
<th>Course (Category 6 through 10 may be taken in any order)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Writ 1120 College Writing (3 cr)</td>
</tr>
<tr>
<td></td>
<td>(Students with an ACT score of 32 or higher are exempt from Writ 1120)</td>
</tr>
<tr>
<td>2</td>
<td>Math 1296 Calculus I (5 cr)</td>
</tr>
<tr>
<td>3</td>
<td>CS 1121 Introduction to Programming in Visual Basic (3 cr)</td>
</tr>
<tr>
<td>4/5</td>
<td>Chem 1153/1154 General Chemistry I + Lab (5 cr)</td>
</tr>
<tr>
<td></td>
<td>Phys 2011 General Physics I (4 cr)</td>
</tr>
<tr>
<td></td>
<td>(Students may take two courses from Category 4 and none from Category 5)</td>
</tr>
</tbody>
</table>
Lib Ed Category | Course (Category 6 through 10 may be taken in any order)
--- | ---
6 | Recommend Econ 1022 Macro Economics or 1023 Micro Economics. [if the Category 4 courses have two different course designators.]
7 | Elective
8 | Recommend Phil 1003 Ethics and Society, or SW 1210 Global Issues, or Econ 1003 Economics & Society (unless Econ taken in Category 6)
9/10 | Electives (6 cr)
- Students may take two courses from Category 9 and none from Category 10 if the Category 9 courses have two different course designators. Art and Art History are considered the same course designator.

2.6 Minors

The BSChE degree does not require a minor. We do not normally recommend minors for engineering students. However, ChE students may earn one of the following minors without additional credit requirements by carefully selecting advanced chemistry and science/engineering electives:

Chemistry Minor
- Advanced Chemistry Electives: Chem 2542, 2544, and (3322 or 4351 or 4641)
- Science/Engineering 2XXX Elective: Chem 2212 or 2242 or (2222 and 2223)

Mathematics Minor
- Science/Engineering 3xxx Electives: Two courses from Math/Stat 3XXX (e.g., Math 3298, Stat 3411)
- Science/Engineering 4XXX Elective: One course from Math/Stat 4XXX (e.g., Math 4326)

Environmental Engineering Minor
- Chem 2212 Environmental Chemistry or (2222 and 2223 Quantitative Analysis & Lab)
- Two courses from CE 3225, CHE 4601, 4615, ESCI 3101, 3102

2.7 Department Honors

The ChE Department awards honors to graduates that meet each of the following criteria:
- GPA 3.50 (or higher)
- Recommendation of ChE Faculty based on extraordinary participation in research, leadership, engineering societies, and service to the department and profession.

Students may elect to participate in the separate university honors program (www.duluth.umn.edu/honors).

3 Advisement and Registration

Academic advising at UMD involves more than simply planning a schedule for each term. It offers the opportunity for students to develop short and long range life goals, to understand themselves, to explore the world of work, to understand their decision making process, and to engage in academic planning. In these processes, faculty advisors serve as experts in their fields, and provide of general and specific program information. The integration of student growth through these
experiences and the formal academic curriculum develops mature, self-directed students who are capable of thinking and acting rationally within their own communities and society.

Student advisement is an integral part of the chemical engineering student experience. The Department of Chemical Engineering is committed to providing quality advice to our students. Each semester, the department schedules group advisement meetings to disseminate general information to all students before registering for classes the following semester. Students have a hold on their registration that is removed after attending a group advisement session.

### 3.1 Faculty Advisers

Each ChE student also has an individual adviser on the chemical engineering faculty who is available to meet with him or her any time during the semester. Schedule an appointment with your advisor if you have unusual circumstances that need individual attention. Faculty advisers post their office hours and meeting sign-up sheets each semester before registration. If you are not sure who your advisor is, check with the Department of Chemical Engineering (176 Engr) or Swenson College of Science and Engineering office of Student Affairs in 140 Engineering Building.

Students are encouraged to meet regularly with their adviser to ensure that they are on track as they progress through the program. Advisers expect students to come prepared to discuss their plans by bringing their registration or graduation plan and APAS document to the meetings (see sections 3.3 and 3.7). Faculty advisers serve as valuable resources for up-to-date information on:

- Course availability and class scheduling
- Announcements of Coop/internship opportunities
- Opportunities for research mentors
- Career guidance or information about graduate school

### 3.2 SCSE Student Affairs

Swenson College of Science and Engineering advisors are available to assist with general advising issues that include registering for classes, registration waiting lists, transfer credits, petitions for changes to the degree program, APAS changes, etc. Contact the SCSE SA office for additional information:

- Office: 140 Engr
- Phone: (218) 726-6360
- Email: scsesa@d.umn.edu
- Web Site: [www.d.umn.edu/scse/students/advising/index.html](http://www.d.umn.edu/scse/students/advising/index.html)

### 3.3 Permission Numbers for Upper Division Courses

Several upper division courses require permission numbers for registration. You must be admitted to our professional program before registering for these courses. We control enrollment for upper division students in labs, independent study, research, coops, and graduate level courses. The following table lists courses requiring permission numbers and requirements in addition to meeting the course prerequisites. Requests permission numbers from Julie DeRoche in the ChE Department office, 176 Engr.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Requirements beyond prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE 2111</td>
<td>Material and Energy Balances</td>
<td>Offered Fall and Spring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall reserved of ChE majors</td>
</tr>
<tr>
<td>Course</td>
<td>Title</td>
<td>Requirements beyond prerequisites</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ChE 2121</td>
<td>Chemical Engineering Thermodynamics</td>
<td>Offered Fall and Spring Spring reserved for ChE majors</td>
</tr>
<tr>
<td>ChE 3111</td>
<td>Fluid Mechanics</td>
<td>Offered Fall and Spring Fall reserved for upper division ChE majors</td>
</tr>
<tr>
<td>ChE 3112</td>
<td>Heat and Mass Transfer</td>
<td>Offered Fall and Spring Spring reserved for upper division ChE majors</td>
</tr>
<tr>
<td>ChE 3211</td>
<td>Lab I</td>
<td>Limited enrollment per section</td>
</tr>
<tr>
<td>CHE 3241</td>
<td>Principles of Particle Technology</td>
<td>Limited enrollment per section</td>
</tr>
<tr>
<td>ChE 3791</td>
<td>Independent Study</td>
<td>Faculty sponsor (signed permission form)</td>
</tr>
<tr>
<td>ChE 3894</td>
<td>Independent Research</td>
<td>Faculty sponsor (signed permission form)</td>
</tr>
<tr>
<td>ChE 3951</td>
<td>COOP</td>
<td>Department head approval (signed contract)</td>
</tr>
<tr>
<td>ChE 4211</td>
<td>Lab II</td>
<td>Limited enrollment per section</td>
</tr>
<tr>
<td>ChE 4402</td>
<td>Process Control</td>
<td>Limited enrollment per sections</td>
</tr>
<tr>
<td>ChE 5193</td>
<td>Process Optimization-Lean 6 Sigma</td>
<td>Instructor permission</td>
</tr>
<tr>
<td>ChE 5250</td>
<td>Advanced Process Control</td>
<td>Instructor permission</td>
</tr>
</tbody>
</table>

### 3.4 Email Communication

Email is the university’s primary mechanism for communicating important information to students. Please read and respond to your email from the department, faculty, and advisors. When communicating with your professors via e-mail, it is important to remember that many faculty members view an e-mail message as a letter that was delivered quickly rather than a quick conversation. Here are a few tips to keep:

1. **USE APPROPRIATE SALUTATIONS AND TITLES:** Like letters, e-mails should begin with a proper salutation. If “Dear Dr. Smith” seems too formal, begin your message with “Hello Dr. Smith,” but avoid the kinds of casual greetings you would use with friends (e.g., “Hey”) or no greeting at all. The faculty member will let you know when it is okay to use his or her first name.

2. **IDENTIFY YOURSELF:** Faculty interact with a large number of students every semester. At the beginning of your message, refer to the class you are taking with the faculty member or how the faculty member knows you, especially when you are contacting someone who does not know you very well. Conclude your message with your full name.

3. **AVOID TEXT ACRONYMS:** If you are responding to e-mails on a smart phone, it is tempting to abbreviate or shorten words and phrases (e.g., u instead of you). However, abbreviations are easy to misinterpret or may be completely misunderstood.

4. **BEWARE OF YOUR TONE:** Perhaps the most difficult part of writing an e-mail is achieving the right tone. If you are writing an especially sensitive e-mail, let your final draft sit overnight and reread it before sending to make sure the message is appropriate. You also can ask a colleague or friend to read your message and offer feedback about how the message might be perceived. Remember, e-mail creates a permanent record of your communication that you have no control over after you click the send button. So if you are worried about the
tone of your e-mail, you might want to skip the message altogether and ask for a meeting with the faculty member.

5. **KEEP IT SIMPLE**: Long e-mails with too many questions can get confusing. If your message is more than one or two paragraphs, rethink the purpose of the message. You may want to start with the most important question or topic. A lengthy e-mail may be a signal that the subject warrants a meeting rather than a written communication.

E-mail communication is an important part of building positive relationships with your professors. It is always worthwhile to take the time to make sure your messages are clear and appropriate.

### 3.5 FaceBook and LinkedIn

Friend us! The department uses FaceBook to communicate opportunities to our current students and keep in touch with alumni. We also invite seniors to join our LinkedIn group to help them network and transition into their professional careers.

### 3.6 Graduation Planner

We recommend that you use the web based Graduation Planner ([www.d.umn.edu/students](http://www.d.umn.edu/students)) to map out your classes for each semester. Bring a copy to your advisor for review during your advisement meetings.

### 3.7 APAS

The university uses the Academic Progress Audit System (APAS) to check that you have met all degree requirements. Access your APAS from the UMD web site ([www.d.umn.edu/students](http://www.d.umn.edu/students)). Faculty advisors use your APAS to monitor your progress towards completing the BSChE degree.

### 3.8 Study in Engr 270

The ChE department provides study space in Engr 270 for our majors. Informal study groups form each semester in Engr 270. This peer-based service is open to all ChE majors. You may request an electronic access key from the Department Office, 176 Engr. The space is dedicated for the following activities:

- Study group meetings
- Group projects
- Design teams
- Engineering society meetings
- Student and professional presentations
- Campus recruitment visits
- Seminars
- Lab presentations
- Limited computer and printing capabilities
- Group advisement meetings

### 3.9 Keys to Success

The B.S. Ch.E. is a professional degree program that prepares you for the engineering profession by emphasizing competency skills along with theory and analysis. Unlike most professional 2nd degree programs (such as law and medicine) that require a 1st degree, engineers earn their professional degree at the bachelor (undergraduate) level. What does this mean for you? We expect our
students to begin developing professional competencies before graduation. Several keys to successfully completing the chemical engineering degree program include:

- Attend all classes and lab sessions (instructors tend to test you on what they covered in class).
- Engage in class discussions and active learning exercises - ask questions, take notes.
- Plan on studying at least three hours for each hour that you spend in class – more than three hours will be required for your engineering courses.
- Read all required material.
- Seek help from instructors, tutors, and peers.
- Join a study group (be careful to do your own work).
- Contribute to team projects.
- Do not wait until the last moment to begin working on homework or projects.
- Complete and turn in homework, reports, and projects on time.
- Make your best effort – be neat, organized, and clean, use proper formats, etc.

Though rigorous, there will be time for engaging in extracurricular activities. The reward of a job well done is entry into a challenging and exciting career where you become part of the solution (not the precipitate 😊).

3.9.1 Do Your Own Thinking and Learning

Modern courseware includes beautifully illustrated textbooks, flashy video, PowerPoint slides, software packages, equation summaries, web sites, worked problems, etc. If we are not careful, all of these crutches can overwhelm us, and relieve us from the responsibility we have for our own education, and the ability to think – which hurts us as learners. These accoutrements may help us pass general chemistry, but they do not promote mastery of the material. Fred Watson (Chemical & Engineering News, 2011) recommends the following study regimen:

- Perform a cursory reading of the next topics from textbook and other course materials before the next class or lecture.
- Answer questions and work end-of-chapter problems. Reread in depth appropriate sections of the text to gain insight into how to approach each question or problem.
- Before each quiz or exam, read the assigned chapters and merge your course notes into outline of the chapters. The text usually contains an outline of the chapter; if not, then you should get into the habit of making your own.
- Make a list of pertinent equations with conditions where and when they apply.
- The night before the exam, read over your outline and equation summary a few times.

3.9.2 UMD Academic Integrity Policy

Scholastic dishonesty tarnishes UMD’s reputation and discredits the accomplishments of students. UMD is committed to providing students every possible opportunity to grow in mind and spirit. This pledge can only be redeemed in an environment of trust, honesty, and fairness. As a result, academic dishonesty is regarded as a serious offense by all members of the academic community. All faculty, staff, and students are expected to participate in maintaining the highest levels of academic integrity. Additional information is available at: www.d.umn.edu/conduct/integrity

The chemical engineering faculty expects its students to take full responsibility for their learning. You must maintain a high degree of personal and academic integrity. There are two types of activities in a class: learning and assessment. Students usually study together on homework, labs,
and projects – but each of you is expected to produce your own original data, homework and exam solutions, reports, presentations, etc. As a professional degree program, we have zero tolerance for cheating, plagiarism, or other forms of dishonesty (read our professional society AIChE Code of Ethics in the appendix). Scholastic dishonesty in any portion of academic work for a course may be grounds for awarding a grade of F for the entire course, at the discretion of the instructor. Incidents of academic dishonesty are reported to the UMD Office of Student and Community Standards.

One of the hidden costs of cheating is that it can deceive cheaters into thinking that their higher scores are actually a sign of intelligence and skill. A growing body of research suggests that while cheaters are trying to beat the system, they are also engaging in destructive self-deception, inflating their own estimates of how they will do in the future. A full text of the study is available at: www.pnas.org/content/early/2011/03/02/1010658108.full.pdf+html

4 Balance Your Academic Experiences with Extracurricular Activities

We encourage you to develop a well-rounded personality by balancing your academic and personal lives. Consider engaging in appropriate extracurricular activities where you will begin to develop a network of friends and professional contacts, as well as interpersonal, team, and leadership skills. Start planning early for the extracurricular experiences you want to accomplish before graduation!

4.1 Internship/COOP ChE 3951

Students can work for a company as a chemical engineering coop student (for credit) or as a chemical engineering intern. Students who intern – without enrolling for any credit – do not need to meet any departmental requirements or standards. While the department does not have a formal placement program, many companies recruit students on campus for coop/intern positions.

The chemical engineering department strongly encourages students to participate in an industrial internship or coop experience before graduation. Internships typically last through a summer, but may involve part-time work during the school year. Coops generally last from one semester to 15 months. However, long-term internship (more than a summer) may cause problems with student status and related issues if the student is not enrolling in a course for credit. Typically, one credit is awarded for a summer, two credits for a semester, and three credits for a summer + semester coop.

Students desiring credit for coop experience must enroll in ChE 3951 for a semester or summer term during their coop. This course is open to juniors or seniors who have been admitted to the professional chemical engineering program, and who are in good standing in the department. Transfer students must complete ChE 2111 before enrolling in ChE 3951. Details of registration and requirements for credit are available at: www.d.umn.edu/che/studentAdvising/coop.html

COOP credits may be used for one of the following options:

- Science or Engineering elective requirement (up to 3 credits)
- Transfer students may use 3-credit COOP in place of the 3-credit requirement of ChE 1011 Intro to ChE.

Students who do not need these credits may still wish to enroll for coop because:

- It allows them to remain “full time” student required by medical insurance companies (the dept. head writes a letter to the insurance company if needed). The new health-care law lets all young adults (through age 25) may stay with their parents’ health-care plane.
• International students (visa) must work with the International Student Counselor regarding remaining full-time student status.
• Documents your engineering work experience on your transcript for potential employers and looks better on the resume.
• Provides experience in multidisciplinary engineering environments.

4.2 Research Opportunities

Students interested in research careers or pursuing advanced degrees in graduate school may consider opportunities for obtaining research experience before graduation. There are several different opportunities for becoming involved in research on campus.

4.2.1 UROP (Undergraduate Research Opportunities Program)

UROP students apply for a paid research stipend through the University of Minnesota. Students work with a faculty sponsor to generate a short research plan and proposal.
• Faculty sponsors may come from any department on campus.
• Awards are competitive and given semiannually. UROP proposals are generally due in early in the months of October and March each year.
• Details of the proposal and award process are available from the UROP web site (www.d.umn.edu/urop/description.html).

4.2.2 Independent Study/Research

ChE students may arrange to participate in independent study or research for credit under the direction of a member of the ChE faculty, or other SCSE faculty members. You may use up to three Independent study/research credits to satisfy Science or Engineering elective requirements.
• ChE 3791 Independent Study (1-3 cr, max 3 cr); Prereq BSChE cand. Directed individual study arranged with instructor and head of department before registration.
• ChE 3894 Chemical Engineering Research (1-3cr, max 6 cr); Prereq-BSChE cand. Experience in a selected research area. Student must present a satisfactory written report and oral presentation.
• You must have an agreement with a faculty member before registering for ChE 3791 or 3894.

4.2.3 Research Experience for Undergraduates (REU)

Each summer, universities around the country offer paid internships in their research facilities. These programs are typically funded by the National Science Foundation and last 10 weeks in June through August. Stipends range from $4000 to $6000, and may include travel allowances. The department sends email notices of these opportunities every spring. Applications are usually due in January, February, or March.

4.3 Student Organizations for Chemical Engineers

SCSE and ChE have several student organizations and societies for engineers where you can network with friends, become involved in service learning, and develop leadership skills. Here is a sample:

AIChE (American Institute of Chemical Engineers, UMD Student Chapter)
• Open to all ChE majors.
• Student chapter meetings are Wednesday, 5 PM in Engr 270.
4.4 International Study

Many chemical engineering students experience study abroad before graduation. Depending on the program, you can go for a short January or May term, a summer, one semester, or a year. For example, UMD ChE students have studied abroad in Australia, China, England, Germany, Mexico, Poland, Spain, and Sweden.

- Visit the International Education Office (www.duluth.umn.edu/ieo) for information about established exchange programs at UMD.
- The International Education Office maintains a database of courses that transfer to UMD from abroad. If necessary, work with your advisor to identify other chemical engineering courses that transfer to UMD.
- If UMD (or the University of Minnesota) does not have what you want, several U.S. universities have international programs that are open to any student.

5 Graduation Plans

You can complete the online application if you are an active student and have completed 90 credits. Details are available from the UMD web site (www.duluth.umn.edu/registrar/eDegree):

- Apply for the term in which you are completing all your degree requirements (i.e., last term of enrollment).
- Apply up to one year before you expect to complete all degree requirements. You must apply no later than the deadline for each term.
- Ensure that the major(s) and minor(s) you are completing are declared on the system.

5.1 Fundamentals of Engineering (FE) Exam

Although many chemical engineers do not need a professional license to practice engineering for private companies, we strongly recommend that you take the first steps while you are still in school. Chemical engineers that work on environmental projects or as consultants or in the public sector should consider professional engineering registration. At this stage of your career, you can’t predict the future. We recommend that you take the exam before graduation while your engineering education is fresh in your mind. It is much more challenging to take the exam years after graduation when your study and test taking skills are rusty. The Minnesota Society of
Professional Engineers (www.mnspe.org) oversees professional Engineers-in-Training (EIT) on the UMD campus each spring. A 10-week review course is available to students and the community to help prepare for the exam. Plan to spend several hours per week preparing for the FE exam. UMD Chemical Engineers have a very high pass rate on the FE/EIT exam (>90%).

5.2 Exit Interview
Graduates should schedule an exit interview with the department head during the final semester before graduation. Graduates complete a survey and share ideas with the department on how to maintain the quality and improve the program and educational environment for future students.

5.3 “Order of the Engineer” Ceremony Just for Engineering Graduates
The Order of the Engineer was initiated in the U.S. to foster a spirit of pride and responsibility in the engineering profession, to bridge the gap between training and experience, and to present to the public a visible symbol identifying the engineer.

At the ceremony, graduate engineers are invited to accept the Obligation of the Engineer and to wear a stainless steel ring on the little finger of the working hand. The Obligation is a creed, similar to the oath generally taken by medical students, which sets forth an ethical code. Initiates, as they voluntarily accept the obligation, pledge to uphold the standards and dignity of the engineering profession and to serve humanity by making the best use of Earth’s precious wealth.

The Order is not a membership organization. There are never any meetings to attend or dues to pay. Instead, the Order does foster a unity of purpose and honoring of one’s pledge lifelong.

UMD is the first university in Minnesota to have initiation of its graduate engineers as an official link to the Order.

- The initiation is held at the end of each semester on the Friday afternoon before commencement.
- The ceremony is dignified and recognizes each graduate individually.
- We invite all engineering graduates to join the Order of the Engineer.
- We encourage family and friends to view the ceremony and honor the engineering graduates.
- A reception follows the ceremony for engineering graduates to greet family, friends, and engineering faculty.
- A modest, one-time fee covers the cost of the diploma and stainless steel ring

5.4 Stay In Touch!
We are proud of our graduates and the successes they achieve in their careers. Please keep us up-to-date on where you are and what you are doing. The ChE department uses several tools to keep in touch with our alumni as well as help you stay connected with each other:

- Department newsletter published annually including news from alumni
- Occasional surveys of how you are doing and to solicit feedback on what we can do better
- Social networking web sites (FaceBook, LinkedIn, etc.)
6 Frequently Asked Questions (FAQ)

Look here first for answers to common questions asked by ChE students, before seeking information from the department of faculty advisors.

6.1 What is a Chemical Engineer?

Chemical engineers are often referred to as the Universal Engineer because they find opportunities to contribute in practically every industry.

- Chemical engineers bridge science and manufacturing to solve problems involving the production or use of chemicals.
  - They design equipment and develop processes for large-scale chemical manufacturing, plan and test methods of manufacturing products and treating byproducts, and supervise production.
  - Chemical engineers work in a variety of manufacturing industries other than chemical manufacturing, such as those producing electronics, food, energy, materials, pharmaceuticals, minerals, and pulp and paper.
  - They also work in the healthcare, biotechnology, environmental, safety, and business services industries.

- The knowledge and duties of chemical engineers overlap many fields that integrate applied principles of chemistry, physics, mathematics, and engineering.
  - They frequently specialize in a particular chemical process or field
  - They must be aware of all aspects of chemicals manufacturing and how it affects the environment, the safety of workers, communities, and customers.
  - Chemical engineers use computer technology to optimize all phases of research and production, and need to understand how to apply computer skills to chemical process analysis, automated control systems, and statistical quality control.

6.2 What calculator will I need?

- Any scientific/engineering calculator will suffice.
- Most students find the calculators they used in high school adequate for college course work.
- We generally rely on computers with MS Office (Excel PowerPoint, Word) or other engineering software to solve complex problems.

6.3 Do we require a personal computer?

- You are not required to own a personal computer. Personal computers are available in full access computing laboratories at several locations on campus, as well as Engr 270.
- If you chose to purchase your own computer, we recommend laptop computers that use the MS Window Operating System and MS Office.
- Consult the UMD Computer store for help selecting a computer that works best within the campus network and infrastructure
- Software is available for students at a substantial academic discount from the campus computer store.
6.4 Does the department offer scholarships?

- There are several scholarships available for ChE majors listed on our scholarship web page: (www.d.umn.edu/che/studentAdvising/scholarships.html)
- In addition, the Swenson College of Science and Engineering invites students to apply for engineering scholarships. Applications are due mid April each year and are awarded to students enrolled as full time UMD students in the following year. Details are available from web page: (www.d.umn.edu/scse/students/scholarships.html)
- We use the SCSE Engineering scholarship application to identify students for ChE scholarships.
- University wide financial aid and scholarship information is available from the registrar: www.d.umn.edu/fareg

6.5 Are there any student employment opportunities in the department?

- The faculty uses student graders for most of our courses. Consult individual faculty members if you are interested in working as a grader for their courses. You must have completed the course with a grade of C or higher.
- Some faculty members have funding for undergraduate research assistants.
- The UROP program provides a stipend for undergraduate researchers.

6.6 How do I find a job?

- Build up your resume by working as an engineering intern or COOP student before graduation. Consider using a functional over a chronological resume.
- Read your email from the department and faculty (even after you graduate). The department frequently sends out information about companies that recruit our graduates.
- Visit the campus Career Services office for help with writing resumes, interview skills, meeting with potential employers on campus, etc. (www.d.umn.edu/careers). Career Services offers several workshops throughout the year. You are strongly urged to participate in these opportunities to prepare for your job search.
- This one is very important. You must register on Gold Pass at Career Services to sign up for campus interviews and to receive announcements about job opportunities. (goldpass.umn.edu)
- Prepare for, and participate in E-Fest, the UMD campus career fair for engineers, as well as other job fairs held on campus and in the community.
- Attend all recruiting company information sessions on campus. Ask them questions about the position(s) to prepare for an interview.
- Attend the University of Minnesota Twin Cities Campus and Michigan Technological University career fairs for engineers (both open to UMD Engineering Students)
- Join a professional networking site, such as LinkedIn (be sure to link with Chemical Engineering).
- Network with family and friends (including recent graduates from UMD).
- Ask faculty and employers for permission to use them as references. UMD faculty members require signed reference request consent forms from our students (blank copy provided in appendix): http://www.d.umn.edu/umdhhr/Policies/references/student.htm
6.7 Is the UMD Chemical Engineering program accredited?

- The UMD Chemical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET. (www.abet.org)
- ABET accreditation is your assurance that we meet the quality standards established by the chemical engineering profession.
- Many graduate schools require a degree from an accredited program for admission.

6.8 Should I go to graduate school?

- Talk to your advisor about the pros and cons of attending graduate school. A BSChE degree opens many doors for great careers in chemical engineering. However, if you wish to pursue a specialized research career, you will probably need an advanced degree.
- Get involved with research as an undergraduate student. Just like industry’s preference for hiring engineers with industry coop or internship experience, top graduate schools look to admit students with research experience. There are many ways to get research experience before graduation, e.g., work with a faculty member on campus, apply for a summer REU (Research Experience for Undergraduates) at various universities around the country, intern at a national laboratory, or work in industrial R&D.
- Search for and apply to graduate programs that have active researchers in your area of interest.
- Many graduate programs require the GRE (Graduate Record Exam). Plan to take this in the fall semester of your final year before applying to graduate schools. (www.ets.org/gre)
- A few of our graduates pursue law and medical degrees. Prepare for entrance by passing the LSAT and MCAT entrance exams.
- Ask a faculty member or employers to give you good references. UMD faculty members require a signed reference request consent form from our students (blank copy provide in appendix): (www.d.umn.edu/umdhr/studentjobs/Forms/referenceform.html)

6.9 Help!

This student handbook is not meant to be encyclopedic, but rather a summary highlighting important topics for success. If you have additional questions that were not covered here, or on the ChE or UMD web sites, please contact your adviser or the department for help. We just might add your question to our list of FAQ for the benefit of future students!

7 Appendices

7.1 What do Chemical Engineers Do?
7.2 AIChE Code of Ethics
7.3 Sample Application for Admission to Professional
7.4 Sample Student Reference Request Form
7.5 Example Engineering Scholarship Application
7.6 Letter to Parents
7.7 Plan for My College Experience
What Do Chemical Engineers Do?

Last May, chemical engineering seniors at UMD took their last final examinations, attended graduation ceremonies, threw their mortarboards up in the air, enjoyed their farewell parties, said goodbye to one another, then headed off in an impressive variety of geographical and career directions. Are you thinking about following in the footsteps of those graduates — spending the next few years learning to be a Chemical Engineer and applying what you learn in a career? If so, it is a safe bet that, like most people in your position, you have only a limited idea of what chemical engineering is or what chemical engineers do. A logical way for us to begin answering these questions might therefore be with a definition of chemical engineering.

Unfortunately, no universally accepted definition of chemical engineering exists, and almost every type of skilled work you can think of is done somewhere by people educated as chemical engineers. We will therefore abandon the idea of formulating a simple definition and instead take a closer look at what those recent graduates did, immediately after either graduation (or following a well-earned vacation). Consider these examples and see if any of them sound like the sort of career you can see yourself pursuing and enjoying.

About 45% of the class went to work for large chemical, petrochemical, pulp and paper, plastics and other materials, or agrichemical processing firms.

Another 35% went to work for government agencies or design and consulting firms (many specializing in environmental regulation and pollution control) and for companies in emerging fields such as microelectronics, alternative energy, and biotechnology.

About 10% of the class went directly into graduate school in chemical engineering. The masters degree candidates will get advanced education in traditional chemical engineering areas (thermodynamics, chemical reactor analysis and design, fluid dynamics, mass and heat transfer, and chemical process design), and get jobs doing process or control systems design or product development. The doctoral degree candidates will work on major research projects in bio or nanotechnology, and either go into industrial research and development or join a university faculty.

The remaining 10% of the class went into graduate school in an area other than chemical engineering, such as medicine, law, and business — building on their chemical engineering problem solving skills.

Several graduates went to work for companies manufacturing specialty chemicals — pharmaceuticals, paints and dyes, and cosmetics, among many other products. All of these companies hire chemical engineers to design and run their production processes.

To remain competitive they have to pay attention to such things as mixing efficiency, heat transfer, automatic temperature and liquid level control, statistical quality control, and control of pollutant emissions.

Some went to work for companies that manufacture integrated semiconductor circuits. A critical step in the production of computer chips involves coating small silicon wafers with extremely thin and uniform films of semi-conducting materials. The graduates working in this area may be called on to identify reactions that can be used to produce the desired films, determine the best conditions at which to run the reactions,

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design the reactors, and continue to improve their operation.

• Some took elective courses in biochemistry and microbiology and got jobs with biotechnology firms. One graduate works on the design of pharmaceutical production processes that involve immobilized enzymes, biological chemicals that can make specific reactions go orders of magnitude faster than they would in the absence of the enzymes. Several others work on processes that involve genetic engineering, in which recombinant DNA is synthesized and used to produce valuable proteins and other medicinal and agricultural chemicals that would be hard to obtain by any other means.

• Some joined companies that manufacture polymers (plastics). One is working on the development of membranes for desalination of seawater (fresh water passes through, salt is kept out) and for gas separations (hydrogen passes through and hydrocarbons are kept out, or vice versa); another is developing membranes to be used in hollow-tube artificial kidneys (blood flows from the patient’s body through thin-walled tubes; metabolic wastes in the blood pass through the tube walls but proteins and other important body chemicals remain in the blood, and the purified blood is returned to the body).

• A few of the UMD chemical engineering graduates went to medical school. (Chemical engineering graduates who take electives in the biological sciences have a strong record of success in gaining medical school admission.) One went to law school. Others enrolled in MBA programs and will probably move into management tracks in chemical-related industries.

• One graduate joined the Peace Corps for a two-year stint helping communities develop sanitary waste disposal systems and teaching science and English in a rural school. When she returns, she will earn a Ph.D., after ten years run for the United States Senate; win two terms, become head of a highly successful, private foundation dedicated to improving education in economically deprived communities. She will attribute her career successes to the problem-solving skills she acquired in her undergraduate training in chemical engineering at UMD.

• At various points in their careers, some of the UMD chemical engineering graduates will work in chemical or biochemical or biomedical or material science laboratories doing research and development or quality engineering, at computer terminals designing processes and products and control systems, at field locations managing the construction and startup of manufacturing plants, on production floors supervising and troubleshooting and improving operations, on the road doing technical sales and service, in executive offices performing administrative functions, in government agencies responsible for environmental and occupational health and safety, in hospitals and clinics practicing medicine or biomedical engineering, in law offices specializing in chemical process-related patent work, and in classrooms teaching the next generation of chemical engineering students.

The different careers described here are clearly too diverse to fall into a single category. They involve disciplines including physics, chemistry, biology, environmental science, medicine, applied mathematics, statistics, computer science, economics, management and information science, research, design, construction, sales and service, production supervision, and business administration. The one single feature they have in common is that UMD Chemical Engineering graduates can be found doing them!
**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;
- 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.
APPLICATION FOR ADMISSION TO THE
PROFESSIONAL PROGRAM OF
CHEMICAL ENGINEERING

NAME ____________________________________________________________

Last First Middle Initial

Advisor ________________________________________________________

Catalog Year you are working from ____________________________

Student I.D. Number ____________________________________________

Minors (student reports these to SCSESA) ________________________________

Mailing Address __________________________________________________

Permanent Home Address ____________________________________________

Please check off the courses you have completed. These are required to receive upper division status.

☐ ChE 1011 Intro to Chemical Engineering  ☐ MATH 1296 Calculus I
☐ ChE 2111 Material & Energy Balances  ☐ MATH 1297 Calculus II
☐ ChE 2121 Thermodynamics  ☐ MATH 3280 Differential Equations
☐ ChE 3031 Computational Methods  ☐ CHEM 1153 General Chemistry I
☐ COMP 1120 College Writing  ☐ CHEM 1154 General Chemistry Lab I
☐ CS 1121 Visual Basic Programming  ☐ CHEM 1155 General Chemistry II
☐ PHYS 2011 General Physics I  ☐ CHEM 1156 General Chemistry Lab II
☐ PHYS 2012 General Physics II  ☐ CHEM 2541 Organic Chemistry I
☐ CHEM 1153 General Chemistry I lab  ☐ CHEM 2543 Organic Chemistry I lab

GPA: _______

Sign this form below and return to the Chemical Engineering Office - 176 Engineering Building.

SIGNATURE ___________________________________________ DATE ________________
University of Minnesota Duluth
Student Reference Request Consent Form

Student name (please print:)____________________________________________________

I request __________________________ to serve as a reference for me. The purpose(s) of
the reference are: (check all applicable spaces)

_______application for employment

_______all forms of scholarship or honorary award

_______admission to another education institution

The reference may be given in the following form(s): (check one or both spaces)

_______written

_______oral

I authorize the above person to release information and provide an evaluation about any
and all aspects of my academic and/or employment performance at the University of
Minnesota Duluth to the following: (check all applicable spaces)

1. __ all prospective employers

OR __ specific employers (list on reverse side)

2. __ all educational institutions to which seek admission

OR __ specific educational institutions (list on reverse side)

3. __ all organizations considering me for an award or scholarship

OR __ specific organizations (list on reverse side)

This authorization to provide references is valid for one (1) year from the date of my
signature below, unless I specify an earlier ending date as follows:

Ending date:_________________

Note: Under the Family Educational and Privacy Rights Act, 20 U.S. C. 1232(g), you may,
but are not required to waive your right of access to confidential references given for any of
the purposes listed on this form above. If you waive your right of access, the waiver
remains valid indefinitely.

___________________________________    __________________________
Student Signature                        Date
**Example Scholarship Application** *(Be sure to download the latest version from the SCSE web site)*

**University of Minnesota Duluth**  
**Swenson College of Science and Engineering**  
**Engineering Scholarship Application**

<table>
<thead>
<tr>
<th>Last Name:</th>
<th>First Name:</th>
<th>MI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student ID #:</td>
<td>Gender: M F</td>
<td>GPA:</td>
</tr>
<tr>
<td>Major(s) (please circle): ChE</td>
<td>CE</td>
<td>ECE</td>
</tr>
<tr>
<td>How many credits do you expect to take in: Fall 10</td>
<td>Spring 11</td>
<td></td>
</tr>
<tr>
<td>High School Graduated From:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td>State:</td>
<td>Zip:</td>
</tr>
<tr>
<td>If you had an internship with a company over the summer, please list the company:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Most engineering scholarships are merit-based and do not require financial need. However, a few donors have specified that the student have financial need, a military background, or membership to an engineering club. If you would like to be considered for any of these scholarships, please describe your financial need, military background (including any family member), or membership to any engineering club. Have you applied for financial aid, etc.?

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By initialing this line, you authorize us to release the information on this application to the donors:

You will be notified in writing of the committee’s decision by August 2010. Please provide a complete summer address:

<table>
<thead>
<tr>
<th>Street Address</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
</table>

**Application Instructions**

- **In order to qualify for this scholarship you must have a cumulative GPA of 2.70 or better; have completed 30 semester credits (including credits registered for in spring semester); be enrolled in UMD Swenson College of Science and Engineering during both semesters of the upcoming academic year; and be an undergraduate student in one of the following fields at UMD: Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, Industrial Engineering, or Mechanical Engineering. If you will not be enrolled for both semesters (graduating early, internships or co-ops, etc.), you may be eligible for a partial year scholarship. Please explain this in your essay.**

- Write a personal essay in which you summarize honors or awards you have received, extra-curricular activities in which you have participated (on or off campus, including employment), the position or rank you held, and any special contributions you made. Your essay should include your academic and personal achievements and your aspirations for the future.

- **Essay must be word processed. Correct spelling and grammar are important.**

- **Application must be typed or printed legibly.**

- Your personal statement may not exceed two pages – make sure your name is on all the pages.

- Evaluation of your application will be based on the clarity, completeness, and content of your essay.

- **Applications are due no later than 4:00 pm, Friday, April 16, 2010. Please return the application to your department secretary.**
TO: New Students and Families  
FROM: Chemical Engineering Faculty and Staff  
RE: Welcome to the Department of Chemical Engineering at the University of Minnesota Duluth.

We are pleased that you have joined our program and we will do our best to help you reach your goals. This letter provides an overview for students and their families of what we expect from our students to help them achieve success.

We offer a professional degree program that prepares graduates for fulfilling careers in chemical engineering and beyond. While chemical engineering is among the more challenging majors on our campus, it is also among the most rewarding! Each year, our graduates go on to exiting careers in a variety of fields and locations throughout the state, country, and abroad. The Department of Chemical Engineering provides a student learner-centered environment where students take responsibility for their own learning. The goal is to learn, not to trade performance for a grade.

Professional degree programs, like chemical engineering, require their graduates to demonstrate competence in their discipline. As part of this process, students declare their major as lower division students (freshmen and sophomore level) and complete foundation courses in math, science, and engineering. Students must demonstrate adequate preparation in these areas before formally applying to the professional program (junior and senior level). We only admit students to the professional program after they have completed the lower division courses at a satisfactory level of performance needed for success in the more rigorous upper division courses. Admission to the professional program is also space limited. Most students are well prepared and work hard to meet our admissions standards. Regrettably, a few students learn the hard way that we seriously enforce our standards of competence and quality of graduates. Some keys to success in our program include:

- Attend all your classes and lab sessions.
- Get help from instructors and faculty advisors.
- Do assigned readings and participate in class discussions and active learning exercises.
- Complete all assignments early. Do not wait until the last moment to begin.
- Set up a regular study schedule; three hours of study are expected for each hour spent in class.
- Do your best work and your own work.
- Use campus resources, such as the tutoring center and career services.
- Get involved!

You will develop analytical and problem solving skills that set you apart — skills that are highly sought after in the workplace. Ultimately, however, you get the most out of the program according to what you put into it. Each year we conduct and exit interview with our graduating seniors. One of the questions we ask them is, “What would you tell a first-year chemical engineering student asking for advice about what to expect? Or what do you wish someone had told you during your first year at UMD?” Here are some actual responses from last year’s graduates:

“The courses are challenging but there are always students and teachers there to help.”

“Keep your work organized and on hand, it will come back in the end.”

“Get involved and get to know your classmates.”
“Find a group of students to study with, the earlier the better.”

“Don’t be afraid to ask the upper division students questions.”

“It’s going to be a lot more work than you think, but take pride in it. You’re doing much more than a lot of other majors.”

“Be ready for hard work, but it’s what you truly like/want to do, it’s worth it in the end.”

“This will be the best time of your life. Study hard, play hard. This experience depends on what you put into it.”

“Start projects early. Don’t be afraid to ask for help from professors. Learn to work together with others on homework and studying to make life easier.”

“... Learn ‘how’ to study. Be patient and you will get very efficient at it.”

There is much more to a becoming a chemical engineer than coursework. We encourage you to plan your college experience with a purpose to include extracurricular activities that add value to your education and life experiences. Get involved in student organizations in the department and on campus where you will begin networking with peers, develop teamwork and leadership skills, and give back through community service.

We strongly urge you to graduate with industrial experience through paid internships or a longer term COOP. Many students seek international experience by studying abroad for a semester. While these types of activities may extend your graduation date, you will gain valuable skills required by engineers practicing in a global economy.

Please share this letter with your support group of parents, family, and friends to help them see the bigger picture of what we have to offer and what we expect from you. While Minnesota State law prohibits us from discussing specific information about a student’s performance, such as grades, we are happy to talk to your family and friends about our program requirements and expectations.

We have confidence in your ability to succeed, and will work hard to help you achieve your goals. We look forward to a bright and rewarding future ahead of you.

Sincerely,

[Signature]

Professor and Head of Chemical Engineering
Sample Plan for My College Experience

Year 1

Fall:
☐ Learn about campus resources, including Career Services and register on Gold Pass
☐ Attend UMD E-fest Engineering Job Fair and company information sessions

Spring:
☐ Start attending UMD AIChE Student Chapter meetings

Summer:
☐ Update resume and Gold Pass

Year 2

Fall:
☐ Practice mock interviews with Career Services
☐ Attend UMD E-fest Engineering Job Fair

Spring:
☐ Apply for admission to Professional Program in Chemical Engineering
☐ Participate in Study Abroad?
☐ Apply for Engineering Scholarship

Summer:
☐ Update resume and Gold Pass.

Year 3

Fall:
☐ Attend UMD E-fest Engineering Job Fair
☐ Attend TC and Mich Tech Engineering Job Fairs
☐ Apply for COOP/Internships
☐ Apply to UROP program

Spring:
☐ Run for office in AIChE or other student organization
☐ Participate in UROP or undergraduate research experience
☐ Apply for REU experience
☐ Apply for Engineering Scholarship

Summer:
☐ Update resume & Gold Pass

Year 4

Fall:
☐ Attend UMD E-fest Engineering Job Fair
☐ Attend TC and Mich Tech Engineering Job Fairs
☐ Get a job
☐ Take GRE & Apply to Graduate School?

Spring:
☐ Keep the job search going
☐ Take the FE exam
☐ Graduate!