Carnegie Mellon

Chemical Engineering

2013 – 2014

Doctoral Student Handbook
# Table of Contents

1. **CHEGSA** .............................................................................................................................................. 1
   1A. **GENERAL INFORMATION** .............................................................................................................. 2
       - ChEGSA Symposium ............................................................................................................................ 2
       - ChEGSA Lounge .................................................................................................................................. 3
       - Coca-Cola Machine ............................................................................................................................. 3
       - Personal Participation ......................................................................................................................... 3
   1B. **CURRENT OFFICERS** .......................................................................................................................... 3

2. **FINANCIAL POLICIES** .................................................................................................................... 9
   2A. **FINANCIAL AWARDS** .................................................................................................................... 9
   2B. **PAYMENT OF TUITION** .................................................................................................................. 9
   2C. **STATUTE OF LIMITATIONS FOR FINANCIAL SUPPORT** ......................................................... 10

3. **ACADEMIC REQUIREMENTS** ....................................................................................................... 10
   3A. **REGISTRATION REQUIREMENTS** .................................................................................................. 10
       3A.1 Registering for the First Semester ................................................................................................. 10
       3A.2 Registering after the First Year (with Financial Support) ............................................................ 10
       3A.3 Registering after Termination of Financial Support & ABD Status ............................................. 11
   3B. **ADVISORS** ................................................................................................................................... 14
       3B.1 Advisor Selection ........................................................................................................................... 14
       3B.2 Role of the Advisor ....................................................................................................................... 15
       3B.3 Role of the Student ....................................................................................................................... 15
   3C. **MAJOR PROGRAM REQUIREMENTS AND RULES OF TIMING** ......................................................... 15
   3D. **CHANGE OF ADVISOR OR DISMISSAL** ........................................................................................ 16
   3E. **COURSE AND QUALITY POINT (QPA) REQUIREMENTS** .......................................................... 17
       Definitions ............................................................................................................................................ 17
       Course and QPA Requirements for the PhD Degree ........................................................................... 18
   3F. **POLICY ON TRANSFER OF CREDIT FROM OTHER INSTITUTIONS** ........................................... 24
   3G. **06-799 ASSIGNMENTS (TEACHING RESPONSIBILITIES)** .......................................................... 25
       3.G.1 ITA Test ..................................................................................................................................... 25
3H. SEMINAR .....................................................................................................................................26
3I. PhD QUALIFYING EXAMINATION ................................................................................................26
   3I.1 Who can take the exam? ...............................................................................................................26
   3I.2 Scoring the exam ...................................................................................................................31
3J. PhD PROPOSAL ...........................................................................................................................32
   3J.1 Preparing for the PhD Proposal ...........................................................................................32
   3J.2 Results of the PhD Proposal ..................................................................................................33
3K. THESIS .........................................................................................................................................34
   3K.1 Thesis Committee ...................................................................................................................34
   3K.2 Writing the Thesis ..................................................................................................................35
   3K.3 Presentation of Final Public Oral Defense ...........................................................................35
3L. CHECKOUT PROCEDURE ..............................................................................................................35
3M. SWITCHING AMONG MS, PhD AND MChE PROGRAMS ..............................................................36
   3M.1 Changing from PhD to MS: ...................................................................................................36
   3M.2 Switching from PhD or MS to MChE ....................................................................................36
3N. CHANGING ACADEMIC REQUIREMENTS AND POLICIES .............................................................36
4. PREPARATION OF THE THESIS .................................................................................................36
   4A. FORMAT ......................................................................................................................................36
   4B. COPIES ........................................................................................................................................37
   4C. COST ...........................................................................................................................................37
   4D. BINDING ......................................................................................................................................37
   4E. PROCESSING ................................................................................................................................37
   4F. DEADLINE ...................................................................................................................................38
5. GRADUATE STUDENT AWARDS ................................................................................................38
   5A. KEN MEYER AWARD ......................................................................................................................38
   5B. MARK DENIS KARL TEACHING ASSISTANT AWARD ..............................................................38
6. FACILITIES & SERVICES .............................................................................................................39
   6A. HOURS ........................................................................................................................................39
   6B. EQUIPMENT ................................................................................................................................39
   6C. SUPPLIES .....................................................................................................................................39
   6D. ADMINISTRATIVE ASSISTANTS ..............................................................................................39
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A.</td>
<td>WITH PURCHASE ORDER</td>
<td>53</td>
</tr>
<tr>
<td>8B.</td>
<td>WITH A DEPARTMENTAL CREDIT CARD – PURCHASES UNDER $2500</td>
<td>54</td>
</tr>
<tr>
<td>8C.</td>
<td>WITH CASH</td>
<td>54</td>
</tr>
<tr>
<td>8D.</td>
<td>PURCHASING IN UNIVERSITY STORES</td>
<td>55</td>
</tr>
<tr>
<td>8E.</td>
<td>EXPENSE REPORTS</td>
<td>55</td>
</tr>
<tr>
<td>8F.</td>
<td>PROCEDURE FOR PICKING UP PACKAGES</td>
<td>55</td>
</tr>
<tr>
<td>8G.</td>
<td>SHIPPING VIA FREIGHT</td>
<td>56</td>
</tr>
<tr>
<td>8H.</td>
<td>GAS CYLINDERS</td>
<td>56</td>
</tr>
<tr>
<td>9.</td>
<td>LABORATORIES</td>
<td>57</td>
</tr>
<tr>
<td>9A.</td>
<td>PPG INDUSTRIES COLLOIDS, POLYMERS AND SURFACES LABORATORY</td>
<td>57</td>
</tr>
<tr>
<td>9B.</td>
<td>ROBERT R. ROTHFUS LABORATORY IN CHEMICAL ENGINEERING</td>
<td>59</td>
</tr>
<tr>
<td>10.</td>
<td>CONTACT INFORMATION</td>
<td>59</td>
</tr>
<tr>
<td>11.</td>
<td>CAMPUS FACILITIES</td>
<td>60</td>
</tr>
<tr>
<td>11A.</td>
<td>ATHLETIC FACILITIES</td>
<td>60</td>
</tr>
<tr>
<td>11B.</td>
<td>CLEANERS/LAUNDRY</td>
<td>60</td>
</tr>
<tr>
<td>11C.</td>
<td>CAMPUS DINING SERVICE</td>
<td>60</td>
</tr>
<tr>
<td>11D.</td>
<td>HEALTH SERVICES</td>
<td>60</td>
</tr>
<tr>
<td>11E.</td>
<td>LIBRARIES</td>
<td>61</td>
</tr>
<tr>
<td>11F.</td>
<td>PARKING FACILITIES</td>
<td>61</td>
</tr>
<tr>
<td>11G.</td>
<td>PUBLICATIONS</td>
<td>61</td>
</tr>
<tr>
<td>11H.</td>
<td>STUDENT PHOTO I.D.</td>
<td>62</td>
</tr>
<tr>
<td>12.</td>
<td>MISCELLANEOUS ISSUES</td>
<td>62</td>
</tr>
<tr>
<td>12A.</td>
<td>POLICY ON &quot;OUTSIDE&quot; EMPLOYMENT</td>
<td>62</td>
</tr>
<tr>
<td>12B.</td>
<td>POLICY ON THE AVAILABILITY OF SUMMER EMPLOYMENT</td>
<td>62</td>
</tr>
<tr>
<td>12C.</td>
<td>POLICY ON OUTSIDE FELLOWSHIPS</td>
<td>62</td>
</tr>
<tr>
<td>12D.</td>
<td>CHEATING, PLAGIARISM, AND RESPONSIBLE CONDUCT OF RESEARCH</td>
<td>62</td>
</tr>
<tr>
<td>12E.</td>
<td>POLICY ON VACATION TIME</td>
<td>63</td>
</tr>
</tbody>
</table>
First and foremost, welcome to the Carnegie Mellon Chemical Engineering Department! Our reputation as one of the strongest departments in both research and education may come as no surprise, but we take great pride in also being a close knit community of alumni, faculty, and students dedicated to building an environment that inspires such excellence. This is maintained in no small part by the Chemical Engineering Graduate Student Association (ChEGSA), which serves and is composed of all of the graduate students in our department. Our goal is to enhance your experience here at Carnegie Mellon, both socially and professionally, as well as serve as a liaison between our members and industry, alumni, faculty, staff, and undergraduate students. We hold elections at the beginning of the fall semester for all of the positions on the ChEGSA governing board and it is a great chance to get involved.

On the social front, ChEGSA hosts a weekly Happy Hour in the Graduate Student Lounge (Doherty Hall A209) every Friday afternoon for all graduate students, faculty, and staff. The event epitomizes our department, serving as an opportunity to relax and get to know the members of our department. In addition to this weekly event, we host several parties throughout the year including the Fall Party, Holiday Party, Super Bowl Party, and Spring Party. We also organize camping trips, a trip to a Pirates game, international potlucks, a wine and cheese tasting, and an annual Chili Cook-off among others. ChEGSA also participates in several outreach events throughout the year, so be sure to volunteer!

Many of these events are supported from our fundraising efforts from the Coca Cola machines on the A-level and second floor. So please be sure to support us by purchasing from our Coke machines!

Professionally, ChEGSA organizes two major events during the course of the year, the most significant of which is the ChEGSA Graduate Student Research Symposium held each fall semester. The event, initiated in 1979, is completely run and organized by students with funding support from industry and alumni. It offers a unique opportunity for students to present their work and receive feedback from alumni, industrial representatives, faculty, and their fellow students. Additionally, it serves as an opportunity to broaden the research knowledge of our department and to grow our relationships with industry. The second event is the ChEGSA Industrial Career Seminar held each spring that provides insight for PhD students from experts on the job search, building your marketing package, and interviewing as well as a Q&A panel of industrial guests and alumni. Through these events, we aim to enrich your experience here and make you better prepared for conferences and your future careers.

We hope that you enjoy your stay here are Carnegie Mellon and that we can play a part in helping you to make the most of your experience. Please let us know if you ever have any suggestions as we are happy to serve you!

Sincerely,

Stephen Spagnol
ChEGSA President
1A. GENERAL INFORMATION

ChEGSA's goal is to encourage good working relationships among students, faculty and staff. To accomplish this, ChEGSA sponsors several social events to which all graduate students, faculty, and staff are invited:

- Happy hour is held at 4:30 p.m. every Friday (unless posted otherwise) in the ChEGSA lounge (A209) at which beer, soft drinks, snacks, and (occasionally) pizza is provided. Happy hour is free to all graduate students, guests (within reason), faculty, and staff in this department.

- Two parties are organized during the fall semester: one to welcome new students and another for December holidays. A party is held in the spring and a picnic (sometimes held before a Pirates game) during the summer. Recently, we have also sponsored skiing trips, a golf tournament, camping/hiking trips, a Cinco de Mayo happy hour, a Super Bowl party, a wine and cheese event and an international potluck dinner.

- Subject to demand, ChEGSA sponsors intramural sports: football, basketball, soccer (1985, 1986 and 1998 intramural champs), volleyball (2005 intramural champs), softball (1985, 2004 GSA league champs, 2005 intramural champs), swimming (1988 intramural champs), floor hockey, and racquetball (2001 intramural champs). If you are interested in these or other sporting events, please talk to any of the ChEGSA officers.

-CHEGSA SYMPOSIUM

The ChEGSA Symposium, held in the fall, gives students the opportunity to make formal technical presentations in a setting similar to the one used at technical meetings and conferences. Students at various stages of their studies present symposium papers, and all the session chairpersons are student volunteers. Members of the faculty and industrial guests serve as judges to determine the winners of the awards given at a follow-up banquet.

We highly encourage everyone, particularly students who are new to the department, to take full advantage of the symposium. It provides an excellent setting for students to get a panoramic view of a large part of the research being conducted in the department. It also affords an opportunity for students to interact with the industrial representatives who attend the symposium. In addition to providing the bulk of the financial support for the symposium, many of these representatives also recruit on campus.
CHEGSA LOUNGE

ChEGSA maintains a lounge in DH A209 that features

- A place to sit and relax and have your lunch and/or dinner as well as a brand new coffee machine
- A microwave oven, refrigerator, compact disc player, and color TV
- Foosball, shuffleboard, pool, and ping-pong tables
- Equipment for volleyball, softball, soccer, and football

COCA-COLA MACHINE

Happy hour and most of the parties organized by ChEGSA are funded from sales of soda from this machine. The machine is located on the A-level (next to the stairwell) and has a selection of Coca-Cola products. Please support ChEGSA by buying your soft drinks from this machine.

PERSONAL PARTICIPATION

ChEGSA may be the only organization that offers its members so many benefits without asking for any responsibility in return. There are no dues and events are either completely free or heavily subsidized.

In return for this privilege, we ask that you plan to "do something for ChEGSA" at least once a year. There are several ways to do this: you can help organize a party or the symposium, fill the Coke machine, assist with the delivery of soft drinks, or help with the purchase of supplies needed for happy hour. Whatever it is that you can offer, the important thing is to participate. Help enlarge the small circle of student non-officers who give so much of their time to ChEGSA throughout the year.

1B. CURRENT OFFICERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Stephen Spagnol</td>
<td>sspagnol</td>
</tr>
<tr>
<td>Vice President</td>
<td>Ben Yezer</td>
<td>byezer</td>
</tr>
<tr>
<td>Symposium Chairs</td>
<td>John Riley</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zhongnan Xu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zixi Zhao</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>jkriley zhongnanxu zixiz</td>
</tr>
</tbody>
</table>
| Social Chairs          | Alex Dowling  
|                       | Steve Illes  
|                       | Stephanie Kirby  
|                       | Steve Klara  
|                       | Nick Chisholm  
|                       | Gabrielle Cusimano  
|                       | awdowlin  
|                       | silles  
|                       | smk  
|                       | sklara  
|                       | nchishol  
|                       | geusiman  
| Fundraising Chair     | John Goldman  
|                       | jonatha  
| GSA Reps              | Satya Amaran  
|                       | Jake Boes  
|                       | samaran  
|                       | jboes  
| Webmaster/Secretary   | Sreekanth Rajagopalan  
|                       | sreekanr  
| Outreach Coordinator  | Denise Posluszny  
|                       | dposlusz  

These officers are here to serve you. Please bring any suggestions or concerns to their attention.

---

**Constitution of the Chemical Engineering Graduate Student Association**

**Carnegie Mellon University**

**Article 1 - Name**

The official name of the association shall be “The Chemical Engineering Graduate Student Association, Carnegie Mellon University,” hereinafter referred to as ChEGSA.

**Article 2 - Object**

The object of the ChEGSA shall be:

2.1 to provide a link between its members and industry, chemical engineering societies in other universities, the Graduate Student Assembly of Carnegie Mellon and the American Institute of Chemical Engineers.

2.2 to represent and promote the views of its members, and to implement academic, cultural, educational, physical, professional, social and other programs of interest to its members.

**Article 3 – Membership**

The regular members of the ChEGSA shall be students currently registered at Carnegie Mellon University in the graduate Chemical Engineering program. These members shall constitute the ChEGSA constituency.

**Article 4 – Fiscal Year**

The fiscal year of the ChEGSA shall be from the commencement of the Spring semester of one academic year until the preceding day of the commencement of the Spring semester of the next academic year.
Article 5 – Members of the Governing Board

5.1 The Governing Board shall consist of:
   i) the President
   ii) the Treasurer
   iii) the External Affairs Representatives
   iv) the Internal Affairs Representatives
   v) the Webmaster
   vi) the Graduate Student Assembly (G.S.A.) representatives
   vii) the Fundraising Officer

5.2 The terms of office for the members of the Governing Board excluding the GSA representatives shall be congruent with the length of the fiscal year. The terms of office for the GSA representatives shall coincide with the term of office for GSA, which is currently from the commencement of the Fall semester of one academic year till the preceding day of the commencement of the Fall semester of the next academic year.

5.3 Any member of the governing board may resign from their position by presenting the governing board with a letter of resignation.

5.4 Upon leaving the Chemical Engineering graduate program, a member of the governing board automatically resigns their position.

Article 6 – Powers and Duties of the Governing Board

6.1 The Governing Board shall, to the best of its ability, fulfill the object of the ChEGSA, as described in Article 2.

6.2 The Governing Board shall meet on a monthly basis to discuss previous and upcoming events, receive updates from each position of the Governing Board, and discuss other issues relevant to the ChEGSA constituency. ½ of the governing board must be present to establish quorum. These meetings of the Governing Board shall be open to any member of the ChEGSA constituency.

6.3 The President shall:
   i) be elected from the ChEGSA constituency in accordance with election procedures described in Article 7 and shall not be a first year student nor a student with preconceived plans to forfeit membership as outlined in Article 3 or otherwise vacate the position prior to the prescribed term of office defined in Article 5.
   ii) be charged with the general management and supervision of the affairs of the ChEGSA.
   iii) be charged with all duties relating to public relations on behalf of ChEGSA.
   iv) be charged with arranging regular Governing Board meetings whose dates will be chosen upon the discretion of the Governing Board, and preside over the meetings.
   v) have signing authority for the ChEGSA business account.
6.4 The Treasurer shall:

   i) be elected from the ChEGSA constituency in accordance with election procedures described in Article 7 and shall preferably not be a first year student nor a student with preconceived plans to forfeit membership as outlined in Article 3 or otherwise vacate the position prior to the prescribed term of office defined in Article 5.

   ii) be charged with receiving all moneys and have signing authority for the ChEGSA business account.

   iii) be charged with keeping a proper account of all financial affairs of the ChEGSA and reporting and/or presenting financial statements at meetings as required.

   iv) be charged with preparing, in cooperation with the Governing Board, the annual budget of the ChEGSA.

   iv) assume, in the absence of the President, all of the duties of the office of the President.

6.5 The External Affairs Representatives shall:

   i) be elected from the ChEGSA constituency in accordance with election procedures described in article 7 and shall preferably consist of 2-3 students, where at least one representative is preferably a non-first year student.

   ii) be charged with the responsibility of increasing and improving relations between the ChEGSA and industrial/external groups.

   iii) be charged with the responsibility of ensuring the successful financing and organization of the annual ChEGSA Symposium.

6.6 The Internal Affairs Representatives shall:

   i) be elected from the ChEGSA constituency in accordance with election procedures described in article 7 and shall preferably consist of 3-4 students, where at least one representative is preferably a non-first year student.

   ii) be charged with the responsibility of increasing and improving relations between the Chemical Engineering graduate students and Faculty/Staff.

   iii) be charged with the responsibility of increasing and improving relations between the Chemical Engineering graduate students and undergraduate students.

   iv) be charged with the responsibility of organizing Happy Hour every week, unless other departmental or ChEGSA events conflict.

   iv) be charged with the responsibility of organizing Chemical Engineering intramural sporting teams through the University intramural athletic program, the University Graduate Student Assembly and/or internal to the Chemical Engineering Department with discretion towards the interest of the ChEGSA constituency.
v) be charged with the responsibility of organizing off-campus department events throughout the year. Examples include the first-year party, the holiday party, the spring party and the summer picnic.

vi) be charged with organizing faculty/staff appreciation events and other intra-departmental events as called upon by members of the Chemical Engineering department.

6.7 The Webmaster shall:

i) be elected from the ChEGSA constituency in accordance with election procedures described in article 7.

ii) be charged with the responsibility of maintaining ChEGSA email distribution list(s).

iv) be charged with the responsibility of ensuring the proper functioning of the ChEGSA website(s).

v) be charged with the responsibility of taking minutes during ChEGSA meetings and ensuring electronic communication of ChEGSA matters to and from the constituency.

6.8 The Graduate Student Assembly representatives shall:

i) be elected from the ChEGSA constituency in accordance with election procedures described in article 7.

ii) be charged with representing ChEGSA in the Graduate Student Assembly.

iii) be charged with ensuring, in conjunction with the GSA, that their constituency is up to date regarding current GSA events, policies and benefits.

iv) be charged with attending monthly GSA meetings on the first Wednesday of every month as well as attending meetings of their respective sub-committees within GSA.

6.9 The Fundraising Officer shall:

i) be elected from the ChEGSA constituency in accordance with election procedures described in article 7.

ii) be charged with ensuring the maintenance and successful operation of the A-level soda machine, including but not limited to communicating with the supplier regarding physical problems with the machine, ensuring regular delivery of inventory for the machine from the supplier, and collecting and depositing cash from the machine to the ChEGSA business account.

iii) be charged with managing other fundraising activities such as the selling of departmental pint glasses.
Article 7 – Elections of the Governing Board

7.1 Elections for the Governing Board shall be held at a meeting open to all members of the ChEGSA constituency, prior to the selection of advisors by first-year students and after the commencement of the fall academic semester.

7.2 The current president shall serve as moderator for the election and remain impartial during the voting. In the event that he/she will be running for a position, he/she will name an impartial replacement from the ChEGSA constituency.

7.3 The order of elections is as follows:
   i)     the President
   ii)    the Treasurer
   iii)   the External Affairs Representatives
   iv)    the Internal Affairs Representatives
   v)     the Webmaster
   vi)    the Graduate Student Assembly (G.S.A.) representatives
   vii)   the Fundraising Officer

7.4 Nominations shall be conducted as follows
   i) Any member of the ChEGSA constituency may be nominated for a governing board position by any member of the ChEGSA constituency, including his or herself, if the nominee is eligible for the position as stipulated in Article 6.
   ii) Members are eligible to be nominated for multiple positions, but may only be nominated for one position at a time.
   iii) If not elected to a position, members are still eligible to be nominated for other governing board positions.
   iv) Nominees are permitted to give a brief speech with respect to their nomination at the discretion of the moderator.

7.5 Voting shall be conducted as follows
   i) After the moderator has closed nominations for a position, the nominees will leave the room and the moderator will open the floor for discussion.
   ii) After the moderator closes discussion, a blind vote of the ChEGSA constituency will be held.
   iii) The nominee with most of the votes will be elected to the position in the Governing Board.
   iv) In the event of a tie or a vote deemed too close by the moderator, the moderator has the authority to hold a runoff vote between the top two candidates.
7.6 Special Elections
In the event that a ChEGSA governing board position is empty mid-term, any member of the ChEGSA constituency may be nominated by a member of the governing board to fill a vacancy. Upon acceptance of the nomination and a vote of \( \frac{2}{3} \) majority of the ChEGSA governing board during a monthly meeting, the nominee may assume the powers and duties of the position for the remainder of the fiscal year. The governing board may choose to hold a mid-term election to fill the position operating under the procedures of Article 7 if the ChEGSA governing board is not able to nominate another member of the ChEGSA constituency.

Article 8 – The Constitution may be amended by a two-thirds (2/3) majority vote of members of the Governing Board.

2. FINANCIAL POLICIES

2A. FINANCIAL AWARDS

The Department of Chemical Engineering pays tuition and provides a stipend for living expenses to PhD graduate students accepted into its graduate program with the promise of financial aid. Financial aid, if available, is normally offered simultaneously with acceptance to the PhD graduate program. The award of financial aid at any other time is an exception and is handled on a case-by-case basis by appeal to the Department Head. Students are normally guaranteed continued support subject to their having an Advisor, meeting the deadlines and requirements outlined in section 3, and not exceeding the Statute of Limitations on Funding described in section 2C.

2B. PAYMENT OF TUITION

The university deducts tuition automatically from each student’s pay. See the department’s business manager (at present Toni McIl trot in DH 1105) if you have any questions concerning payroll or tuition deductions.

Students are responsible for obtaining and paying their health insurance and for paying all other fees. Please see the CMU HUB website for more information concerning health insurance and fee payment options: [http://www.cmu.edu/hub/billing/departmental.html](http://www.cmu.edu/hub/billing/departmental.html)
2C. STATUTE OF LIMITATIONS FOR FINANCIAL SUPPORT

A student entering the PhD program in the Department of Chemical Engineering with a BS degree is called "Direct Entry." A student entering the program with a MS degree is called "Advanced Entry." A Direct Entry student is supported up to fourteen semesters of full-time residence and Advanced Entry students are supported up to twelve semesters of full-time residence.

Continuation of support in all cases depends on satisfactory progress by the student in coursework (as discussed in section 3C.6) and research. If the Statute of Limitations for Support expires, the student must justify to his/her research advisor and department head why additional funds should be provided. This justification must take the form of a written petition. The advisor must provide a written recommendation to the department head regarding action on the student's petition. If approved, funding will be provided on a month-to-month basis. See also the discussion in section 3A.3.

3. ACADEMIC REQUIREMENTS

The Department of Chemical Engineering offers three basic graduate degrees: the Doctor of Philosophy (PhD), the Master of Science in Chemical Engineering (MS), and the Master of Chemical Engineering (MChE). The PhD degree requires original research and a thesis.

3A. REGISTRATION REQUIREMENTS

3A.1 REGISTERING FOR THE FIRST SEMESTER

All incoming PhD students (Direct Entry or Advanced Entry) must take four courses of nine units or more in their first semester. PhD students must register for the graduate seminar 06-800 (taken every semester), and the safety course. Students asked to be a TA must also register for 06-799A. Thus Direct Entry students should register for a minimum of 46 units in the first semester (includes at least one core chemical engineering course) and a maximum of 53 units. This normal load comprises four courses, the safety course, graduate seminar, and TA duty (if selected). Advanced Entry students should register for a minimum of 40 units including 4 courses of at least nine units, graduate seminar, the safety course, and the TA course if necessary.

3A.2 REGISTERING AFTER THE FIRST YEAR (WITH FINANCIAL SUPPORT)

The recommended course load for the second semester is three courses for Direct Entry students. Advanced Entry students should develop a second-semester course schedule in consultation with their thesis advisor(s).
All PhD students must carry 48 units of credit in every semester after the first semester including coursework, graduate seminar, the TA course (when applicable) and research units. In every semester other than the first semester, therefore, the number of research units must equal 48 units minus the sum of coursework, seminar, and TA units.

3A.3 REGISTERING AFTER TERMINATION OF FINANCIAL SUPPORT & ABD STATUS

The faculty of the Chemical Engineering Department strongly encourages each student to finish his/her degree within the limits of time for financial support. Most often this is the case. When the student does not complete the degree requirements in the allotted time and no further support through the Department is forthcoming (see section 2C), the following rules apply. (This is a summary of the University and CIT policy on the status of PhD students. Interested students and faculty should consult the University and CIT guidelines for detailed descriptions.) First some definitions:

ABD

All But Dissertation ["ABD"] status. When a doctoral student has finished all degree requirements but the thesis defense and submission of a properly signed dissertation, the student is ABD until the two remaining requirements have been satisfied. According to the University policy promulgated on June 1, 2011, the University recognizes two types of ABD students: Students In Residence and In Absentia. Most doctoral students of the ChemE department, i.e. students who the department is supporting and who are on track to complete the remaining requirements on time, do not need to pay attention to these policies because ABD is purely a clerical matter. Any doctoral student who is self-supported and/or not on track to finish in the normal amount of time (either 4 years and 9 months for Direct Entry or 4 years for Advanced Entry) should study the ABD policies of the University, the College, and the ChemE Department and should discuss their case with the Graduate Advisor, currently Prof. Sides. Please see the following summary.
**ABD "IN RESIDENCE"**

According to the University: "A doctoral student In Residence maintains student status and all consequent student privileges and continues to be actively engaged with the university." This category is for students who make substantial use of university resources. According to the CIT policy, typically, substantial use shall include: office space other than desk space, if available; all but minimal use of laboratory space or university-furnished laboratory equipment and expendables; and all use of computer resources that is not specifically exempted for thesis text preparation. "In Residence" is the normal status for students who are ABD.

---

**ABS (ALSO KNOWN AS IN ABSENTIA)**

A student who is ABD, and who does not require substantial use of university resources, does not have to register and pay tuition until he/she reaches the semester of expected graduation. This situation is called "in absentia." According to CIT policy in absentia candidates shall be permitted use of the libraries or consultation with faculty or students (in particular, with a thesis advisor or members of the thesis committees). The university will provide in absentia candidates with identification for access to the library and other services permitted under the guidelines.

---

**IMPLICATIONS OF ABD & ABS STATUS**

CIT recognizes the ABD "In Residence" and "In Abstentia" categories. The following is a short interpretation of the implications of the above categories for students of the Department of Chemical Engineering.

1. Full-time PhD candidates, including ABD candidates, must register for a minimum of 36 units per semester if they are using university facilities as described above.

2. If all requirements except the thesis have been fulfilled, and if the student was admitted with a normal commitment of support from the Department, and if the student is currently self-supported (e.g. is beyond the statute of limitations for financial support), the student may declare him/herself to be ABS; however, these students cannot receive a stipend and cannot make substantial use of University facilities. Also, the university will not certify a student who is ABS for immigration purposes. The ABS student must register for a minimum of 5 units in the semester of graduation.

3. It sometimes happens that a PhD student is beyond the limits of financial support and needs to do a few experiments to complete the dissertation. In this case the student must write a letter of petition to the Dean of CIT through the Associate Dean for ABD with in residence status. This gives the right to register for only 5 units and work in a laboratory. This petition is carefully reviewed along with input from the Advisor at which time all current policies and rules will be
applied. If allowed, it will be granted for at most two semesters where the summer is counted as a semester.

4. Although rarely occurring, doctoral students sometimes pay for tuition out of pocket or by company benefit programs without channeling the support through the University. The doctoral student in this case must pay full tuition for the normal time to degree (4 years or 4 years plus two semesters). In the case of demonstrated financial hardship (see the CIT policy statement), however, the doctoral student can petition for ABD in residence status with ABS unit registration requirements (5 per semester for up to two semesters) after 3 years of full time enrollment.
3B. ADVISORS

Professor Paul Sides is the academic advisor of all PhD students. After the first semester, PhD students have Thesis Advisors as their primary advisors, but Professor Sides can provide advice to PhD students concerning satisfaction of technical requirements and any other non-thesis issues that arise, in any semester.

Each PhD student must have one or more official Thesis or Project Advisor(s) to graduate. The Advisor/Student relationship is a cornerstone of graduate education. The Department of Chemical Engineering is committed to making the best possible Advisor/Student match, to establish standards and timetables for equitable treatment of students, and to serve as an objective point of reference for both the student and the advisor when called upon to resolve disputes. Students or advisors can and should bring disputes to the attention of the Department Head in person when either party feels that reference to a third party is necessary. (See sections 3.C.6 and 3.D) Such notice will begin the process of resolution of the dispute. See also the CIT Grievance policy for additional information.

3B.1 ADVISOR SELECTION

The Advisor selection process accounts for student preferences, for faculty availability and for funding, and for other general department requirements. During the first semester in residence, each new graduate student must attend the presentation of each faculty member on the list provided by the department head to discuss research projects underway or planned. New students must attend the ChEGSA Symposium to learn about related projects directed by the prospective advisors.

PhD students: After attending the presentations of all advisors and after follow-up meetings with favored advisors, the student must indicate three choices for a thesis advisor, in order of preference. In addition, the student must submit a 100-400-word essay on his/her research and career interests and the reason(s) supporting his/her advisor choices. The student preferences are required to be in the department office by a particular date in the first semester. An announcement is made each year as to the exact date. The Department Head manages advisor assignment and attempts to assign all PhD students on or about the first of December of each academic year. The Department Head gathers the documents submitted by the students, compares them to a list of open projects submitted by faculty, factors in departmental requirements such as the funding status of projects and the necessity that new faculty need students, and makes the match. Most students are granted their first or second choice. Occasionally, constraints of student numbers or finances require a student to work on the topic listed as third choice. In exceptional circumstances, the Department Head will meet with those students who cannot be assigned any of their choices.
3B.2 ROLE OF THE ADVISOR

The role of the Advisor is complex and can vary from student to student, but at least three characteristics can be identified: mentor, evaluator, and colleague. The Advisor is responsible for helping the student define a project, for evaluating the student's progress, and for jointly working with the student toward a successful outcome.

The Advisor continually determines whether or not the student is making satisfactory progress, as mentioned in section 3C.6.

3B.3 ROLE OF THE STUDENT

The Student, under the guidance of the Advisor, should make original scholarly contributions in his/her area of research and disseminate his/her findings through journal publications and meeting presentations. Since the Student must demonstrate the ability to perform at the highest intellectual level by both national and international standards, he/she should have one or more articles at least past the reviewed/accepted stage of publication and should have made at least one conference presentation at the time of the defense.

3C. MAJOR PROGRAM REQUIREMENTS AND RULES OF TIMING

1. Students must complete coursework as outlined in section 3E. An average of B or better must be maintained.

2. Students in the PhD program must complete their TA assignments as described in section 3G.

3. Students in the PhD program must take the Qualifying Exam within 12 months of admission to the graduate program at CMU. In unusual cases such as mid-year starts or illness, the Student and Advisor may petition the Graduate Advisor and Department Head for delay. (See section 3I for a description of the exam.)

4. Direct Entry Students and students completing a MS at CMU who wish to enter the PhD program must pass the PhD Proposal by the last day of the seventh semester in residence (summer counts as one semester). Advanced Entry students must pass the PhD Proposal by the last day of the sixth semester. If the semester in question is a summer semester, then the student must pass the proposal before the first day of classes in the fall semester. A reminder of the proposal deadline will be sent to each student the semester before the deadline. Failure to meet this deadline will result in suspension of stipend until a proposal is accepted; tuition support will also be suspended after one additional semester. The PhD Proposal is described in section 3J. Careful reading of section 3J will make clear that the Student should not postpone this step until near the deadline; it is
highly recommended that the student schedule his/her PhD Proposal in the first half of the semester by the end of which it must be completed.

5. Admission to candidacy for the PhD degree, which commences with successful completion of the Qualifying Exam, is for a period of no longer than six calendar years. If, at the end of this six-year period, the PhD has not been awarded, the student may petition for extension of the six-year limit under extenuating circumstances such as a forced change of advisor, military service or prolonged illness.

6. In general, all students are subject to continual review of their progress by their Advisor who is responsible for determining whether each student's progress is satisfactory or not. If the Advisor determines at any time that the student is not making satisfactory progress and believes that the situation might lead to disassociation with the Student, the Advisor must provide written notification of such a determination to the Student and to the Department Head at the earliest appropriate moment. The letter should include:

- A statement of the shortcomings that led to a determination of unsatisfactory progress.

- Specification of what changes must occur to resume satisfactory progress.

- A time period (minimum one month) during which the student will be regarded as being on probation.

If the Advisor still regards the progress as unsatisfactory after the end of probation, the provisions for Change of Advisor or Dismissal (section 3D) are activated.

7. The minimum residency of a student on campus is one year.

3D. CHANGE OF ADVISOR OR DISMISSAL

It is the responsibility of both Advisor and Student to seek accommodations of differences in good faith. Under extremely negative circumstances, either the Student or the Advisor may petition the Department Head to oversee the resolution of the problem. If none can be achieved, the Department Head will ordinarily direct the student to discussions with potential new advisors to see if a better match can be made. The student may seek a new Advisor, but the Department of Chemical Engineering is not obligated to find a new Advisor for the student. If a new match is found, the Student might be requested to document work already performed before making the switch; the timing and circumstances of the switch will be made on a case-by-case basis. If no new match is found, the Department Head will advise the student of his/her dismissal from the graduate program as of a specified date. These cases are rare.

Any student who feels unfairly treated may consult the CIT Grievance policy for further appeal.
Some introductory notes about courses …

- A student must receive a letter grade in a course to count that course toward meeting the numerical unit requirements for any degree. Courses issuing Pass/Fail grades will not count toward degree requirements.

- In the forthcoming sections about degree requirements, the basic rule is that the student must maintain a B average with some additional requirements concerning performance in graduate courses. Note that the B average applies to courses that the student intends to use, or must use, for satisfying degree requirements. Transcripts show all courses and grades and might not reflect perfectly whether the student is satisfying the QPA requirement in the courses required for the degree. A student can check with the department’s staff member responsible for student records (at present Cindy Vicker) if there is any doubt about progress toward satisfying degree requirements and QPA requirements.

- If a course is repeated, the higher grade is used in the calculation of the QPA in order to determine whether the student has satisfied degree requirements.

- The College of Engineering now requires that student transcripts report withdrawals from courses after the withdrawal deadline. A student’s transcript will record a W for any course where the student withdraws from the course after the official deadline to drop.

**DEFINITIONS**

**Graduate:** Any course having a designation 06-Nxx, where N ≥ 6 except for the TA course 06-799A and graduate seminar 06-800. These courses are not graded and therefore cannot be counted toward the unit requirement.

**PhD Core:** The department has designated six of our Graduate courses as "PhD Core graduate courses;" these are Thermodynamics (06-705), Kinetics (06-702), Fluid Mechanics (06-703), Heat and Mass Transfer (06-704), Mathematical Techniques in Chemical Engineering (06-713), and Advanced Process Systems Engineering (06-720). **Note:** PhD Core graduate courses can be substituted for non-Core Graduate courses but not vice versa. (Students entering with a M.S., however, can count a maximum of two Core Graduate courses toward the Ph.D., which is the only exception to this rule.)

**Outside Technical:** A technical course having substantial engineering or scientific content offered by a different department and having a course number of the form xx-Mxx, where M ≥ 2. A list of
courses that Chemical Engineering students have taken and that includes courses pre-approved for this category appears in Table 1 at the end of this section. If a student wants to count a course that does not appear on this list as a technical elective, and if there is any doubt about its suitability, please check with the Graduate Advisor, who is solely responsible for this matter.

Safety: Our department is committed to safety awareness. As of the Fall 2006 semester, we require that all graduate students take the Chemical Engineering safety course, 06-608.

### COURSE AND QPA REQUIREMENTS FOR THE PHD DEGREE

**Direct Entry** students (see section 2C for definition) must take a minimum of 96 units of course work as part of the 144 total units required for the Ph.D.

- 4 Core Graduate
- 2 Graduate (at least 9 units each)
- 1 Outside Technical (at least 9 units)
- 1 Graduate or Outside Technical (at least 9 units)
- 1 Safety (06-608)

- This distribution of units might not fulfill the minimum 96 units of course work. Students should consult with their advisor to decide on the best way to fulfill the 96-unit requirement.

- The student must maintain an overall “B” average, with no grade lower than “C,” and receive no more than one unbalanced “C” among the core courses.

- Graduate seminar and TA course credit cannot be counted toward course unit requirements.

- The PhD student must enroll for PhD research units (06-900) in any semester in which the course units do not total more than 48. Register for sufficient units to bring the total to 48 in this case. Research units do not count toward the 96-unit requirement for coursework.

- A student must receive a letter grade in a course to count that course toward meeting the numerical unit requirements for any degree. Courses issuing Pass/Fail grades will not count to degree requirements.

**Advanced Entry** students (see section 2C for definition) must take 48 units of course work, with the following minimum distribution:

- 1 Core Graduate
- 1 Graduate (at least 9 units)
- 2 Graduate or Outside Technical (at least 9 units each)
- 1 Safety (06-608)
Note: A maximum of two core graduate courses will be acceptable.

- An overall "B" average (no more than one unbalanced "C" among the core graduate courses) and no grade lower than "C" is required to satisfy the course requirements. "Satisfactory progress" in course work means that the normal full-time course load is carried, and a “B” average or better is maintained each semester.

- Graduate seminar and TA courses cannot be counted toward course unit requirements.

- The PhD student must enroll for PhD research units (06-900) in any semester in which the course units do not total more than 48. Register for sufficient units to bring the total to 48 in this case. Research units do not count toward the 48-unit requirement for coursework.

- A student must receive a letter grade in a course to count that course toward meeting the numerical unit requirements for any degree. Courses issuing Pass/Fail grades will not count to degree requirements.
Table 1. A list of courses outside the Department of Chemical Engineering taken by our students. The third column is the number of students who have taken this course. This is a snapshot as of Spring 2003; the numbers will not be updated. These courses are pre-approved as Outside Technical courses. If you want to take a course and count it as Outside Technical, and it is not on this list, you should clear it with the Graduate Advisor Professor Sides.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-231</td>
<td>Biochemistry I</td>
<td>1</td>
</tr>
<tr>
<td>03-232</td>
<td>Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>03-438</td>
<td>Physcl Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>03-439</td>
<td>Intro to Biophysics</td>
<td>2</td>
</tr>
<tr>
<td>03-442</td>
<td>Mol Bio Eukaryotes</td>
<td>1</td>
</tr>
<tr>
<td>03-534</td>
<td>Fluore Spec Bio Rsch</td>
<td>1</td>
</tr>
<tr>
<td>03-738</td>
<td>Physcl Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>03-240</td>
<td>Cell Biology</td>
<td>1</td>
</tr>
<tr>
<td>03-871</td>
<td>Structural Biophysics</td>
<td>1</td>
</tr>
<tr>
<td>09-344</td>
<td>Physical Chem Quanm</td>
<td>1</td>
</tr>
<tr>
<td>09-518</td>
<td>Bioorganic Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>09-560</td>
<td>Computational Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>09-701</td>
<td>Quantum Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>09-702</td>
<td>Statcl Mech &amp; Dynamic</td>
<td>3</td>
</tr>
<tr>
<td>09-712</td>
<td>Synth Organic Chem</td>
<td>1</td>
</tr>
<tr>
<td>09-723</td>
<td>Proxml Probe Technqs</td>
<td>3</td>
</tr>
<tr>
<td>09-741</td>
<td>Orgnc Chem Polymers</td>
<td>1</td>
</tr>
<tr>
<td>09-742</td>
<td>Poly Phy Chem</td>
<td>2</td>
</tr>
<tr>
<td>09-745</td>
<td>Polymer Rheology</td>
<td>2</td>
</tr>
<tr>
<td>09-746</td>
<td>Linear Viscoelstcty</td>
<td>4</td>
</tr>
<tr>
<td>09-860</td>
<td>Computation Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>12-411</td>
<td>Engineering Economics</td>
<td>1</td>
</tr>
<tr>
<td>12-651</td>
<td>Air Quality Engin</td>
<td>4</td>
</tr>
<tr>
<td>Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>12-704</td>
<td>Pr Est Mthd Eng Sys</td>
<td>1</td>
</tr>
<tr>
<td>12-720</td>
<td>Water Source Chem</td>
<td>1</td>
</tr>
<tr>
<td>12-726</td>
<td>Math Mdl Env Qua Sy</td>
<td>2</td>
</tr>
<tr>
<td>12-732</td>
<td>Air Quality Engin</td>
<td></td>
</tr>
<tr>
<td>12-742</td>
<td>Engr Databases CAE</td>
<td>1</td>
</tr>
<tr>
<td>12-743</td>
<td>Expert Systms In CAE</td>
<td>1</td>
</tr>
<tr>
<td>12-751</td>
<td>Adv Tpcs Air Quality</td>
<td>3</td>
</tr>
<tr>
<td>12-755</td>
<td>Finite Elem Mech I</td>
<td>3</td>
</tr>
<tr>
<td>12-756</td>
<td>Finite Elem Mech II</td>
<td>1</td>
</tr>
<tr>
<td>15-211</td>
<td>Fund Struc CMP Sc I</td>
<td>7</td>
</tr>
<tr>
<td>15-398</td>
<td>Bug Catching</td>
<td>1</td>
</tr>
<tr>
<td>15-491</td>
<td>Cmp Percp &amp; Sene Anl</td>
<td>1</td>
</tr>
<tr>
<td>15-820</td>
<td>Model Chkg Theo Prov</td>
<td>1</td>
</tr>
<tr>
<td>15-849</td>
<td>Performance Modeling</td>
<td>1</td>
</tr>
<tr>
<td>15-859</td>
<td>Hier Methods Simulation</td>
<td></td>
</tr>
<tr>
<td>18-311</td>
<td>Semicond Devices</td>
<td>1</td>
</tr>
<tr>
<td>18-316</td>
<td>In Data Stor Sys Tch</td>
<td>2</td>
</tr>
<tr>
<td>18-483</td>
<td>Civ/Mil Ap of Space</td>
<td>1</td>
</tr>
<tr>
<td>18-716</td>
<td>Adv Appl Magnetism</td>
<td>1</td>
</tr>
<tr>
<td>18-751</td>
<td>Appl Stoch Process</td>
<td>1</td>
</tr>
<tr>
<td>18-771</td>
<td>Linear Systems</td>
<td>1</td>
</tr>
<tr>
<td>18-772</td>
<td>Non Linear Systems</td>
<td></td>
</tr>
<tr>
<td>18-815</td>
<td>Integ Circ Fabr Proc</td>
<td>1</td>
</tr>
<tr>
<td>18-829</td>
<td>Dsgn Microfluide Cir</td>
<td>2</td>
</tr>
<tr>
<td>18-879</td>
<td>Hybrid Dynamic Sys</td>
<td>4</td>
</tr>
<tr>
<td>19-424</td>
<td>Energy &amp; the Envrnmnt</td>
<td>1</td>
</tr>
<tr>
<td>19-630</td>
<td>AT CMY AIR POL GL CH</td>
<td>1</td>
</tr>
<tr>
<td>19-650</td>
<td>Climate &amp; Energy</td>
<td>1</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>19-726</td>
<td>Math Mdl Envrn Sys</td>
<td>2</td>
</tr>
<tr>
<td>19-742</td>
<td>New Tech &amp; Eco Grwth</td>
<td>1</td>
</tr>
<tr>
<td>21-257</td>
<td>Modl Meth Optimization</td>
<td>1</td>
</tr>
<tr>
<td>21-292</td>
<td>Operation Rsch I</td>
<td>2</td>
</tr>
<tr>
<td>21-369</td>
<td>Numerical Methods</td>
<td>2</td>
</tr>
<tr>
<td>21-605</td>
<td>TCHNG Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>21-630</td>
<td>Ord Diff Equations</td>
<td>1</td>
</tr>
<tr>
<td>21-651</td>
<td>General Topology</td>
<td>2</td>
</tr>
<tr>
<td>21-690</td>
<td>Meths of Optimization</td>
<td>9</td>
</tr>
<tr>
<td>21-691</td>
<td>Inter Point Methods</td>
<td></td>
</tr>
<tr>
<td>21-732</td>
<td>Part Diff Equa I</td>
<td>1</td>
</tr>
<tr>
<td>21-762</td>
<td>Finite Elem Methods</td>
<td></td>
</tr>
<tr>
<td>21-765</td>
<td>Parallel &amp; Sci Com</td>
<td></td>
</tr>
<tr>
<td>24-311</td>
<td>Numerical Methods</td>
<td>1</td>
</tr>
<tr>
<td>24-701</td>
<td>Math Tch Mech Eng I</td>
<td>1</td>
</tr>
<tr>
<td>24-718</td>
<td>Computnl Fluid Mech</td>
<td>1</td>
</tr>
<tr>
<td>24-719</td>
<td>Adv TPC Fluid Mech</td>
<td>2</td>
</tr>
<tr>
<td>24-719</td>
<td>CFD: Finite Vol Methd</td>
<td>4</td>
</tr>
<tr>
<td>24-721</td>
<td>Thermodynamics I</td>
<td>1</td>
</tr>
<tr>
<td>27-432</td>
<td>Elec Mag Opt PR Mags</td>
<td>1</td>
</tr>
<tr>
<td>27-511</td>
<td>Intro Biomatrils II</td>
<td>2</td>
</tr>
<tr>
<td>27-530</td>
<td>Adv Phys Metallurgh</td>
<td></td>
</tr>
<tr>
<td>27-533</td>
<td>Prn Grth Proc Semcon</td>
<td>1</td>
</tr>
<tr>
<td>27-542</td>
<td>Str Prop Thin Films</td>
<td>1</td>
</tr>
<tr>
<td>27-764</td>
<td>Nanostructured Materials</td>
<td>1</td>
</tr>
<tr>
<td>27-770</td>
<td>Electron Mag Op Prop</td>
<td>2</td>
</tr>
<tr>
<td>27-776</td>
<td>Foundtn Material Sci</td>
<td>1</td>
</tr>
<tr>
<td>27-794</td>
<td>Electrochem Prc Mtrls</td>
<td>1</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>33-225</td>
<td>Quantm Phy Struc Mat</td>
<td>1</td>
</tr>
<tr>
<td>33-338</td>
<td>Intrm Elec &amp; Mag I</td>
<td>1</td>
</tr>
<tr>
<td>33-448</td>
<td>Intro Solid St Phys</td>
<td>8</td>
</tr>
<tr>
<td>33-453</td>
<td>Intermediate Optics</td>
<td>1</td>
</tr>
<tr>
<td>33-466</td>
<td>Ex Astrophyc Cosmlgy</td>
<td>1</td>
</tr>
<tr>
<td>33-765</td>
<td>Statistical Mechanics</td>
<td></td>
</tr>
<tr>
<td>33-777</td>
<td>Intro Astrophysics</td>
<td>1</td>
</tr>
<tr>
<td>36-220</td>
<td>Engr Stat Qual Ctrl</td>
<td>1</td>
</tr>
<tr>
<td>36-401</td>
<td>Adv Data Analysis I</td>
<td>1</td>
</tr>
<tr>
<td>36-707</td>
<td>Regression Analysis</td>
<td>1</td>
</tr>
<tr>
<td>36-711</td>
<td>Statistic Computing</td>
<td>1</td>
</tr>
<tr>
<td>36-724</td>
<td>Appl Bayesian Mthds</td>
<td>1</td>
</tr>
<tr>
<td>39-405</td>
<td>Eng Des Crea Prd/Prce</td>
<td>7</td>
</tr>
<tr>
<td>39-605</td>
<td>Engineering Dsgn Prj</td>
<td>3</td>
</tr>
<tr>
<td>39-717</td>
<td>Data Storage Systems</td>
<td>1</td>
</tr>
<tr>
<td>39-801</td>
<td>Coll Poly Sur Lab I</td>
<td>6</td>
</tr>
<tr>
<td>39-802</td>
<td>Col Poly Sur Lab II</td>
<td>6</td>
</tr>
<tr>
<td>42-401</td>
<td>BME Design</td>
<td>1</td>
</tr>
<tr>
<td>42-511</td>
<td>Intro Biomaterls II</td>
<td>1</td>
</tr>
<tr>
<td>42-609</td>
<td>Biotechnlgy Env Proc</td>
<td></td>
</tr>
<tr>
<td>42-622</td>
<td>Bioprocess Design</td>
<td>2</td>
</tr>
<tr>
<td>42-704</td>
<td>Biological Transport</td>
<td>3</td>
</tr>
<tr>
<td>42-744</td>
<td>Medical Devices</td>
<td>1</td>
</tr>
<tr>
<td>42-882</td>
<td>Directed Study</td>
<td>1</td>
</tr>
<tr>
<td>45-760</td>
<td>Quant Mthds Mgt Sci</td>
<td>2</td>
</tr>
<tr>
<td>45-761</td>
<td>Operations Research</td>
<td>2</td>
</tr>
</tbody>
</table>
Up to 24 units (two courses) of graduate work completed at other universities, with a grade point average of 3.0 or better, may be transferred from another academic institution provided that such course work is part of the graduate program leading to the degree sought. Such transfer credit is not granted prior to admission to the graduate program and must be approved by the department after the student has satisfactorily completed at least 36 units of graduate courses at Carnegie Mellon. These courses must not have been counted toward any other prior degrees. The Department Head and College of Engineering administration must approve the transfer. Students
should complete a Transfer Credit Request form and provide all required attachments for their request to be considered.

3.G. 06-799 ASSIGNMENTS (TEACHING RESPONSIBILITIES)

TAs provide help and advice to students, and grade homework assignments and projects. In most cases, your responsibilities will not exceed 5 hours per week. You should be available at least 2 hours per week for consultation at the times that the professor of your course will announce to the class.

In order for you to be effective in your duties as a TA, you should be familiar with the material covered in class. You should obtain copies of the class notes and the solutions or problem sets. If you think you do not have enough background in the course, you should audit the course.

The responsibility for serving as a TA is spread among all of our first- and second-year PhD graduate students instead of having some students designated as teaching assistants (TAs) while others have no teaching responsibilities. Besides the fairness of this plan, some teaching experience is beneficial to all students, whether or not they plan an academic career. The requirement of 5 hours per week lasts for three semesters and consists primarily of grading papers and leading recitation sessions. A student may volunteer to assist in teaching after his/her three-semester requirement has been fulfilled. Many students find this aspect of their education enjoyable and satisfying.

The two-unit course, 06-799, is the vehicle for these assignments. Students must register for this course during each semester they are assigned as a TA. The units received for this course are not counted toward PhD degree requirements. Assignments are made by the Department Head and announced at the beginning of each semester.

To re-emphasize, this course is a requirement for graduation and must be taken seriously by all Ph.D. students; it is in no way linked to a student’s source of financial support. Unsatisfactory performance in a TA assignment may require the student to serve an additional semester as a TA.

3.G.1 ITA TEST

The Department of Chemical Engineering requires its international PhD students to comply with campus rules and standards about mastery of English language in order to be effective as a TA. All PhD students, who are non-native speakers of English, must participate in a language Placement Interview given by the Intercultural Communication Center (ICC). Based on the results of the interview, administrators at the ICC will place the student in the appropriate ICC programs and will suggest the most realistic date to try the International Teaching Assistant (ITA) test. Students and departments receive copies of interview results. You are expected to have an interview at the start
of your first semester on campus. Please call the ICC office at 8-4979, or visit them in Warner Hall 308, to schedule an interview at your earliest convenience.

State law of the Commonwealth of Pennsylvania requires ITA test before non-native speakers of English can work as TAs. It is offered three times a year: November, April, August (incoming students only). The ITA test evaluates whether students have sufficient fluency to communicate effectively with students. Chemical Engineering TAs are often required to offer one-on-one help and advice to students, making the ITA test a requirement. The department requires that TAs pass at a minimum, the Restricted II level before the departmental TA requirement is fulfilled.

### 3H. SEMINAR

The graduate seminar (06-800) is required each semester for all students in residence. It provides opportunities to learn about research in various chemical engineering and related fields being conducted at other universities and in industry. **All graduate students must register for this course during each semester of full-time study. Attendance is mandatory.** A failing grade can be given to students who do not attend seminars. Seminar credits do not count toward graduation.

### 3I. PHD QUALIFYING EXAMINATION

#### 3I.1 WHO CAN TAKE THE EXAM?

Only students enrolled in the Chemical Engineering doctoral program and having a research advisor may take the qualifier. Students not officially in the doctoral program may not take the qualifier.

The Ph.D. Qualifying Examination is oral and is usually administered in August. It tests research potential, communication skills, and a general knowledge of chemical engineering. The examination consists of two parts:

1. Each student must provide a written report of research accomplished and projected at CMU. The report consists of three sections: (1) the Title and Abstract, (2) the report Body, and (3) the list of the Literature Cited in the body; no material other than these three sections may be included. Specifications for the report are summarized below:
   
   a. Title and Abstract section – one page total. The Abstract is limited to 300 words.

   b. Body section – no more than ten pages total. This includes all figures and tables. Any material that is not Title, Abstract or Literature Cited is considered part of the Body.
c. Literature Cited section – unlimited in length, but typically one to two pages. Use full citations: list all authors, full title of article, full name of journal and inclusive page numbers.

d. Format

d.1. Use one-inch margins at the top, bottom, left, and right for all three sections. Figures or tables in the Body must also fit within these margins.

d.2. Use 12 point Times New Roman (or close equivalent) font for all text in all sections. Text within figures or tables must be at least 10 point font.

d.3. Use double-spacing for the Title and Abstract and for the Body sections: no more than 23 lines per page (2.56 lines per inch). The Literature Cited section may be single-spaced.

Reports that do not comply with these requirements will not be accepted. The date on which the report is due will be announced well in advance. The student may solicit editorial comments from his/her advisor and the advisor may participate in practice talks.

2. On exam day, according to a schedule published one to two weeks before the exams, each student makes a 20-minute presentation before four members of the faculty. A question period of 30 to 60 minutes follows the formal presentation. The same four members of the faculty will administer and score the examination for all students, except when a student’s research advisor is also serving on the examining panel. In this case, a fifth (alternate) member of the examining panel will replace the student’s research advisor. The student’s research advisor may participate in rehearsals of the presentation and may sit in on the actual exam as a silent observer to provide feedback to the student on his/her performance.

3. The following criteria will be considered in arriving at each student's score:

- Definition of the research problem
- Knowledge of fundamental principles involved
- Knowledge of the appropriate literature
- Approach to solution and quality of preliminary results
- Ability to critically evaluate preliminary results and define direction of future work
- Quality of the written and oral presentations
Sample ChE Ph.D. Qualifying Examination Scoring Rubric

(Used in 2010 Qualifying Exam, not necessarily used each year, but it gives more detail on criteria)

Student: __________________________________________________________

Faculty Examiner: __________________________________________________________

Semester: Fall 2010, First Round

1. Student can express him/herself well in written form (as demonstrated by written report)
   1.1. rating
      1.1.1. Excellent – well-organized and written, could be directly incorporated into a manuscript or proposal
      1.1.2. Clear Pass – clearly written and understandable; could be used externally with editing help
      1.1.3. Minimal Pass – parts unclear or not well-organized, but understandable overall; needs heavy editing
      1.1.4. Must Improve – document did not prepare reader well for oral presentation
      1.1.5. Clear Fail – concepts and organization incoherent, needs remedial writing help

   1.2. comments

2. Student can express him/herself well in oral form (as demonstrated by oral presentation)
   2.1. rating
      2.1.1. Excellent – polished performance suitable in content and style for conference presentation
      2.1.2. Clear Pass – good performance with solid content and style
      2.1.3. Minimal Pass – minimal performance, but essential content was coherent
      2.1.4. Must Improve – missing some essential content, portions of presentation unclear
      2.1.5. Clear Fail – incoherent, missing significant content, poor use of allotted time

   2.2. comments

3. Student is poised under pressure (as demonstrated by student’s management of Q&A session)
   3.1. rating
      3.1.1. Excellent – able to engage examiners in discussion, had comfortable/confident demeanor
      3.1.2. Clear pass – sustained discussions; occasionally hesitant, but very responsive to prompting
      3.1.3. Minimal pass – while sometimes stuck, student able to dialog with questioners
      3.1.4. Must Improve – student frequently immobilized, prompting frequently unsuccessful
      3.1.5. Clear Fail – student unable to mount responses and unable to be prompted
3.2. comments

4. Student clearly understands project and the relevant science & engineering background knowledge

4.1. rating

4.1.1. Excellent – facile with aims, motivation, approach; strong “elevator pitch”; makes own connections freely and explicitly to background knowledge

4.1.2. Clear Pass – clear grasp of project aims, motivation and approach beyond surface level; good awareness of and comfort level with background knowledge

4.1.3. Minimal Pass – can describe aims, motivation and approach at surface level; able, with prompting, to connect with background knowledge

4.1.4. Must Improve – uncertain/unclear about one or more of aims, motivation, approach; missing key elements of relevant background knowledge

4.1.5. Clear Fail – unable to explain logic behind aims, motivation, approach; unable to see relevance of, or apply basic background knowledge

4.2. comments

5. Student can set project in the context of what has been done by others

5.1. rating

5.1.1. Excellent – deep knowledge of prior work, can explain nuances between own work and competitors

5.1.2. Clear Pass – can differentiate own effort and directions from prior work and competing groups

5.1.3. Minimal Pass – can describe prior work, competitors’ efforts; can make some connections to own work

5.1.4. Must Improve – some surface awareness of prior work and competing groups but unsure of how own work fits in

5.1.4.1. Clear Fail – no connection with prior work, unaware of competing groups, working in a vacuum

5.2. comments

6. Student is productive

6.1. rating

6.1.1. Excellent – output is of high quality and roughly equivalent to publication; exceptional productivity

6.1.2. Clear Pass – solid body of work, making fine progress and on a good trajectory; normal productivity

6.1.3. Minimal Pass – making forward progress; basic productivity that should be stepped up

6.1.4. Must Improve – pace not up to expectations of first year student

6.1.5. Clear Fail – minimal effort or commitment evident; serious concerns about ability to make progress
6.2. Comments

7. Student understands tools used, results expected and obtained, and can draw deeper conclusions

7.1. rating

7.1.1. Excellent – expertise with tools demonstrated, facile with expectations and in explaining any discrepancies, consistently volunteers deep analysis of work

7.1.2. Clear Pass – good grasp of tools used, expectations and explanation of discrepancies, can sustain deeper analysis with occasional prompting

7.1.3. Minimal Pass – can explain at surface level tools used, expectations and discrepancies, can analyze results with prompting

7.1.4. Must Improve – unsure of how tools used function, unconfident in what to expect, unsure of discrepancies, unable to sustain an analysis of results even with frequent prompting

7.1.5. Clear Fail – tools treated as “black boxes”, no expectations, no assessment of discrepancies, understanding of work limited to surface level, unaware of any deeper implications

7.2. comments

8. Student can see the path forward

8.1. rating

8.1.1. Excellent – can lay out clear plan to move forward, spontaneous in addressing path forward

8.1.2. Clear Pass – has a viable ideas for moving forward, will have good proposal within a year

8.1.3. Minimal Pass – has some ideas of what to do next, significant coaching necessary for good proposal

8.1.4. Must Improve – has little idea what to do next, operating in technician mode without thinking for own self

8.1.5. Clear Fail – has no idea what to do next, unlikely to be successful even in technician mode

8.2. comments

Overall Impression: This is the individual examiner’s score for the exam. The examiner’s question ratings above are not averaged, rather they are used by the examiner to form their opinion of the student’s overall performance in the categories below. The final score for the exam will comprise the distribution of scores from each of the four examiners.

exam score

High Pass – excellent performance, exceptionally strong in all respects, excellent proposal within one year anticipated, already performing at level of a senior graduate student

Pass – reasonable to solid performance, successful proposal within one year anticipated, performing at level typical for a junior graduate student

High Retake – student capable of passing with better performance, retake would be helpful to polish skills and bring out best in student, shows promise of successful proposal within one year
**Retake** – student capable of passing with much better performance, retake is necessary to definitively demonstrate mastery of key skills, shows promise of successful proposal within one year

**Fail** – below the bar; concern that student will be able to be successful as a PhD student; path forward to proposal unclear; dramatic improvement necessary to pass if student were to retake

**Low Fail** – well below the bar; serious concern that student will be able to be successful as a PhD student; very unlikely to pass if student were to retake

### 3.1.2 SCORING THE EXAM

The faculty as a whole will meet as soon as possible after the exam and assign each student one of three grades: **Pass, Retake, or Fail**.

- **Pass**

Students who pass the examination immediately become candidates for the PhD degree and must next prepare for the PhD Proposal. (See PhD Proposal, section 3J). The PhD Proposal must be presented and successfully defended within four semesters after passing the Qualifying Exam for Direct Entry students. Advanced Entry students must defend a proposal within three semesters after passing the Qualifying Exam.

- **Retake**

Students assigned a grade of "Retake" should understand that their performance on this exam must improve before they move on to preparing for the PhD Proposal. These students must retake the qualifying exam at a time to be determined by the examining faculty. The student should consult with his/her advisor about areas that need attention. The status of the student and the stipend remain unchanged. A maximum of one retake is allowed

- **Fail**

The student who fails the qualifier cannot complete a PhD in Chemical Engineering at CMU. The timing and terms of departure from the graduate program can vary from case to case depending on the interests of the student and the Thesis Advisor and on the availability of resources. The student should meet with the Thesis Advisor at the earliest possible time. The Thesis Advisor and the Graduate Advisor will make recommendations to the Head, who will make final decisions on all cases.
3J. PREPARING FOR THE PHD PROPOSAL

3J.1  PREPARING FOR THE PHD PROPOSAL

After the Qualifying Exam, the next major requirement for the Ph.D. degree is acceptance by a Thesis Committee of a proposal for PhD research. (See Sec. 3K.1 for discussion of the Thesis Committee.) The student should regard the PhD Proposal as both an examination of his/her fitness to do doctoral research on the chosen topic and an opportunity to get early input from the thesis committee into the proposed investigation. The knowledge necessary for the research, a clear conception of the scope of the work, and familiarity with the methods to be used are the prerequisites for the Proposal. These factors are more important than specific data taken or codes written.

The PhD Proposal consists of a written document describing the proposed research and an oral presentation of the proposed research.

- The Written Proposal

The written proposal should include a summary of previous experimental and theoretical work relevant to the proposed research. The student is expected to have a detailed understanding of all the material reported in the written proposal. This specifically includes knowledge of definitions and terminology; the ability to derive equations with an appreciation for the assumptions involved and the limitations thereof; and the ability to describe qualitatively pertinent phenomena.

The written proposal should define the thesis problem and include an outline for a plan of attack on the thesis problem, which the student should be prepared to defend. While the outcome of an investigation may be impossible to predict, the student should be aware of the possibilities and contingencies, and include the necessary research alternatives in his/her proposal. An organizational table outlining the time to be allotted to various facets of the problem should be included.

The student should answer the question, "If my research succeeds, what original research contributions will I have made?"

Twenty-five pages is the upper limit for the proposal document including the body, references, appendices, figures and tables. The document must be typed in 12-point font with no less than one-inch margins and no more than four lines per inch.

It is expected that the detailed preparation for both the written proposal and the oral presentation will result from extensive discussions between student and research supervisor, with the final responsibility resting on the student.
• The Oral Presentation

At the presentation, the committee will evaluate the student's knowledge in the area of the thesis topic and the potential contributions, as described in the written research proposal. The student and his/her advisor should establish a date and time. The student should then reserve the Conference Room and any audio-visual equipment through Janet Latini. He/she should also contact Cindy Vicker at least two weeks prior to the presentation to inform her of the date and time of the proposal, the thesis title, and the names of the committee members. Cindy will then prepare a computer card for the required signatures. After the computer card is signed on the day of the proposal, the student should return it to Cindy.

3J.2 RESULTS OF THE PHD PROPOSAL

- **Passing:** If the thesis committee finds that the student passes the exam, the committee will check "Pass" on the PhD Proposal certification card and the student continues in the PhD program toward the objective of defending and filing a completed thesis. If the student is beyond the deadline for passing the PhD Proposal and funding has been discontinued, then support will be restored at this time.

- **Not Passing:** As the ultimate evaluator of the student's fitness to continue on a particular project, the PhD Thesis Committee may not pass a student at the proposal if it perceives low probability for scholarly contributions in the proposed area. The following rules govern this decision:

  1. If the thesis committee recommends a new exam, the committee should not check anything (i.e. *neither Pass nor Fail*) on the certification card. If the student is not beyond the time allowed for successful completion of the PhD Proposal, then funding can be continued at the normal level (subject to approval by the Thesis Advisor) until the deadline for successful completion of the proposal. If the student is beyond the Proposal deadline, the rules of section 3C item #4 with regard to tuition and stipend apply until the PhD Proposal is completed successfully.

  2. If the Thesis Committee recommends termination, the Thesis Committee should check **Fail** on the certification card. Tuition support will be discontinued at the earliest possible time; stipend will be stopped immediately. The Student and the Thesis Advisor, in consultation with the Graduate Advisor, should discuss the final outcome of the Student's residency at CMU and make a recommendation to the Department Head who will make a final decision.

A Student who feels unfairly treated should consult the CIT Grievance policy.
The PhD Thesis is the capstone of the graduate research experience and is a requirement for the PhD degree. The final step to graduation is acceptance of a thesis by a Thesis Committee. Since it is an official record of work and achievements, there are special guidelines for its preparation. These issues are described below.

3K.1 THESIS COMMITTEE

Just as every PhD student must have an Advisor, every student must have a Thesis Committee to hear the PhD Proposal and to approve the thesis. When a student is ready to present the Proposal, he/she consults with the Advisor and together they identify suitable members of the PhD committee. The student contacts the prospective members and obtains their assent to serve on the student's Thesis Committee. The PhD thesis committee consists of:

- A minimum of three faculty members from the Chemical Engineering department (including the Advisor). Each student must have two chemical engineering faculty members on his/her committee who are not advisors. Thus, if a student is co-advised by two chemical engineering faculty, there must be four chemical engineering faculty committee members.

- A minimum of one member of the CMU faculty from a department other than Chemical Engineering. Each student must have one non-chemical engineering faculty member who is not an advisor on his/her committee. Thus, if a student is co-advised by one non-chemical engineering faculty member, there must be two non-chemical engineering committee members.

- A maximum of one voting member from outside the University. The member from outside the University must hold a doctor’s degree or equivalent. Otherwise, the person is a Visitor. There is no restriction or dependence of the composition of the committee on whether the member from outside the University is a co-advisor.

- If it happens that a student's advisor or committee member has left Carnegie Mellon before the defense and has no continuing appointment in the department, the student must identify a thesis committee that satisfies the above requirements.

This committee will evaluate the PhD Proposal (Sec. 3J), offer suggestions concerning the scope and techniques used in the research, and evaluate the PhD dissertation after hearing a public defense of the thesis (Sec. 3K.3) by the candidate.
3K.2 WRITING THE THESIS

Preparation of the thesis is a separate topic and is described in major section 4.

3K.3 PRESENTATION OF FINAL PUBLIC ORAL DEFENSE

The Defense: The public oral defense of the thesis is the opportunity for the Student to highlight his/her accomplishments in a short opening presentation and to answer detailed questions from the thesis committee members and the public. The student must show by argument and fact that the accomplishments are both original and meet national, as well as international, standards of excellence. Evidence of publication and professional performance, as mentioned in section 3.B.3, will strengthen the case. Each member of the Thesis Committee must sign the card certifying that the student passed the thesis defense and must sign the thesis before the Department and the University will confer the doctor's degree.

Logistics: The student and his/her advisor should set up a date and time. The College of Engineering has rules about timing of the defense with respect to participating in Commencement. If you foresee your defense occurring after March 31st in any year, you should consult the college's website to stay within the timeframe. The student should then reserve the Conference Room and any audio-visual equipment through Janet. The student must also contact the staff member responsible for student progress (at present Cindy Vicker) at least two weeks before the scheduled date and pass on the date and time of the defense, the title of the dissertation and the names of the committee members. She will distribute a public notice to the campus community and prepare a computer card for the signatures of the committee members. After the card is signed on the day of the defense, the student should return it to Cindy. Any other materials necessary for the proposal or the defense, such as transparencies, should be coordinated beforehand with the Department’s receptionist (at present Janet Latini).

3L. CHECKOUT PROCEDURE

There is a packet of information regarding checkout procedures and thesis information that each student must obtain from Cindy before the final defense. One of the most important forms is the lab safety checkout. The aim of the checkout is to make sure that waste has been disposed and chemicals are properly labeled and stored. See Section 7 and the Department of Chemical Engineering Safety Policy manual for the safety form and details.
3M. SWITCHING AMONG MS, PHD AND MCHE PROGRAMS

3M.1 CHANGING FROM PHD TO MS:

If a student initially accepts admission into the Direct Entry PhD program and then decides to finish with a MS degree, the student can switch to the MS program at any time. The Student must send a letter requesting this change to the Graduate Advisor (Paul Sides) with a copy to the Advisor. Continuation of financial aid for pursuit of the MS degree is not guaranteed. The Department Head, in consultation with the Advisor, will make the decision on any request for continuation of tuition support and stipend.

3M.2 SWITCHING FROM PHD OR MS TO MCHE:

A student who has received full tuition support or stipend (or both) from the Department must complete a thesis to receive any chemical engineering degree. Thus a student who has received such support toward either the MS or PhD degree cannot receive the MChE degree except on approval of the Department Head.

3N. CHANGING ACADEMIC REQUIREMENTS AND POLICIES

In the relentless pursuit of excellence, the Department changes its requirements from time to time. The Chemical Engineering Department uses a "grandfather" policy with regard to these changes; that is, every student has the right to graduate under the policies in effect at the time of entry into the graduate program or to graduate under the policy in force at the time of receiving the degree.

4. PREPARATION OF THE THESIS

4A. FORMAT

Each thesis should be double-spaced on 8½" x 11" bond paper. A margin of 1" should be maintained on three sides, with a 2" left side margin (to allow for binding).

Specific details of presentation should be consistent with those recommended by the American Chemical Society (ACS) in The ACS Style Guide: A Manual for Authors and Editors (Section III). The Guide is available from the department. It contains complete guidelines for tables, figures, references, etc.


In particular, note the rules about the Acknowledgments section which, at minimum, requires the source(s) of support for the work even if it is self-support. For doctoral dissertations, the doctoral
committee must also be listed in the Acknowledgments, and the chair of the committee should be identified. The doctoral committee should not be listed on the title page.

### 4B. COPIES

Copies of the original thesis are required on 100% cotton or non-acidic paper. The copies required are listed below:

- 1 – per advisor
- 1 - department
- 1 - library
- 1 - student

If photographs are used in the thesis, each copy must contain original photographs, not xerographic reproductions.

Students who have been supported by a fellowship or research grant should acknowledge the support and should check with their advisor to see if a copy for the sponsor would be in order. Students with two advisors should have five copies made.

### 4C. COST

Financial responsibility for typing the manuscript and providing the required number of copies rests entirely with the student. Students should NOT use the department copy machine to produce the thesis copies.

### 4D. BINDING

The department sends out the looseleaf PhD Thesis for binding once processing is completed. The department pays for binding only those copies required by the department (Sec. 4B). Additional copies of a PhD can be sent out for binding at the student’s expense.

### 4E. PROCESSING

All required copies of the thesis must be turned in by the deadline date (see Sec. 4F) to Cindy. Upon receipt of the theses, title pages will be prepared and circulated by the department for signatures. When completed, the title pages will be inserted into the theses and the copies will be distributed appropriately or sent out for binding.
4F. **DEADLINE**

August and December graduate theses are due in the Dean’s office by the date that grades are due for that semester and no more than two weeks after the oral defense. May graduate theses are due in the Dean’s office not less than ten days before commencement. If all of the paperwork is not turned in on time, the student must register for the following semester. All students must be registered for at least five units the semester of graduation.

5. **GRADUATE STUDENT AWARDS**

The Chemical Engineering Department has established the following graduate student awards to recognize research achievement and graduate student service in education.

5A. **KEN MEYER AWARD**

The Ken Meyer Award was established in 2005 in his memory by the Department of Chemical Engineering and by his family and many friends. Ken was a remarkable member of the department of Chemical Engineering for 28 years. He held Bachelors degrees in Physics and in Philosophy and a Masters degree in Physics from Carnegie Mellon. Ken joined the Department of Chemical Engineering in 1977 and served the department as instrument designer and maker. He made instrumentation used in research and teaching laboratories in the department, throughout the university, and across the country. In 1996 Ken was given Carnegie Mellon’s Andy Award for Customer Satisfaction. Ken was a great friend to his colleagues and customers and earned everyone’s respect through his commitment not just to excellence but to perfection.

The Ken Meyer Award is presented every year to a senior doctoral student who has demonstrated excellence in graduate research in chemical engineering. The faculty base their selection of the student on research quality, productivity, recognition, and impact.

5B. **MARK DENIS KARL TEACHING ASSISTANT AWARD**

Mark Denis Karl, a former graduate student, was an outstanding Teaching Assistant whose commitment to education is commemorated by the TA award. Each year the Mark Denis Karl award is given to a student judged by the faculty to have done an outstanding job as a teaching assistant.
6. FACILITIES & SERVICES

6A. HOURS

The Department office in Doherty Hall 1107 is open 8:30-12:00, 1:00-5:00, Monday through Friday.

6B. EQUIPMENT

The office has two Gestetner copiers, a paper cutter, staplers and a paper punch available for your use. No equipment is available outside the regular office hours. However, keys to the copy room may be signed out with Janet for overnight or weekend use of the copy machine.

6C. SUPPLIES

Office supplies are not provided for your use, but the Bookstore carries a wide selection and is conveniently located in the University Center.

6D. ADMINISTRATIVE ASSISTANTS

No administrative services are provided for graduate students.

6E. EMERGENCIES

The University Security Office is equipped to deal with all emergencies or to obtain the aid needed. It is open 24 hours a day. Call 8-2323.

6F. YOUR OFFICE

Desks are available to all full-time PhD graduate students in the Department. If the student is involved in experimental research, the desk will often be located in the assigned lab space. If the student is involved in theoretical research, the desk will generally be in an office. Julie Tilton makes the room assignment for the first semester. The student’s research advisor coordinates the room assignment with Julie after that time.

Students who are assigned to one of the cubicle areas should note that nothing is permitted to be attached to any laminate or vinyl surface. There are rubber tack boards at each desktop that can be used to attach notes, photos, etc.

Each cubicle has a locking file cabinet and you will be issued a key. You must turn in this key when you leave the space. If not, you will be responsible for the cost of a replacement key.
Please remember that many different students will eventually use your cubicle so take special care to keep it looking clean and undamaged. And because there are a large number of students in each office, please be considerate of your neighbors by talking quietly and keeping walkways clear and clutter free.

6G. KEYS

You will be assigned a key to your office and the mailroom. If you move to a new office you must turn in your keys to Janet, at which time you will be issued new keys. At the termination of your studies, return all your keys to the department.

Do not under any circumstances pass on your keys to another student or lend them to anyone. You are responsible for the keys issued to you and a record is kept in your file until all keys are returned.

6H. COMPUTER SERVICES

Each student is assigned an Andrew account automatically from the university’s computing services. Additionally, each student is assigned an account in Chemical Engineering.

Chemical Engineering Computer Services maintains the Computer Laboratories and other Department computer resources including, but not limited to, file, print, and web servers. End-user support is available for all Chemical Engineering faculty, researchers, staff, and students. If you have any questions about computing here in the Department please visit the Chemical Engineering Computing webpage at http://www.cheme.cmu.edu/facilities/computing/, or contact the computing staff. All help requests should be sent to the helpdesk email accounts:

cc66.general@gmail.com,

cc66.software@gmail.com,

cc66.hardware@gmail.com.

The Chemical Engineering Computer Consultants are available weekdays from 8:00 A.M. to 6:00 P.M. Please email the helpdesk, cc66.general@gmail.com or stop by DH A225. If you have an urgent request or cannot access email you may contact the computing office by telephone at extension 8-7993. In emergency situations, the Director of computing is available 24/7 at extension 8-5437.

Additional information regarding computing in the department is available at:

http://www.cheme.cmu.edu/facilities/computing
The Main Computer Laboratory is located in DH A226 and may be used by all faculty, researchers, staff, and students in the Chemical Engineering Department. Undergraduate students who have declared a major in Chemical Engineering are the primary users. All users must abide by the general usage policies posted inside the Computer Laboratory and on the web site given below.

The Computer Laboratory is a two-room collaborative work space. The main room consists of 22 PCs with one available for instructional purposes. Basic multimedia services are available. The smaller room is equipped with 8 PCs, a black and white printer, color printer, and color scanner.

Additionally, six public access computers, a black/white printer, and a color printer are available in the undergrad lounge (DH 2103). The computers in DH 2103 should be reserved for undergrad use, or grad use while assisting in undergraduate education.

In order to use any of the computer labs you must have a valid account in the Chemical Engineering Department. Chemical Engineering faculty and staff may reserve either part of the Computer Laboratory. Please see the reservation policy posted on the door and on the web site given below. More specific information can be found at [http://www.cheme.cmu.edu/facilities/computing](http://www.cheme.cmu.edu/facilities/computing).

Doherty Hall is an old building. Only the most basic janitorial services are performed. Therefore, many of the housecleaning chores in the space assigned to you are your responsibility. Trash pick-up inside offices occurs once per week. Trash receptacles in the hallways and corridors are emptied nightly. Cardboard boxes should be broken down and placed next to paper recycling containers in the corridors for removal by the nightly cleaning crew. The department owns a vacuum and other cleaning supplies that can be borrowed for “emergency” cleaning needs.

Facility Maintenance requests for Doherty Hall are handled by Julie Tilton, the Chemical Engineering Facility Coordinator. Please contact Julie by email (jrtilton@andrew.cmu.edu) or phone x8-9537 if you have a work request. If there is an emergency repair after hours, call the Service Response Center directly at 8-2910 or Security at 8-2323. Emergencies include any loss of utilities, leaks and elevator entrapments. The Service Response center will accept emergency requests from students. All other requests must be handled through the facility coordinator.

If you are cleaning out offices or lab space and have larger items, such as furniture, microwaves, or boxes of materials to discard, you must contact the departmental contact in advance and provide an
Oracle string to be charged for these special trash pick-up services. Large items will not be picked up during the regular cleaning schedule.

### PAY DAY

For graduate students with financial awards, the University payday is always the last working day of the month starting in September. Direct deposit of student stipends to the student’s checking or savings account is set up when the student completes the payroll information forms with Toni Mclltrot.

### MAILING

Each graduate student has a mailbox in the mailroom, DH 1108. There is also a box for outgoing campus and stamped mail in DH 1103. Mail is delivered and picked up at the department once each day, usually before 10am. Postage is provided only for official department business.

The gray mailboxes on campus are for campus mail; delivery is guaranteed the following day if mail is deposited before 6 p.m. There is a U.S. Post Office branch in the University Center (lower level), open Monday through Friday from 8:30 a.m. to 4:30 p.m. In addition, the U.S. mailbox outside Baker Hall has a 5:00 p.m. pick-up.

### COPYING

All graduate students are required to pay five cents per copy for all copying unless it concerns their research work and has the prior approval of the research advisor. Graduate students pay Toni McIlrot directly when doing any personal copying. You must enter a charge number into the Gestetner copier login system before copying is allowed.

### TELEPHONES

Personal telephone calls should not be made from departmental phones

### TRAVEL

If you are traveling for departmental business with your advisor’s consent, you can purchase your travel ticket(s) through a university-approved travel agent with a Ticket Request form (TR). The TR can be used to purchase airline or railroad tickets for domestic or international travel. When you use a TR, you do not have to pay for the ticket from your own pocket. The form can be found at [https://www.cmu.edu/finance/forms/files/travel_advance.pdf](https://www.cmu.edu/finance/forms/files/travel_advance.pdf)

To use this form:

- Call one of the travel agents listed at the top of the page.
Work with the travel agent to determine the dates of travel and the price.

- Complete the “traveler information” section with your name and Organization name (Chemical Engineering).

- List the purpose of travel - do not use acronyms. If you are attending a conference for an organization - spell it out. Be specific and detailed.

- Write in the amount of the ticket and the dates of the travel. You must also denote the account number that will be charged for this ticket. Get this “GM” account number from your Advisor.

Most of the time you will use a GM number (i.e. 2232.1.500000). It is broken down in 3 segments by PROJECT.TASK.AWARD.

The Expenditure Type is the type of travel - Domestic Airline or Foreign Airline.

The Organization Type is Chemical Engineering.

The ticket price and trip MUST be approved by your advisor. Once you have his or her approval, sign as the traveler at the bottom of the form.

Drop the form off in your advisor’s administrative assistant’s office. Once the account has been approved, a copy will be put in your mailbox and the original will be put on Janet's countertop. Your tickets will be dropped off or mailed to you.

All of these steps must be completed BEFORE a ticket can be issued to you.

It is YOUR responsibility to get the TR filled out correctly, signed and ready for the travel agent in a timely manner. The travel agencies will not issue a ticket without the completed TR.

6Q. CHEMICAL ENGINEERING AND MATERIALS SCIENCE MACHINE SHOP

- Services Provided

Services provided by the Chemical Engineering (ChemE) and Materials Science and Engineering (MSE) Machine Shop, also referred to as the Collaborative Machining Center (CMC,) include the design and fabrication of research equipment and the production of parts and assemblies from specifications. The shop has manual machines, Computer Numerical Control machines and Rapid Prototyping machines and can produce precise parts in large or small quantities. The shop can machine and weld a wide variety of materials to exact tolerances. The staff can make Computer Aided Design drawings for you if needed and act in an advisory capacity to help you with design specifications. In addition, the staff can refer you to technical suppliers to help solve your purchasing problems and has connections with regional manufacturers for subcontracting special work.

- Work Scheduling Policy

As work comes into the shop, it goes onto the queue and is processed on a first-in first-out basis. Special requests for expedited delivery will be handled on a case-by-case basis.
• Material Gathering Policy

If the job requires material from an outside source, the shop staff can handle the purchasing. If you prefer to purchase the material, we can advise you regarding specifications and suppliers. A modest selection of material and hardware is available in the machine shop.

• Education and Training

The philosophy of the CMC includes training and education of students, staff and faculty in actual machine shop practice. The goal is to encourage participation and hands-on experience of machine shop work as a key component of CMU’s engineering and arts education, through formal courses, offered in the shop in manufacturing technology, rapid prototyping and agile robotics.

• Website

Visit and contact the machine shop online at: http://cmc.cheme.cmu.edu. Phone: 412-268-2817

7. SAFETY PROCEDURES

The Chemical Engineering Department takes safety practices very seriously. The safety practices concerning the handling of laboratory glassware and chemicals, the use of safety glasses and respiratory and fire hazards as set forth in the American Chemical Society publication, "Safety in Academic Chemistry Laboratories," are applicable to all Chemical Engineering laboratories and a copy is available at the door of each laboratory. The department, as a reference and reminder for safety practices, has designed a safety manual called the Department of Chemical Engineering Safety Policy, which is included in the following section. Included at the back of the manual is a Safe Laboratory checkout list. Students are required to have a safety inspection prior to graduation. A complete and authorized safety checkout list must be turned in to Cindy along with other graduation papers before the student is considered to have graduated.

What follows is a brief summary of Safety Practices and Procedures.

Upon entering a laboratory, students should familiarize themselves with the safety features available in case of emergency:

1. The location of fire extinguishers, their type and method of operation, and fire escape routes.

2. The location of emergency eyewash fountains and safety showers.

3. The location of the nearest telephone. To report a fire or obtain help in other emergencies, call Security, ext. 8-2323.
If you feel that additional safety equipment is needed, or if the existing equipment is not working properly, talk to a member of the safety committee (Sec. 7A) about acquisition or replacement of the safety items.

The following safe practices should be observed in the laboratory:

1. Wear proper eye protection. **Safety glasses must be worn in laboratories at all times.** If a faculty member identifies a student in violation of this policy, a warning will be issued and the student will be barred from the laboratory for one week. Repeated violations can result in dismissal from the program.

2. Keep all chemicals away from heat and sunlight.

3. Keep all chemicals and materials out of sinks and drain lines. Disposal of chemicals through sinks can only be authorized by Environmental Health and Safety (EH&S). Check chemical waste disposal manual for listing of authorized chemicals.

4. Good housekeeping is essential for safety and efficiency.

5. Label all bottles and containers. Review the Chemical Hygiene Plan to determine what labeling is required for bottles and chemicals. The plan can be found online at [http://www.cmu.edu/ehs/chemical/index.html](http://www.cmu.edu/ehs/chemical/index.html).

---

**PARTICULARLY HAZARDOUS SUBSTANCES**

There are some chemicals which are considered particularly hazardous due to their reactivity, toxicity, reproductive effects or carcinogen potential. The list of these Particularly Hazardous Substances (PHS) can be found here [http://www.cmu.edu/ehs/chemical/cmuphstable.pdf](http://www.cmu.edu/ehs/chemical/cmuphstable.pdf). Handling of PHSs requires filling out special forms before use, which is available at the EHS website [http://www.cmu.edu/ehs/chemical/forms.html](http://www.cmu.edu/ehs/chemical/forms.html). Also, ordering PHS requires purchase orders; PHS can never be ordered on P-cards.

---

**WORKING ALONE**

*Working in a laboratory alone is hazardous.* Working alone outside the hours of 7am to 10pm, Monday through Friday is not permitted unless you have completed a “Laboratory Work Alone Exemption Form” found at this link: [http://www.cmu.edu/ehs/chemical/forms.html](http://www.cmu.edu/ehs/chemical/forms.html). It is not suggested that you work alone at any time on hazardous processes, and you must either arrange with an associate to check with you frequently or arrange a periodic check by Security, (ext. 8-2323). Not only will this help in dealing with emergency experimental situations, it will also help discourage potential assailants.
OPERATING MACHINES AND EQUIPMENT

You must receive instruction in operating machinery or equipment by the P.I. or the senior lab technician/researcher. Do not use equipment without the permission of the person responsible for the laboratory. When working around moving machinery, secure hair and loose clothing (ties, sleeves, etc.)

COMPRESSED GAS CYLINDERS

Except when gas cylinders are being moved, they must be securely fastened with an approved strap or chain to prevent falling. If a cylinder should fall over and the valve breaks, the cylinder can become a dangerous, jet-propelled projectile. A leaking gas cylinder in an enclosed space is a suffocation hazard.

- Cylinders of compressed gas must not be placed near sources of heat.
- Do not use pipe wrenches on cylinder valves.
- All valves should be closed tightly on cylinders that are not being used.

If you require gas cylinders for your research, they can be ordered through the department business office (see Gas Cylinders, Section 8H). Cylinders are normally delivered to your laboratory. If not, you will be notified and they may be delivered to an area on the Wean Hall loading dock (get key to freight elevator from Larry Hayhurst). In order to transport these cylinders back to your laboratory, use the special carts designed for this purpose. These carts are kept in the machine shop and can be obtained by asking any of the shop personnel. Fasten the cylinder in the cart with the chain. While actually moving the cylinders or while they are stored in your laboratory, make sure that the cylinder cap that protects the valve is firmly secured in place. NEVER move a cylinder with a pressure regulator installed on it. Remove the regulator and put the safety cap on the cylinder before releasing it from its safety mooring. All valves should be closed tightly on cylinders that are not being used.

CHEMICAL WASTE DISPOSAL

All chemicals must be stored in the laboratories until removed. The Environmental Health and Safety (EH&S) group at CMU offers CURBSIDE PICKUP OR TRANSFER. This is an extremely convenient and cheerful service that makes it easy to dispose of both chemical waste and chemicals still in the jar but no longer being used. The department requires the use of his service to remove chemical waste from the laboratory. The department strongly recommends that when a chemical is no longer going to be used, that it be removed from the lab with this service rather than
storing it indefinitely. To access the service, please go to http://www.cmu.edu/ehs/chemical/waste/index.html. Likewise, if you need to have chemicals moved from one lab to another, this can be arranged. You will need to label all separate items. The tags and wires are available in the graduate student lounge on the A level. Advice on handling of waste, containers, etc. can be obtained from EH&S at the above website or by dialing extension 8-8182. When you call, please clearly state your name, department, and the nature of the problem; this will expedite handling of your question.

A special problem occurring frequently in our department is that of unidentified chemicals in unmarked containers. If you find such a situation in your laboratory, it should be corrected immediately.

Graduate students are responsible for disposal or proper storage of all chemicals they have been using. Each student must complete a checkout form signed by the advisor before leaving or graduating. If the advisor is unavailable for an extended time, a member of the Safety Committee can also perform the inspection. See the Department of Chemical Engineering Safety Policy manual for details.

7A. SAFETY COMMITTEE

MEMBERS: Bob Tilton, Kris Dahl and Paul Sides.

The Safety Committee serves only an advisory role. As such, the members rely heavily on the comments, questions and concerns of individuals within the department. It should be clearly understood that the individuals involved in research are primarily responsible for the existence of safety equipment in research laboratories and that all activities associated with research projects are safely conducted.

LABORATORY GUIDELINES

Each faculty member involved in research appoints a graduate student as a research group representative. The representative helps to inform the committee about existing situations in each of the faculty member's laboratories. The representative should ensure that each laboratory under his/her jurisdiction meets the following guidelines.

- Each area must have at least one recently inspected (less than 12 months) fire extinguisher. Check the inspection record label on each extinguisher.
- All gas cylinders must be secured in a stable manner.
- Emergency numbers where the lab occupants and the lab supervisor can be reached outside working hours should be posted inside the laboratory.
• Each area must have a first aid kit.

• Areas in which flammable gases are used must have posted "No Smoking" and "Flammable Gas" signs on all doors and walls near the apparatus. There should be no smoking in any lab or area adjacent to a lab regardless of the type of materials present.

• Evacuation directions must be posted near each door.

• Each laboratory will make the American Chemical Society publication, Safety in Academic Chemical Laboratories available to all workers in the laboratory, as well as CMU's Chemical Hygiene Plan and Guidelines for Hazardous Waste Disposal.

• Each phone should be labeled the campus emergency number ext. 8-2323 (police, fire, ambulance).

• The Safety Committee will provide each group representative with an inspection checklist; the completed lists are reviewed and then kept on file. Inspections must be performed monthly.

---

**EMERGENCY INFORMATION**

Sometimes experimental equipment needs to run unattended. If an emergency situation develops in a laboratory while the laboratory personnel are not present, a method of contacting the parties involved is required. The telephone numbers of the laboratory supervisor and personnel, plus any other pertinent information regarding the operation and shutdown of equipment, **must** be posted inside the laboratory. This will assist campus security, faculty and students in dealing with any situation.

Equipment for which failures can result in a fire, spill of material, explosion, or flood must be attended at all times or provision made for periodic inspections. No equipment should be left unchecked for longer than 8 hours.

---

**DEPARTMENT OF CHEMICAL ENGINEERING: SAFETY POLICY DOCUMENT**

The Department of Chemical Engineering fully endorses Carnegie Mellon University’s Chemical Hygiene Plan (CHP) as the document that defines its laboratory safety policy. This policy is to be adhered to by all members of the faculty and staff and by graduate and undergraduate students. The plan can be found at [http://www.cmu.edu/ehs/chemical/index.html](http://www.cmu.edu/ehs/chemical/index.html).

The issues that are of particular importance to the chemical engineering laboratories and that must be emphasized are:

1. The use of protective eyewear at all times in the laboratories. Repeated violations of this most basic precaution are grounds for dismissal.
2. The maintenance of a current set of MSDS sheets for all chemicals being used or stored in a laboratory.

3. The maintenance of a set of written Standard Operating Procedures (SOP) for all operations that are performed on a routine basis.

4. The maintenance of a set of standard CMU data sheets for all Particularly Hazardous Substances (PHS) that are being used or stored in a laboratory. For guidance see http://www.cmu.edu/ehs/chemical/program-management/phs.html.

5. Prior to graduation all students will complete a laboratory checkout form documenting the fact that they have disposed of or stored all chemicals used during their research, repaired or documented all equipment problems, and made adequate copies of all laboratory notebooks and digitally stored data. If a student used other labs, such as the CPS Lab, s/he must fill out a form for each additional lab.

Emergency and Information Contacts

1. Police / Emergency Services - 8-2323

2. Environmental Health & Safety (Chemicals) - 8-8182

3. Environmental Health & Safety (Radiation) - 8-7502


LABORATORY SAFETY GUIDELINES - DEPARTMENT OF CHEMICAL ENGINEERING

The Department of Chemical Engineering laboratories operate under the safety guidelines and policies described in Carnegie Mellon University’s Chemical Hygiene Plan (CHP, a link to the CHP can be found at http://www.cmu.edu/ehs/chemical/index.html). In addition, the following guidelines describe the policies of the department and the expectations of all students, faculty, and staff working in laboratory environments.

POLICIES

1. **Eye protection** shall be worn at all times by persons actively performing experiments in the laboratories or working in the laboratories in spaces that are in line-of-sight with experimental work areas. Individuals working at desks that are protected by partitions from the experimental areas of the lab need not wear safety glasses although they are encouraged to do so and must have safety glasses available. Individuals working with lasers shall wear laser safety goggles appropriate for that laser frequency and power.
2. **Materials safety data sheets (MSDS)** must be maintained for all chemicals being used or stored in a laboratory. These should be located somewhere near the entrance to the lab and should be clearly marked as MSDS in case emergency personnel need them. Any person using a chemical is responsible for reading the MSDS and being aware of the safety issues associated with the use of that substance.

3. **Food and drink** shall not be stored, prepared, or consumed in the laboratories. The only exceptions to this are for persons working at desks that are separated from laboratory work areas by partitions.

4. **Emergency contact phone numbers** of all personnel working in the lab and of the professor or staff member with primary responsibility for the lab shall be posted on the door to each lab.

5. **New experiments or new apparatus** being built in the labs will be brought to the attention of the safety committee, who will review the safety issues and the SOP (see next item) associated with that experiment.

6. **Standard operating procedures (SOP)** shall be maintained for all procedures in the laboratory that are performed on a regular basis. These should describe the procedure and the potential hazards associated with that procedure. All personnel performing that procedure are responsible for having read the SOP.

7. **Shutdown procedures** for all apparatus normally left running will be written and posted on the apparatus for emergency personnel.

---

**EDUCATION**

The department will offer a safety-training course (06-608, Safety Issues in Science and Engineering Practice) during each academic year. All graduate students, postdocs, and all undergraduates participating in undergraduate experimental research projects are expected to take or audit this course. In addition, they are expected to be aware of the contents of the Chemical Hygiene Plan pertinent to their work and to be aware of the contents of the MSDS sheets for chemicals that they are using. Undergraduates or others who have not taken or audited 06-608 will need to attend, at a minimum, the Laboratory Safety and Hazardous Waste Generation training session by Environmental Health and Safety (for information see [http://www.cmu.edu/ehs/chemical/training.html](http://www.cmu.edu/ehs/chemical/training.html)); the only exception is for lab students who have successfully completed Carnegie Mellon Course 09-221, Laboratory 1: Introduction to Chemical Analysis. It has been determined that the safety and environmental elements of this course meet the OSHA requirements.

---

**INSPECTION**

The departmental safety committee will conduct full inspections of all the laboratories once each year in order to ensure that equipment is being properly maintained and that safe procedures are in practice. In
addition there will be several impromptu safety inspections throughout the year in which Environmental Health and Safety personnel will be asked to visit some of the labs in order to evaluate safety practices.

**ENFORCEMENT**

Personnel working in the laboratories who are found to be using unsafe practices will be reprimanded by a letter from the department head (copied to their advisor) and prohibited from working in the labs for a period of one week. Repeated violations may result in immediate dismissal from the graduate program.

**CHECK-OUT**

Personnel leaving the department will be responsible for disposal or storage of all chemicals that they have been using. In addition they are expected to make sure that all instrumentation is left in working order and that the laboratory areas are left orderly. Copies of lab notebooks and electronic copies of all data should be made and given to the advisor in a form that is useful. In the case of graduate students, the following checkout form must be completed and signed by the advisor before the department head signs the thesis. In the case of undergraduates, grades for research will not be assigned until the lab checkout has been completed.

**Safety Committee:**  
Kris Dahl  
Paul Sides  
Bob Tilton
LABORATORY CHECKOUT FORM

Department of Chemical Engineering Laboratory Checkout Form

Student Name: __________________________________________________________
Date of Graduation: ______________________________________________________

Student and Advisor: Please identify laboratory sites used and check as appropriate, then fill in the requested information and obtain signature(s). Where not relevant, indicate N/A.

_____Advisor's Lab Space
_____CPS Lab
_____Rothfus Lab
_____Other Lab(s) _______________________________________________________

Laboratory Site #1 (Bldg/Rm) _____________________________________________

Date of exit inspection: __________________________________________________

_____ Lab is clean and ready for use by the next person
_____Office is clean and ready for use by the next person
_____The computer is ready for the next person; administrator or other passwords are available
_____Chemicals are stored or disposed properly
_____Equipment is properly organized and its condition is known
_____Data and notebooks are properly stored.

Please sign below ONLY if all appropriate inspection points are acceptable. All chemicals must be labeled, properly stored, or disposed.

_________________________________________ ____________
Lab Supervisor/Advisor Date

If lab is NOT acceptable please write actions to be taken and date of re-inspection:

Actions:

Date of re-inspection:
8. PURCHASING SUPPLIES

The purchasing of all supplies and equipment by members of the Chemical Engineering department is coordinated through the department and handled by Julie Tilton, the Buyer. Please see Julie before agreeing to purchase any services or software as they both require approval by the university contracts office prior to purchase agreement. Do not send equipment in for repairs without consulting Julie first!

8A. WITH PURCHASE ORDER

All purchases over $2500 have to be made with a Purchase Order (PO) using the university’s electronic purchasing system, Oracle. All Chemical Engineering Purchase order requests are handled through e-mail. The purchase order request form can be found at http://www.cheme.cmu.edu/order. You will need to provide the following information:

- Requestor name
- E-mail address
- Campus telephone number
- Complete name and address of company
- Phone number and fax number of company
- Campus shipping address (DH B211)
- Office/Lab where equipment will be stored or used
- Order information
  - Item #, Catalog #, Complete Description, Unit of Measure (UOM), Price, Total Price, ACCOUNT NUMBER
  - Special Instructions

The information will be verified by Julie and entered into the university purchasing system (Oracle). After the Purchase Order has gone through the proper channels and been approved, Julie will print a copy and send an electronic copy to the requestor. The PO should then be forwarded by the requestor to the vendor. Please allow a three-day turn-around time for purchase orders.

In order for a PO to be created in Oracle, the vendor’s name and pertinent information (address, billing terms, etc.) must already be present in Oracle. Commonly used vendors will be in the purchasing system. Vendors that go unused for 2 years are automatically deactivated in Oracle. Julie will notify the requestor if the vendor is not in Oracle and provide the requestor with forms
that the vendor will need to complete. The completed forms should be returned to Julie and she will forward them to the Purchasing Department.

The university recommends that you use contract suppliers when making all purchases. Contract suppliers have agreed-to terms and conditions with the university and the required paperwork is considerably less than using other vendors. To view a listing of contract suppliers by both name and commodity, visit the purchasing department’s website at https://www.cmu.edu/finance/procurementservices/supplier-directory/supplier-directory.html.

A PO Checklist and Bid Summary Form must accompany all federally-funded purchase orders ≥ $2,500 and any university-funded purchases > $4999. This form requires the solicitation of 3 quotations/proposals. Julie Tilton can provide you with this form and help with its completion.

Once the purchase has been received and is determined to be correct and in good working order, the requestor must immediately let Julie know that the invoice is OK to pay by sending an email to jrtilton@andrew.cmu.edu. The notice should include the PO#, the vendor name, and the office or lab where the item(s) will be used/stored.

8B. WITH A DEPARTMENTAL CREDIT CARD – PURCHASES UNDER $2500

Julie Tilton, the Chemical Engineering Buyer, can make purchases using a credit card that are under $2500. To make a purchase via credit card, complete and submit the form located at this site: http://www.cheme.cmu.edu/order/TCOrder.htm. Once the order is received and is determined to be correct and in good working order, please send an email to Julie and let her know the order is okay to pay. Include the vendor name and the items that were received if a partial shipment was made.

All software purchases and services must be approved by the university contracts office prior to purchase agreement. Do not send equipment in for repair, arrange to have equipment serviced, or agree to purchase any other services without talking to Julie first.

8C. WITH CASH

When it is convenient to purchase small items with cash (e.g., batteries, rubber gloves, SOS pads, etc.) from an outside vendor, the department may reimburse you from the petty cash fund. You need to present a receipt to Janet Latini for the goods purchased with your name written on the receipt and an account number given to you by your advisor. Petty cash is replenished by charging your purchases against the accounts of your advisor. Cash reimbursements are limited to $20 or less.
This service is only for legitimate supplies needed for research, lab work, etc., and your advisor must approve every purchase. Sales tax is not reimbursable.

8D. PURCHASING IN UNIVERSITY STORES

Included on this page is a list of those University Stores where various items can be purchased. A few of the items that each store handles are listed to give an idea of the supplies available. Each store handles its own bookkeeping. You need an account number, proper identification and a signed authorization in order to purchase goods. See Toni McIltrout for authorization before going to the University Shoppe, Art Store or Computer Store. Please return the receipt to the department when you have made a purchase.

8E. EXPENSE REPORTS

Students who accrue business-related costs, such as conference and research travel, should seek reimbursement using the following Expense Reimbursement Request form. Submit all original receipts for reimbursement, with the research advisor’s approval, to your advisor’s administrative assistant. Reference the university policies for travel and non-travel business expenses online at: http://www.cmu.edu/finance/controller/bte/index.html. Domestic per diem rates can be found at this site: http://www.gsa.gov/portal/category/21287. International per diem rates can be found at this site: http://aoprals.state.gov/web920/per_diem.asp

8F. PROCEDURE FOR PICKING UP PACKAGES

Packages are delivered to the Machine Shop in Doherty Hall B211. The package area is the small room to the left just inside B211.

- The Machine Shop foreman, Larry Hayhurst, will notify you via email when your package arrives.

- Pick up packages immediately after receiving notice. This will decrease the chance of misplaced merchandise. If you pick up a package addressed to someone else, you will need to sign for it using the clipboard hanging above the package storage area.

- Check your package to be sure your order is complete and in good condition.

- Once the shipment has been verified for accuracy, either submit a notice to the Department Buyer via e-mail stating that the purchase is OK to pay or sign the packing slip, write “okay to pay” and put it in Julie Tilton’s mailbox or bring it to her office.
8G. SHIPPING VIA FREIGHT

For the purpose of this note, freight is considered anything too large to be shipped via UPS or Federal Express. Long sections of Unistrut, sheets of plywood and heavy equipment are examples. Freight arrives at CMU by truck. If you are ordering something large and suspect it may be shipped via freight but are not certain, simply ask the supplier.

When receiving a package via freight, have it shipped directly to:

Carnegie Mellon, Central Receiving
6555 Penn Avenue
Pittsburgh, PA 15206
(Phone: 412-268-3301)

Do not have it shipped to Doherty Hall B-211 because:

1) The loading dock at Central Receiving is accessible to large trucks. The Wean Hall loading dock may not be accessible to larger trucks.

2) Central Receiving has someone available during normal business hours to meet the driver, accept the delivery and help unload the truck.

3) Central Receiving has the mechanism available to unload and temporarily store large, heavy items.

Typically, Central Receiving will bring freight shipments to Doherty Hall with their other deliveries. If the item is of extraordinary size and/or weight, special arrangements will need to be made with a rigger. We can help you make these arrangements if you provide advance notice.

8H. GAS CYLINDERS

The university maintains a service through the Mellon Institute Store Room for purchasing compressed gas cylinders. Cylinder Request Forms are available from Julie Tilton either electronically or via paper copies. Julie is the only person in Chemical Engineering who is authorized to order cylinders. **DO NOT order directly from the company. This is against university policy and orders will not be processed.** For common gases that are already in stock, the cylinder usually arrives at your specified lab on Tuesday, Thursday, or Friday of the same week. See Section 7 (Safety) for important and essential safety procedures related to cylinder transportation.

When the cylinder is ordered and processed in the system, the cylinder request form will be returned to you. Record the cylinder number inscribed on the barcode onto the form. Return the
form to Julie. The information will be recorded and the form will again be returned to you. Keep this form until you return or exchange the cylinder. When cylinders are empty they must be returned in order to cancel the monthly demurrage charges. Mark them "MT" (empty) and leave them in your lab. Notify Julie that you have an empty cylinder to return and inform her of the location. Once the empty cylinder has been picked up, complete the return portion of the cylinder request form and return it to Julie. She can then keep an accurate check of cylinder demurrage charges.

9. LABORATORIES

9A. PPG INDUSTRIES COLLOIDS, POLYMERS AND SURFACES LABORATORY

The Colloids, Polymers and Surfaces (CPS) Program is an interdisciplinary effort of the Chemical Engineering, Chemistry and Physics departments under the direction of Professor Annette Jacobson. The PPG Industries Colloids, Polymers and Surfaces Laboratory operated under this program contains equipment for measuring numerous physical and chemical properties that are important in the characterization of fine particles, macromolecules and interfaces. The primary function of the lab (located in DH 3200/3207) is educational, providing a full year of laboratory instruction and experience at the graduate level, as well as a year of training for undergraduates enrolled in the CPS minor. In addition, training in techniques of polymer characterization provided by the PPG CPS Lab is required of undergraduate Chemistry majors pursuing the polymer option and of all Chemistry graduate students who plan to do a thesis in the polymers area. Priority in the use of the Lab is therefore given to these educational functions. However, the instruments in the laboratory are available to graduate students and faculty for research. If your thesis entails experimentation of the sort that the PPG CPS Lab affords, your advisor will send you to see Professor Annette Jacobson, Mrs. Rosemary Frollini, Associate Director and Lab Manager or Professor Susana Steppan, Assistant Director and Assistant Lab Manager, for help in gaining access to the available equipment and in obtaining whatever instruction you may require.

Access to the 3200 lab is by card reader only. Students who have completed the required training can request access by contacting Rosemary Frollini.
PPG Industries CPS Laboratory

User Regulations

1. All instrument users must be trained by authorized personnel. Students are not permitted to train others in their research group without permission of CPS staff.

2. You must bring your own glassware, chemicals and supplies, including gloves and paper towels. Please clean up your workspace before you leave the lab.

3. Do not leave anything behind in the lab or it will be discarded. Please remove whatever you brought when you leave. The exception is chemical waste which must remain where it is generated. Please bring an appropriately labeled container. A completed waste tag must be attached, listing contents and responsible party.

4. MSDS sheets must be brought to the lab for each chemical that you are using.

   All containers and samples brought into the lab must be labeled with chemical contents and your full name. Anything not in compliance will be removed.

5. Instrument log books must be signed before using the instrument and after completing use.

6. Some instruments have Yahoo calendars for scheduling use time. Please check for availability and schedule your usage. If you are not on the instrument’s schedule, you may be asked to leave by CPS staff if another student has signed up. You may schedule up to 48 consecutive hours on an instrument. At the end of your scheduled time, if no one else has reserved the instrument, you may schedule an additional 48 hours.

7. Data should not be stored on CPS Lab computers longer than a few weeks. Make arrangements to retrieve your data ASAP. All data will be purged by CPS staff at the end of each semester.

8. **No instrument, equipment, or supplies may be removed from the CPS labs.**

9. No instrument may be left running unattended. Plan to remain in the lab for the duration of your work. Exceptions are only by permission of the CPS staff. Instruments left unattended will be shut down by CPS staff.

10. The lab is available strictly for use of the instruments there -- other lab work should be done in the space allotted by your advisor.

11. Misuse and/or damage to an instrument will result in loss of privilege to use the CPS Labs. Your advisor will be responsible for the cost of the repair.

12. In scheduling use of the lab equipment, use for the CPS Lab courses is given priority. Researchers are not permitted to be in the lab during scheduled CPS classes.

13. Safety glasses must be worn at all times while in the lab. No opened-toed shoes are permitted.

14. Absolutely, no food or drink is permitted in the lab.

**Failure to abide by the rules will result in loss of access to the lab and its equipment.**
The undergraduate lab maintains a wide array of analytic equipment, instrumentation, and laboratory hardware such as fittings, tubing, and other sundry parts. These may be used or borrowed by PhD students in urgent cases, upon prior arrangement. Long-term usage of equipment may be feasible in special cases. Cubed iced, filtered and DI water, and some chemicals may be similarly available in the Lubrizol Lab, located within DH A100. Access to these facilities can be arranged by contacting Matt Cline at mc86@andrew.cmu.edu or at x8-2818.

### 10. CONTACT INFORMATION

<table>
<thead>
<tr>
<th>What</th>
<th>Whom to See</th>
<th>Room</th>
<th>Ext.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admissions (Graduate)</td>
<td>Todd Przybycien</td>
<td>DH 3109</td>
<td>8-3857</td>
</tr>
<tr>
<td></td>
<td>Cindy Vicker</td>
<td>DH 1101</td>
<td>8-2243</td>
</tr>
<tr>
<td>AIChe</td>
<td>Jim Miller</td>
<td>DH A207A</td>
<td>8-9517</td>
</tr>
<tr>
<td>Copying/Transparencies</td>
<td>Janet Latini</td>
<td>DH 1107</td>
<td>8-2230</td>
</tr>
<tr>
<td>Computer Accounts</td>
<td>Justin Dawber</td>
<td>DH A207D</td>
<td>8-2243</td>
</tr>
<tr>
<td>PhD Degree Requirements and Registration</td>
<td>Paul Sides</td>
<td>DH A207C</td>
<td>8-3846</td>
</tr>
<tr>
<td>Masters Degree Requirements and Registration</td>
<td>Susana Steppan</td>
<td>DH 3101</td>
<td>8-2226</td>
</tr>
<tr>
<td>Departmental Programs and Courses</td>
<td>Cindy Vicker</td>
<td>DH 1101</td>
<td>8-2243</td>
</tr>
<tr>
<td>Electives</td>
<td>Thesis Advisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Support</td>
<td>Toni McIlrrot</td>
<td>DH 1105</td>
<td>8-3573</td>
</tr>
<tr>
<td>CPS and MS-CPS Degree Requirements</td>
<td>Annette Jacobson</td>
<td>DH 3102B</td>
<td>8-2244</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Julie Tilton</td>
<td>DH 1208</td>
<td>8-9537</td>
</tr>
<tr>
<td>Purchasing</td>
<td>Julie Tilton</td>
<td>DH 1208</td>
<td>8-9537</td>
</tr>
<tr>
<td>Space</td>
<td>Julie Tilton</td>
<td>DH 1208</td>
<td>8-9537</td>
</tr>
<tr>
<td>Safety</td>
<td>Safety Committee</td>
<td>DH 3111</td>
<td>8-1159</td>
</tr>
</tbody>
</table>
11. CAMPUS FACILITIES

11A. ATHLETIC FACILITIES

You are welcome to use the athletic and recreational facilities in the gymnasium and University Center, including the swimming pool, handball courts, weight room, golf room and main gym, as well as the tennis courts. These facilities may be used during scheduled periods when they are not in use for instructional purposes. You may be asked to show your I.D. card to identify yourself as a student or to obtain a permit. There is a charge for use of some facilities.

11B. CLEANERS/LAUNDRY

The laundry facility is open 24 hours a day, with validated CMU ID. An attendant is on duty Monday through Friday, 8:00 a.m. to 4:30 p.m. It is located in Margaret Morrison Plaza 4 (phone 8-8878).

11C. CAMPUS DINING SERVICE

CMU Dining Services provide meals at reasonable prices in several locations. Complete menus are posted at each location. Hours of operation may be verified by calling 8-2139 or by checking http://www.cmu.edu/dining. Some of the locations include:

- University Center
- Resnik Hall
- Food carts are also scattered around campus, including Wean Hall, Porter Hall, Newell-Simon Hall, Hamburg Hall, and Mellon Institute.

You will find vending machines for snacks and candy located in various buildings across the campus.

11D. HEALTH SERVICES

- **Health Office (x2157)**

The Health Office is located on the first floor of E Tower in Morewood Gardens (Room 144). It is open from 8:00 a.m. until 7:00 p.m. Monday, Tuesday, & Thursday; Wednesday 10:00am – 7:00pm; Friday 8:00 - 5:00 and Saturday from 11:00am until 3:00pm. The services normally expected of a family physician are provided. Gynecological services are available by appointment only.
If an emergency occurs during hours when Health Services is closed, call the after-hours physician on-call service at 412-268-2157 (Identify yourself as a Carnegie Mellon student.) Also, call campus police for transport at 412-268-2323 (on campus, 8-2323)

• Insurance

All students are required to have medical insurance. The Associate Dean of Student Affairs, (WH 301) extension 8-2075, has complete information.

11E. LIBRARIES

Students are invited to use the collections in Hunt Library and the Engineering & Science Library. In addition to a large collection of books, the libraries also contain current and past issues of magazines, newspapers, manuals, encyclopedias and many other reference materials. Circulating material may be borrowed by presenting your I.D. card. Each library has a reserve book room for books designated by a professor as assigned reading in his/her class.

11F. PARKING FACILITIES

A charge is made for use of parking spaces by meter or by permit. Parking tags and key cards (for lots requiring them) are obtained from the Parking Office in the East Campus Garage. Fines are given for meter, general and hazard violations. Many of the local streets near the campus have parking limited to residents.

11G. PUBLICATIONS

The following regular CMU communications are available at the information desk in the University Center.

*Tartan* - The CMU student weekly publication that reflects student thought, highlights campus activities such as athletic schedules and scores, lectures, seminars and meetings, concerts and art exhibits, and other information.

*Campus Calendar* - A weekly listing of current campus events (plays, concerts, recitals, seminars, etc.) and local events of special interest to the academic community.

*8½ x 11 News* - A single-sheet weekly update of news about campus events.
11H. STUDENT PHOTO I.D.

Student I.D.s are necessary for many university services including use of athletic facilities, purchasing meal plans, special events, etc.

12. MISCELLANEOUS ISSUES

12A. POLICY ON "OUTSIDE" EMPLOYMENT

The possibility exists that a student might be approached to consult on a project for an entity outside the university and be offered a fee for services in addition to the stipend. Alternately, a student conceivably could operate some other extracurricular business. The Department strictly forbids such arrangements while the student is registered full time and pursuing a degree. The student is expected to devote his/her time and energy to timely completion of the degree.

12B. POLICY ON THE AVAILABILITY OF SUMMER EMPLOYMENT

If applicable, the fellowships offered by the Department are full time and paid year round. While the student is registered and receiving a stipend, no summer employment other than full time research is allowed. This is not meant to preclude cases where students are temporarily placed in industries relevant to their thesis work and are paid by a company. In these cases, the student should collect the normal stipend plus an allowance for extra expenses due to any relocation or maintenance of a second dwelling place. Toni McIlhrot should be consulted.

12C. POLICY ON OUTSIDE FELLOWSHIPS

A student receiving any kind of fellowship or external support other than through family or prior investments must notify the Department of that support so that appropriate arrangements can be made for equitable pay.

12D. CHEATING, PLAGIARISM, AND RESPONSIBLE CONDUCT OF RESEARCH

The Department will take strong action consistent with CMU policies against any student who engages in cheating or plagiarism in courses or in research. The web link to the University policy on Cheating and Plagiarism is http://www.cmu.edu/policies/documents/Cheating.html.
• The Department of Chemical Engineering embraces requirements for education in Responsible Conduct in Research. All researchers must take the available online course and pass it. New graduate students will take this training and fulfill this requirement as part of the 06-608 Safety course. The website for this training is https://www.citiprogram.org/Default.asp?

12E.  POLICY ON VACATION TIME

Research never sleeps, but most people need a periodic rest. As a guideline, each student should plan no more than two weeks of vacation per year in addition to the week between Christmas and New Year, Memorial Day, July 4, Labor Day, and Thanksgiving Day. All vacation time should be cleared in advance with the student's advisor to make sure that progress is satisfactory and deadlines are being met.