
THE UNIVERSITY OF IOWA
Department of Chemical and Biochemical Engineering

# Department of Chemical and Biochemical Engineering

## GRADUATE STUDENT HANDBOOK

## (Updated August 2007)

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## I. INTRODUCTION

The Chemical and Biochemical Engineering Department at the University of Iowa (UI) has a long and distinguished history in chemical engineering education and research. Chemical engineering has been taught at UI since 1905 and was accredited in 1926 (it was among the first 16 schools to receive accreditation). The department is accredited by ABET and is one of the best Biochemical Engineering Programs in the nation. The department has ten tenure track faculty with research interests in three major areas: polymerization; environmental systems and biological systems. All graduate degrees in Chemical and Biochemical Engineering are awarded by the Graduate College. Undergraduate degrees are awarded by the College of Engineering. The faculty have appointments in both colleges.

This handbook is intended to inform graduate students of the policies, regulations and procedures of the graduate program in Chemical and Biochemical Engineering. In addition, it provides guidance regarding the academic performance, research excellence and general standards of conduct expected of students pursuing a Master of Science or Doctor of Philosophy degree in this department. Since this handbook is concerned primarily with acquainting you with departmental regulations, the general regulations of the Graduate College are not repeated in this handbook. Graduate students are expected to independently familiarize themselves with all Graduate College regulations. If any of these policies, regulations, or procedures are found to be in conflict with those of the University or Graduate College, then those of the University or Graduate College will take precedence. Similarly, if any part of these policies, regulations, or procedures is found to be in conflict with Federal, State or municipal laws, or with the constitutions of the United States or the State of Iowa, then that part shall be automatically void.

The University of Iowa and the Department of Chemical and Biochemical Engineering admits, trains, and graduates students without regard to race, color, religion, age, disability, sex, associational preferences or national origin.

## II. GRADUATE PROGRAMS AND DEGREES

The graduate program in the Department of Chemical and Biochemical Engineering provides qualified students with deeper and broader training than is possible at the B.S. level. Both the M.S. and Ph.D. programs are designed to equip the student with the skills to pursue a career in industry, academia, or government. All graduate students are expected to be competent in the core areas of chemical engineering. Students obtain more specialized knowledge and expertise through advanced course work in chemical engineering as well as in related disciplines. Excellence in research is expected of both Ph.D. and M.S. thesis students.

Students entering the department generally follow one of two degree tracks. Track 1 is followed by students who want a terminal M.S. degree or for students receiving the M.S. degree before obtaining the Ph.D. Track 2 is followed by students who enter the program with an acceptable M.S. and are pursuing the Ph.D. In consultation with their advisor and the approval of their thesis/examining committee, the student develops a comprehensive plan of study based on his/her background and career objectives.

## III. ADMISSION

### *A. Requirements and Procedures*

Admission to the Department of Chemical and Biochemical Engineering is competitive and is based on an applicant's previous course work, research and industrial experience. The general admission standards outlined below are intended to maintain the quality of the graduate program and to ensure

that the student is properly prepared to successfully complete their graduate program in a timely fashion. Specific admission standards may be waived by the faculty when other evidence of competence is compelling. It should also be noted that these standards are minimum standards and that meeting these standards does not ensure admission to the program. Admitted students typically exceed these standards:

- Applicants to the graduate program are expected to have a minimum cumulative grade point average of 3.00/4.00 with a B.S. degree in Chemical Engineering or a related science or engineering discipline.
- Applicants are required to submit the results of the Graduate Record Examination. The GRE Advanced Examination in Engineering is not required for admission to the program; however, these scores should be forwarded to the department if the Advanced Examination is taken.
- Applicants who do not speak English as their native language are required to submit the results of the TOEFL examination. A minimum TOEFL score of 600 (250 for the computer test) is ordinarily required.
- Applicants must arrange to have three evaluation letters forwarded to the department. These evaluation forms should be completed by persons who are well acquainted with the applicant and their ability to undertake graduate work in chemical engineering.

Conditional admission to the M.S. program may be granted to students with demonstrated ability, but who do not meet the requirements for regular admission. For students admitted with conditional status, regular status must be attained within two academic terms. A conditional admission will carry a written statement of deficiencies and the specific actions required to remove the conditions. The student is responsible for taking the steps needed to remove the conditions.

While the department will consider applications at any time, first consideration is given to students who have their application folders (application material, GRE and TOEFL scores and the required letters of recommendation) completed by February 1 for fall admission. Students seeking admission to the spring semester must have their admission folder completed by October 1.

The Director of Graduate Admissions (DGA) is responsible for overseeing the graduate recruiting activities and the graduate admissions procedures in the department. The DGA serves as the point of initial contact between prospective graduate students and the department and maintains a file of each qualified applicant in the department office. The DGA, in consultation with the graduate admission committee and DEO, screens the applicants and ultimately determines the applicants to be extended offers of admission.

### *B. Ph.D. Program*

All students who are in the Ph.D. program in Chemical and Biochemical Engineering are required to pass the Ph.D. Qualifying Requirement and to provide evidence of superior ability to carry out independent research. Qualified students complete the Ph.D. program by one of two tracks:

***Track 1 (Students entering without an M.S. degree in Chemical Engineering)***

In addition to the Graduate College requirements for the PhD degree (which are described in Section V), the student will complete the M.S. degree in Chemical Engineering as described in Section V.

***Track 2 (Students with M.S.Ch.E. degree from another institution)***

The normal graduate requirements for the PhD degree must be completed as described in Section V).

### *C. Applicants with B.S. Degrees not in Chemical Engineering*

The department encourages students with degrees in other scientific disciplines, such as chemistry, biochemistry, biology, engineering, materials science, mathematics, and physics, to apply for admission to the graduate program. Many such students have successfully completed both M.S. and Ph.D. degrees. However, these students are expected to attain a proficiency in specified core areas of chemical engineering equivalent to entering graduate students who hold a B.S. degree in chemical engineering. The background of each student admitted to the program with a degree not in chemical engineering will be reviewed by the faculty. The graduate faculty adviser (the Director of Graduate Studies) will specify in writing any remedial courses which will be required of the student. Examples of core undergraduate courses include:

Mathematics
Calculus (22M:031, 22M:032, or equivalent)
Differential Equations (22M:41, 22M:034, or equivalent)
Matrix Algebra (22M:40, 22M:033, or equivalent
Chemistry
General (4:011, 4:012, or equivalent)
Organic (4:121, 4:122, 4:141 or equivalent)
Advanced Sequence (Analytical Chem, Inorganic Chem, Biochemistry, or Physical Chem)
Chemical Engineering
Process Calculations (52:041 or equivalent)
Engineering Flow and Heat Exchange (52:151 or equivalent)
Chemical Engineering Thermodynamics (52:103 or equivalent)
Mass Transfer and Separations (52:161 or equivalent)
Chemical Reaction Engineering (52:105 or equivalent)

The courses numbered 100 level or above may be used to satisfy credit and course requirements for a graduate degree in this department.

## IV. ADVISING AND PROGRAM PLANNING

### *A. Faculty Advisor*

The graduate student research supervisor also serves as the student's academic advisor. For non-thesis M.S. students, an academic advisor will be assigned by the Director of Graduate Studies. The faculty advisor evaluates the performance and progress of his/her advisees. The faculty advisor serves as a teacher and mentor to the graduate student. It is through this close sharing of responsibilities and common goals that the graduate student learns to become an independent investigator.

Initially, the Director of Graduate Studies will orient the student to the policies and procedures of the department and assist the student in adjusting to graduate student life. Within the first month or so of joining the program, new graduate students are required to discuss their research interests and objectives with each faculty member. At the end of this period, each student will inform the Director of Graduate Studies of his/her top three choices for their faculty advisor. Final assignment of the student to a faculty advisor is based on the mutual interests of the student and the faculty, current research commitments, and departmental obligations. The department chair, in consultation with the faculty, is responsible for making the assignment of each graduate student's research advisor.

### *B. Examining Committee*

In addition to the faculty advisor, each student has an examining committee (also referred to as a thesis or dissertation committee) which assists the student in their graduate studies, evaluates his/her progress, administers the comprehensive and final examination, and approves the M.S. thesis or Ph.D.

dissertation. The M.S. committee normally consists of three members. The Ph.D. committee normally has five members, one of which must be from outside the department.

The examining committee plays an important role in advising the degree student in their graduate studies. It is therefore important that the committee be selected carefully. The graduate student and the faculty adviser together should identify committee members willing to serve on the committee and who meet Graduate College requirements. The names of these faculty members are forwarded to the department Chair who then recommends the examining committee to the Dean of the Graduate College. The Dean of the Graduate College formally appoints the student committee.

## V. REQUIREMENTS FOR DEGREE

### *A. General*

All students are required to satisfy the general requirements of the Graduate College appropriate for the degree they expect to be awarded. In addition, terminal M.S. students must submit a progress report each academic year in residence to their faculty advisor and should periodically report progress to the examining committee. Specific reporting procedures should be discussed with the faculty advisor and documented in writing. All Ph.D. students must give an annual update to their dissertation committee, consisting of an oral presentation and a written summary of progress made in the previous year. The first research update should be given approximately one year following passage of the comprehensive exam and each year in residence thereafter. Students who do not follow give annual updates are subject to the withholding of research credit and/or reduction/termination of financial aid.

To ensure basic competence in chemical engineering, all graduate students must take at least one course, from a departmentally approved list, within their first four semesters in each of the core chemical engineering branches of transport processes, chemical thermodynamics, chemical reaction kinetics and technical communication. Approved courses include:

1. Transport Phenomena
   052:217 Transport Phenomena
   052:271 Transport Phenomena in Biomedical Engineering
   058:143 Computational Fluid and Thermal Engineering
2. Chemical Thermodynamics
   052:117 Intermediate Thermodynamics
   Any 100 level or higher Statistical Thermodynamics Course
3. Chemical Reaction Kinetics
   052:175 Polymer Chemistry + Undergraduate Chemical Reaction Engineering
   052:108 Introduction to Biochemical Eng + Undergraduate Chemical Reaction Engineering
   052:236 Atmospheric Chemistry & Physics + Undergraduate Chemical Reaction Engineering
   ~~052:211 Intermediate Chemical Reaction Engineering~~
4. Technical Communication
   052:215 Intro to Lit Review and Proposal Writing

All graduate students must also complete at least one course (3 sh, selected in consultation with the research advisor) in an area outside their own specialization area from the department's specialization areas – Polymeric Systems, Environmental Systems, and Biological Systems. Finally, all graduate students are required to be teaching assistants at least twice during their residency (except for non-thesis M.S. candidates) so that they can learn the skills needed to train and educate others, an important distinction between the undergraduate and graduate degrees.

### *B. Master of Science Degree*

A minimum of 30 semester hours of graduate credit is required for the M.S. degree with thesis. Of these 30 semester hours, at least 24 semester hours must be in approved graduate level course work and at least 6 semester hours must be in 52:199 M.S. Thesis Research. All M.S. candidates must demonstrate competence in research. M.S. students are required to have a graduate grade point average of 3.00/4.00 in order to graduate. In addition, the student must submit an acceptable M.S. thesis and pass the final examination. There is no foreign language requirement. Undergraduate courses (course numbers less than 100) may not be used to satisfy the 24 semester hour requirement. Non-thesis M.S. candidates must satisfy the same requirements except the 6 semester hours of Thesis Research must be replaced with a cohesive course sequence approved by their academic advisor or the Director of Graduate Studies (DGS). Graduate students who receive assistantships, fellowships or other financial aid which was awarded to them with the assumption that they pursue an advanced degree with thesis, are not eligible to pursue the non-thesis M.S. degree. Non-thesis M.S. students will be required complete the four core courses with a GPA for those courses exceeding 3.25. Students on the Ph.D. track must obtain a non-thesis M.S. by fulfilling the following requirements: 1) completing the non-thesis M.S. course requirements (30 semester hours of coursework); 2) one publication submitted to a peer reviewed journal as approved by the research advisor and 3) giving a departmental seminar.

Graduate students in the non-thesis M.S. option may petition for entry into the thesis M.S. program or the Ph.D.-track program by requesting a change of status through the Graduate College. The request will be reviewed by the Graduate Admissions Committee. If the Committee approves the request, then it will be forwarded to the faculty for final approval. Assignment to research advisors will be handled as if the student were a new graduate.

### *C. Doctor of Philosophy Degree*

The Ph.D. degree is granted primarily on the basis of achievement rather than on the accumulation of semester hours of credit. Excellence in research is the principal requirement for the Ph.D. degree. It is expected that the Ph.D. dissertation research represent an original and significant contribution to the body of knowledge in the field. The Ph.D. candidate is expected to publish his/her research findings as refereed journal articles.

The Ph.D. candidate is normally expected to have completed three academic years of residence, or two years if he/she already holds a recognized M.S. degree. A minimum of 72 semester hours of approved graduate credit beyond the B.S. degree is required. Of the 72 semester hours, at least 30 semester hours must be in approved graduate level course work. This does not include undergraduate courses (course numbers less than 100). The Ph.D. student must have an overall minimum graduate grade point average of 3.25/4.00 in order to graduate. In addition, the student must pass the qualifying requirement, pass the comprehensive examination, submit an acceptable Ph.D. dissertation and pass the final examination. The Ph.D. candidate is reminded that these are minimum requirements. The faculty advisor and/or examining committee may impose in writing other requirements such as the completion of additional course work or the acquiring of specific skills. The actual amount of course work required is determined with the advice and consent of the faculty advisor. There is no foreign language requirement.

## *D. Examinations*

### 1. Ph.D. Qualifying Requirement

All students on a Ph.D. track must pass the Ph.D. Qualifying Requirement within their first four semesters. The purpose of this qualifier is to determine the student's proficiency at graduate level work. The requirement is satisfied if the GPA for the four core areas is 3.50 or better. Students who do not pass the Qualifying Requirement may petition to complete the Qualifying Requirement by an alternative method acceptable to the research advisor, the Ph.D. examination committee, and the departmental graduate faculty.

### 2. Ph.D. Comprehensive Examination

The general rules for the administration of the Ph.D. comprehensive examination are contained in the policies and procedures of the Graduate College. The comprehensive examination consists of a written dissertation research proposal and an evaluation of research progress by the dissertation committee. The proposal must be presented orally and is open to the public. The proposal should contain the plan of study and some preliminary results. A guideline for the proposal format is given in the Appendix of this document. The proposal must be completed no later than two years after entering the department. Non-chemical engineering students will receive one extra year to fulfill this requirement. The student who does not meet these deadlines will be warned that they are failing to make appropriate progress in the program, which may lead to reduced financial aid or dismissal from the program. The comprehensive examination may be reported as satisfactory, satisfactory with reservations or unsatisfactory. Two or more unsatisfactory votes constitute a failure. A satisfactory with reservations report will state in writing the concerns of the committee and the specific courses, procedures or other requirements to be satisfied by the student. The examining committee will also specify in writing the time at which these requirements must be satisfied by the student. The comprehensive examination may be repeated once at the discretion of the examining committee.

### 3. Final Examination

The general rules for the administration of the final examination are contained in the policies and procedures of the Graduate College. The final examination is administered by the candidate's committee and consists of an oral presentation by the candidate of their dissertation work. The final examination is a critical inquiry into the purpose, methods and results of the research and may include intensive examination in areas related to the investigation. Ph.D. and M.S. final examinations are open to the public. The final examination may be reported as satisfactory or unsatisfactory. Two or more unsatisfactory votes constitute a failure. The final examination may be repeated once at the discretion of the examining committee.

The final examination should be scheduled as early in the semester of graduation as possible in order to provide as much time to make the required corrections and additions to the thesis or dissertation that are required by the examining committee. In general, the final examination should be scheduled no later than two weeks before the final deposit deadline.

The final examination must be passed no later than five years after passing the comprehensive examination for Ph.D. students and no later than 4 years after entry into the graduate program with an external M.S. Failure to meet this deadline indicates that the student is failing to make appropriate progress in the program, which may lead to reduced financial aid or dismissal from the program.

### *E. M.S. Thesis and Ph.D. Dissertation*

One copy of the thesis or dissertation, complete and in final typed form, must be presented to the Graduate College for a check of formal characteristics before the final examination and not later than four weeks before the graduation date on which the degree is to be conferred (see the Graduate College Thesis Manual). After approval by the Graduate College and by the examining committee, one final copy of the M.S. thesis or two final copies of the Ph.D. dissertation must be deposited not later than ten days before graduation. The Ph.D. dissertation will be microfilmed. An abstract of the Ph.D. dissertation, not to exceed 350 words of text, is to be deposited with the dissertation. The abstract must be approved and signed by the dissertation advisor.

The Graduate College requires that the Ph.D. dissertation be made available to all members of the examining committee no later than two weeks before the date of the final examination. The department requires that the M.S. thesis be made available to all members of the examining committee no later than two weeks before the date of the final examination. In addition, the department requires that each student deposit two approved copies of the thesis or dissertation to the department properly hard bound, or with payment of the departmental binding fee. Students should also provide a soft bound copy of the approved thesis or dissertation to all members of the examining committee who request one. Photocopies of the thesis must be of high quality on 20-lb. weight paper. Photographs, micrographs and other graphics should be faithfully reproduced. Additional requirements are contained in the "The Thesis Manual" available from the Graduate College.

### *F. Seminar*

All graduate students must enroll in Graduate Seminar (52:191) every semester except summer. Students failing to attend seminar regularly will receive a failing grade for the course.

### *G. Registration Requirements - Ph.D. Post Comprehensive and M.S. Finals*

All registration must accurately reflect the amount and type of work undertaken, the use of University facilities and the amount of consultation with the faculty. The student should register for the courses, research, and thesis necessary to complete the plan of study.

The Graduate College requires that students be registered in the final session in which the degree is awarded. In addition, Ph.D. candidates are required to be registered in each semester after passing the comprehensive examination until the degree is awarded. If a student fails to register, then the student may not be readmitted to candidacy until the student has received the appropriate approval and submitted the necessary application. Both Ph.D. and M.S. students must be registered for at least 2 semester hours (research or coursework) in every fall and spring semester up until the semester of graduation. Registration for summer semester is not required unless the degree will be awarded during the summer or if the department deems registration is necessary.

### *H. Department Graduation Checklist*

After final deposit of the thesis or dissertation, the student must submit a completed Department Graduation Checklist to the department three days before the semester commencement exercises. Failure to submit a Graduation Checklist will result in a hold placed on your graduation records.

**Graduation Checklist**

*Department*

1. Deposit two copies of thesis or dissertation for binding and suitable bound copies for each committee member.
2. Pay departmental binding fee, unless the copies in item (1) are already properly hard bound.
3. Return all keys to department secretary.
4. Return all books and software to department library.

5. Return all U.O. equipment to U.O. laboratory.
6. Satisfy all financial debts to the department.
7. Provide a forwarding address.

*Advisor and Laboratory*

1. Make arrangements with advisor to assure that all originals (or copies if approved by advisor) of log books, laboratory manuals, experimental data, computer codes, etc. are turned in to the faculty advisor.
2. Submit an electronic copy of thesis to advisor.
3. Return all books, journals, papers and other items borrowed from advisor, except as agreed between the advisor and student.
4. Return all instrument operation manuals, safety instructions, procedures and maintenance records to advisor.
5. Return all supplies and equipment borrowed from other laboratories.
6. Report all broken instruments.
7. Report supplies that need to be ordered.
8. Leave all research equipment and chemicals, not in continuing use, in condition for indefinite storage or immediate disposal.

Note: Graduating students are not permitted to take any University supplies, manuals, handbooks or other items from the laboratory, except with permission from the responsible faculty member.

## VI. FINANCIAL ASSISTANCE

### *A. General*

It is the policy of the department to provide financial aid, subject to available resources, to eligible students so that they may devote their full energy and attention to the research and course work necessary for obtaining an education and completing the degree requirements. Although most financial aid is provided in the form of teaching and research assistantships where service to the University is required, the graduate student stipend is viewed primarily as financial aid rather than the remuneration for services rendered. In addition, the graduate assistantship provides an important educational opportunity for students to obtain experience in teaching and research. For this reason, all candidates for Ph.D. and M.S. with thesis are required to complete both teaching and research assistantships during the course of their graduate studies.

### *B. Sources of Support*

The funds available for graduate assistantships are provided to the department by the College of Engineering and the Graduate College. Other funds are available to support graduate students working on sponsored research under the direction of the principal investigator of the grant. In general, there are no departmental funds for summer support. Therefore, summer support for students can only be provided from external funds. Consult your faculty advisor on matters regarding summer support.

### *C. Eligibility*

As available funds permit, it is the policy of the department to provide or arrange financial assistance for each graduate student who is in "good standing" in the graduate program. ("Good standing" refers to performance, progress, and professional conduct as defined in Section VII.). Non-thesis M.S. students are not provided financial aid.

The University requires all first time teaching assistants whose first language is not English to be tested to assess their English speaking and comprehension skills and general suitability for teaching undergraduates before they are assigned assistantship responsibilities. The tests are given each

semester and summer session the week prior to registration by the Department of Linguistics. Students are given detailed information and instructions about the tests and are able to ask questions when they register to take the tests.

Full-time graduate students with outside employment are usually unable to devote the necessary time and effort to their research and course work. This results in unnecessary delays in completing the requirements for the degree, hurried or inferior research and an undistinguished thesis or dissertation. To ensure excellence in research, full-time graduate students appointed to positions of half-time or greater may not be employed outside the department. Students violating this provision will be ineligible for financial aid. Students who feel this provision causes unusual hardship may request an exception from the department. However, the nature and duration of the hardship must be fully documented and the student must be able to maintain "normal progress".

### *D. Duration of Eligibility*

For students entering without previous graduate work, it is the policy of the department to continue support for up to five years for a Ph.D. student in good standing and two years for a M.S. with thesis student. For students entering with previous graduate work, the duration of support will be prorated with respect to the student's initial placement in the graduate program. It is to be emphasized that the uncertainty regarding the funding of graduate education by state and federal agencies makes it impossible to guarantee the level and duration of support for any student. Financial support during a sixth year in residence for a Ph.D. student (third year for M.S. student) in good standing may be arranged upon the recommendation of the student's research advisor. Funding is subject to funds available after all other eligible students have been supported. Students who fail to maintain normal progress as defined in Section VII will not be considered for sixth year (third year for M.S.) support. A Ph.D. student who has been supported for six years (or M.S. for three years) from sources provided or arranged by the department, or requiring departmental approval will not be further supported from such sources (including external research grants and contracts obtained by the research advisor). Exceptions to this policy will require a formal appeal by the student which must be approved by the faculty.

Students become ineligible for financial support from departmental funds 30 days after passing the final examination. Continued support for a time period up to the end of the semester may be provided by the faculty advisor through external research funds.

### *E. Assistantship Responsibilities*

#### 1. Research Assistantship Activities

Each student in the Ph.D. or M.S. with thesis graduate programs will participate in research activities of some type during each semester in residence except when the individual has been assigned an unusually demanding teaching assistantship. Research assistantship activities are intended to give the student direct and continuing experience in the actual research process from formulation of the study through collection and analysis of data and preparation of a scholarly paper. These activities are intended to facilitate the research progress and productivity of the faculty member and the research group with which the student is associated. The research performed under a research assistantship may or may not be related to the student's thesis work. Since thesis research activities are concerned with matters of originality, creativity and excellence, they are not subject to the hours per week guidelines of the general assistantship requirements (Sec. IV.G).

#### 2. Teaching Assistantship Activities

Each Ph.D. or "M.S. with thesis" graduate student in the department is expected to serve as a teaching assistant two different times during their graduate studies. Every effort is made to arrange T.A. assignments with due regard for other responsibilities the student may have. Since T.A.

assignments directly affect the education of students, it is necessary that all duties be carried out in a timely and effective manner. All first time teaching assistants whose first language is not English must be evaluated for certification. Under the certification process, only students with at least a rating of "conditionally certified" will be permitted to teach a discussion or lab section. Non-thesis M.S. students may serve as a Teaching Assistant (with some limited financial aid) if approved by the department.

#### 3. Other Appointments and Assignments

Students funded from project grants carry out their research assistantship in support of that particular project, but must meet the teaching (or alternative) requirement, either during periods when not assigned to the project or through concurrent effort. Specific responsibilities are specified at the time of appointment.

### *F. Absences*

Unlike undergraduate students, Ph.D. or "M.S. with thesis" graduate students and faculty have research and/or teaching duties on a continuous basis including those periods when classes are not in session (e.g., winter and spring break). Graduate students receiving financial support must observe normal University business hours. At the very least, this means assistantship duties should be carried out during Monday through Friday, 9 a.m. to 5 p.m. Students must discuss the possibility of alternative working hours with the research director (R.A.) or the instructor (T.A.) in charge. The research director or instructor in charge should be notified of absences due to illness or family emergency as soon as possible. Graduate students should behave professionally, notifying colleagues and supervisors in advance of planned absences. Students absent for extended periods without approval will become ineligible for departmental financial aid. Graduate students may take paid leave or vacation as outlined by University guidelines. Current guidelines allow two (2) weeks of paid leave for academic year appointments and three (3) weeks of paid leave for fiscal year appointments. Typically, such vacation should be taken between academic semesters and must be approved by the student's research advisor. Students cannot accumulate vacation from year to year (use it or lose it).

### *G. Assignment*

The awarding of financial support is made by the department at the beginning of each semester. The department recognizes primarily two levels of assistantship activities— ¼-time and ½-time. One-half time assignments require about 20 hours per week and ¼-time about 10 hours per week. Specific assistantship assignments are made each semester. For teaching assistantships, the T.A. will be notified as early as possible, in writing, of the course(s), the instructor in charge, beginning and ending date of the teaching appointment and the duties to be carried out. For research assistantships involving research not related to the student's thesis work, the R.A. will be notified as early as possible, in writing, of the project(s), the research director, the beginning and ending date of the research appointment and the duties to be carried out. For research assistantships involving thesis work, the graduate student is supervised by his faculty advisor until the completion of all degree requirements.

In the assignment of financial support, due consideration is given to the interests and capabilities of the students. However, it is necessary to weigh this against the needs of the department and the requirements of the various funding agencies which support departmental research activities. The department makes assignments according to the following procedures:

1. The department Chair presents a list of students eligible for financial support and a list of appointments available for faculty consideration.
2. Faculty members with external research support inform the Chair of the student(s) to be supported from their research grants.

3. The remaining students are assigned to department teaching and research activities. The faculty reviews the progress of these students based on their semester progress reports and determines the eligibility and priority of each student. The faculty considers the following when making this determination: progress toward the degree objective, past performance as a T.A. or R.A. and service to the department. Inadequate progress toward the degree or substandard performance on previous assignments will result in reduction or elimination of financial support. The student will not be eligible for support until he/she is able to perform at the required level of performance for one full semester.
4. In addition, preference is given to thesis students (a) with demonstrated excellence in research and/or academic performance, (b) those already receiving support, and (c) U.S. citizens and permanent residents.

## *H. Renewal and Termination*

### 1. Renewals (Reappointments)

Appointments to assistantships or traineeships are for a fixed period, usually one academic year. Sometimes the appointment may be made for one semester or 11-12 months. Renewal of an appointment for a subsequent period is based on the evaluation of the faculty advisor and the collective judgment of the faculty concerning the student progress and professional conduct. It is emphasized that all renewals are contingent on the continued availability of state, federal, and project funds for student support.

### 2. Termination During the Term of an Appointment

A graduate student on an assistantship or traineeship may be dismissed during the term of that appointment due to loss of student status. A graduate student may be dismissed from an assistantship or traineeship appointment during the term of the appointment, without necessarily losing student status, for 1) any reason sufficient to dismiss a faculty member during the term of an appointment (see University Operations Manual, Section 20:290 Ethics; Section 20:267 Unfitness; and Appendix 720.9.1 Uniform Rules of Personal Conduct), or 2) failure to follow or implement properly and adequately reasonable instructions of the supervisor when such instructions are within the proper scope of the supervisor termination of an appointment for either of these two reasons are those described in Section 20:230 of the University Operations Manual.

## *I. Tax Status*

The University is required by federal regulation to withhold income tax from money paid from University sources and from project grants. The University will provide an annual W-2 form showing the amount withheld. The tax status of these payments, in whole or in part, is subject to interpretation of the Internal Revenue Service Code. Each individual taxpayer bears the responsibility of filing an income tax report according to the individual's situation and applicable status.

## *J. Special Requirements*

To comply with the Immigration Reform and Control Act of 1986, the department and the University must verify the citizenship status or employment authorization of all persons hired after November 6, 1986. Each student employed by the department must present documents that verify his/her identity and eligibility for employment. A departmental authority must physically examine the documents and verify their authenticity and that they relate to the individual to be employed. Both the student and the department must complete the appropriate sections of Form I-9.

The following documents may be used to establish both identity and eligibility for employment: U.S. passport, a Certificate of U.S. Citizenship, a Certificate of Naturalization, an unexpired foreign passport with attached Employment Authorization and an Alien Registration Card with photograph.

The following documents may be used to establish identity only: State-issued driver's license or personal identifying information such as name, sex, date of birth, height, weight, and color of eyes, a U.S. Military Card, Native American tribal documents, a school identification card with a photograph, a voter card, and an identification card issued by a federal, state, or local government agency.

The following documents may be used to establish employment authorization only: social security card other than one not valid for employment purposes, an unexpired reentry permit, an employment authorization document issued by the Immigration and Naturalization Service, a birth certificate issued by a State, county or municipal authority bearing a seal or other certification and Native American tribal documents.

## VII. STUDENT EVALUATION

### *A. Good Standing*

A graduate student is in good standing if, in the collective judgment of the faculty, the student has exhibited "satisfactory performance", "normal progress", and "appropriate professional conduct". Evaluations will be conducted annually by the Director of Graduate Studies to help determine whether satisfactory progress has been made.

### *B. Satisfactory Performance*

#### 1. M.S. Program

- A cumulative graduate grade point average of at least 3.0. The department standard is higher than the 2.5 minimum required by the Graduate College.
- Generally good performance in research productivity for M.S. thesis (based on the written evaluation of the faculty advisor and/or research director).
- Generally good performance in teaching assistantship activities (based on the written evaluation of professor in charge).

#### 2. Ph.D. Program

- Students with 0-12 hours of graduate credit must maintain a grade point average of 3.25. Students with more than 12 hours of graduate credit must maintain a minimum composite GPA of 3.25. The department standard is higher than the 3.0 minimum required by the Graduate College.
- Generally good to excellent performance in research productivity (based on the written evaluation of the faculty advisor and/or research director).
- Generally good to excellent performance in teaching assistantship activities (based on the written evaluation of the professor in charge).

### *C. Normal Progress*

The length of time required to complete a degree program will vary depending on a variety of considerations such as previous degree(s) awarded, background, conditional or regular admission, full or part-time status, degree objective and plan of study. The rate of progress normally expected is such that a resident full-time student would complete an M.S. program in one to three calendar years after the B.S. and the Ph.D. program in four to six calendar years after the B.S. Course selection and registration will be determined in consultation with the academic advisor and generally is as follows:

- Each regular graduate student in the Ph.D. program is expected to carry 12 semester hours of academic credit (course work and/or research) during the first four semesters until the comprehensive examination is passed.
- During each semester in residence every graduate student must enroll in the 52:191 Seminar in Chemical & Biochemical Engineering.

The above requirements apply to students who are "in residence" in the department, a term which means that the student is making substantial demands on departmental facilities and resources (i.e., using faculty time, office space, laboratory space, shop facilities, etc.).

The guidelines for "normal progress" for each degree objective are listed below:

### 1. M.S. Program

*Semester 1*

Before selecting a research advisor, the student is advised by the Director of Graduate Studies (DGS). With the advice and consent of the DGS, the student registers for course work and research. The student meets with potential permanent advisors. After November 1, a permanent advisor is assigned. The student will usually perform a complete literature review, learn necessary methods and techniques, and perform preliminary experimental work. The student must submit a semester report to his/her research advisor.

*Semester 2*

Assuming no remedial course work is required, the student will meet the minimum course work requirement during the second or third semester. Early in the second semester, the student meets with the examining committee for the first time and presents a preliminary plan of study. The examining committee will modify and approve the plan of study. The student will submit a semester report to his/her research advisor. Research normally continues throughout the summer whether registered for summer classes or not.

*Final Semesters*

Depending on the progress made in course work and research, the student should complete the thesis and pass the final examination in the third to fourth semester of registration. The student should report progress to the examining committee at regular intervals. A semester report to the research advisor is required in every semester except in final semester.

### 2. Ph.D. Program

The student is reminded that the Ph.D. degree is awarded primarily on the basis of excellence in original research. The completion of specified course work, the maintenance of a minimum grade point average or the accumulation of semesters of residence does not satisfy this requirement.

All Ph.D. students are required to complete a minimum of 30 hours of approved graduate course work and pass the Ph.D. Qualifying Requirement. The student will usually be required to take additional advanced course work. The student will present a research proposal, pass the Comprehensive Examination and publicly defend the dissertation at his/her Final Examination.

The guidelines for “normal progress” for a Ph.D. student with a B.S. degree and having no transfer graduate credit are indicated below. The guidelines for students holding an M.S. degree or have a degree in a discipline other than chemical engineering will be adjusted accordingly.

*Semester 1*

Before selecting a research advisor, the student is advised by the Director of Graduate Studies (DGS). With the advice and consent of the DGS, each student registers for course work and research. The student meets with potential permanent advisors. After several weeks, a permanent advisor is assigned. The student will usually perform a complete literature review, learn necessary experimental methods and techniques, and perform preliminary experiments.

In general, students who have completed their M.S. in the department will continue with the same faculty advisor. In consultation with the faculty advisor, a preliminary plan of study for the Ph.D. will be developed. The student will register for research and appropriate course work (if any).

*Semester 2*
The student will continue taking required core courses and learning lab techniques. The Literature Review and Proposal course will assist the student in developing their dissertation research plan.

*Semesters 3 and 4*
Semesters three and four are devoted to completing all core course requirements and preliminary research. The student will have completed the four core courses by this time and completed the Ph.D. qualifying requirement. In the fourth semester, a formal proposal of the work comprising the Ph.D. dissertation is made to the examining committee (i.e., the comprehensive exam). In consultation with the faculty advisor and the examining committee, the course work, research tools and research objectives of the plan of study is formalized.

*Subsequent Semesters*
After passing the comprehensive examination, the student intensifies the level of research and achieves a mastery of the subject area. The student should give an annual update to their dissertation committee, consisting of an oral presentation and a written summary of progress made in the previous year. The first research update should be given approximately one year following passage of the comprehensive exam and each year in residence thereafter.

*Final Semester*
In the final semester, the student should meet all the requirements of the plan of study and the rules of the Graduate College. The student should meet all residency and dissertation requirements of the Graduate College and the department. The student must pass the Final examination.

### *D. Appropriate Professional Conduct*
As engineers we are expected to act in a responsible and professional manner and are expected to participate in departmental or other professional activities. Relevant standards include the Code of Student Life in the Policies and Regulations Affecting Students of the University of Iowa, Section 20.240 of the University Operations Manual, "Professional Conduct and Academic Responsibility", Chapter 114 of the Code of Iowa and Administrative Rules (Engineering and Land Surveying [390]) of the Code of Iowa, and the Code of Ethics of the American Institute of Chemical Engineers (see Appendix). Alleged violations of this provision will be investigated by the department faculty. If a violation of professional conduct is substantiated, then the department faculty will determine any punitive or corrective action at a closed session of a departmental faculty meeting. Any investigation of professional misconduct or determination of punitive actions shall comply with item 11 of the Student Bill of Rights (University Operations Manual) which recognizes the student in any action against the student. This compliance will include, along with other rights and procedures, the following:

- A fair and impartial hearing for determination of culpability
- Adequate prior written notice of any investigation, hearing, or punitive determination
- A closed hearing, unless the student requests otherwise
- Representation by an advisor if desired, at the student's request
- The right to present witnesses, written testimony, and other evidence in the student's defense
- Cross-examination of the evidence against the student
- The right to have character witness testimony heard
- The right of appeal to appropriate University Officers

### *E. General Participation and Service Requirements*
Each Ph.D. or "M.S. with thesis" student in good standing, regardless of source of support, is required to participate regularly in the research, teaching, and services activities of the department as an integral part of their graduate training. As a rule, all graduate students are required to serve as examination

proctors several times each semester. However, other responsibilities are taken into consideration in compiling the list of proctors. Students who are selected to serve as proctors will be notified by an announcement in their mailbox. Students may also be asked to grade papers and homework.

Graduate students will be asked occasionally to assist the department in handling special visits to the laboratories. Such visits are regarded as an important departmental responsibility to the University community and general public. Participation provides excellent opportunities for the students to develop skill in both formal and informal presentations.

### *F. Progress Reports*

All students shall report their research activities and document their progress toward their degree objective as discussed in Sections V.A and VII.C. These reports are to be submitted in the form requested by the research advisor. One copy is supplied to the advisor and one copy to the department secretary for placement in your file. Documentation and supporting material may also be required and will be considered part of the progress report. The progress report is to be signed by the graduate student. The progress reports will become a part of the student office. It is the responsibility of the student to have a photocopy of any semester progress reports placed into their departmental folder. Timely submission of the progress report is required for eligibility for financial aid.

The Director of Graduate Studies will review all graduate student files at the beginning of each Fall semester. This evaluation will focus on performance in classes as well as progress toward fulfilling the requirements of the degree objective. Research quality will be assessed by the research advisor and teaching quality will be assessed by the instructor of the courses for which the student was a T.A. All of these evaluations will be compiled and reviewed by the Director of Graduate Studies. This evaluation will be forwarded to the faculty and used to determine whether the student is making satisfactory progress or not. If there are deficiencies in the student progress, then a letter from the Department Chair or the Director of Graduate Studies will summarize them. The corrective measures recommended and the specified time to remove these deficiencies will also be stated.

The student will certify by his/her signature that he/she has read and understands the evaluation. A student who disagrees with the evaluation may submit a letter stating the reasons why the student disagrees with the evaluation. This letter will be attached to the evaluation and will become a part of the student's file.

### *G. Review of Progress by the Faculty*

Each Fall semester, the faculty will evaluate the progress of each student and determine whether a student is in "good standing". The faculty will base their decision on the academic record, the semester progress reports, performance in carrying out the responsibilities of a research or teaching assistantship, evaluations from faculty members and an evaluation by the faculty advisor. In addition, the faculty will determine the level of financial support to be provided (continued, increased, reduced or eliminated), whether the student should be placed on or removed from probation, or in some cases, be terminated from the program.

### *H. Informal Procedure for Student Complaints Concerning Faculty Actions*

In cases where complaints do not involve student alleged academic misconduct, students with complaints against faculty must first attempt to resolve the issue with the faculty member against whom there is a complaint. Lacking a satisfactory outcome, the student should discuss the matter with the Director of Graduate Studies and/or chairperson of the department.

Students who are uncomfortable with dealing directly with a faculty member or department Chair may seek assistance from the Faculty Ombudsman in the College of Engineering in seeking a resolution of the complaint. However, it is anticipated that grievances can be satisfactorily resolved most expeditiously at

the faculty or chairperson level. If the student is not satisfied with the outcome of this procedure, then the student should discuss the complaint with the Dean of the Graduate College.

As with all complaint procedures, all reasonable actions will be taken to prevent any retribution against the student(s) initiating the complaint, and any witnesses. This will include, if necessary, accelerated consideration of a change in academic advisor.

## *I. Academic Misconduct*

In dealing with issues of academic misconduct, the department follows the procedures as outlined in "Regulations Dealing with Academic Misconduct" of the College of Engineering.

Academic misconduct is defined as "academic dishonesty, including the acquisition of honors, awards, certification or professional endorsements, degrees, academic credits or grades by means of cheating, plagiarism, or falsification with respect to any examination, paper, project, application, recommendation, transcript, or test, or by any other dishonest means whatsoever, or aiding or abetting another student to do so."

The following regulations provide a procedure for dealing with students who are alleged to have committed an act of academic misconduct.

### 1. Guidelines for Disciplinary Action by an Instructor

a. Exams:
   In cases of cheating on hourly or final exams, it is recommended that the instructor reduce the student's grade to the grade of "F" in the course. When a course grade has been reduced to an "F", the student may not drop the course, nor use the Second Grade Option procedure to eliminate the failing grade from semester and cumulative GPA values that appear on the permanent record card (i.e., the grade transcript). It is recommended that cheating on quizzes be considered as serious a violation as on exams and that the penalty be similar. The instructor shall send a written report of any disciplinary action to the Office of the Dean of the Graduate College and the report shall be placed in the student's file.
b. Homework, Lab Reports, etc.:
   Each instructor shall announce and distribute in writing, at the beginning of each course, the acceptable policies on student collaboration in each of the graded course requirements. When the policy is clearly violated, a zero shall be assigned for the total portion of the course grade allocated to the requirement in which the violation occurred (e.g., a zero for all homework assignments if cheating occurred on a homework assignment). A written report of this action shall be sent by the instructor to the Office of the Dean of the Graduate College and placed in the student's file.

### 2. Student Appeal

When a written report of a disciplinary action by an instructor is received by the Office of the Dean of the Graduate College, the student shall be notified in writing of the action. If the student feels that the finding of cheating is in error or the penalty is unjust, then the student may request a hearing by notifying in writing the associate dean of the College, who will in turn appoint a committee to review the incident. If the student is not satisfied with the results of the hearing, then the student may request a review by the Office of the Vice President for Academic Affairs.

### 3. Disciplinary Action by the Dean

In cases of a flagrant or a second offense, the dean of the College may impose the following or other penalties as the offense may warrant: cancellation of the student probation; suspension from the College, or recommendation of expulsion from the University by the President. If the student feels

that the penalty imposed by the dean is unjust, then the student may request a review by the Office of the Vice President for Academic Affairs.

#### 4. Record of Disciplinary Action

Reports of academic misconduct received by the Office of the Dean of the Graduate College shall be placed in the involved student file that is maintained in the Dean's office and the departmental office. The reports shall be destroyed when the student graduates or within two years after the student leaves the University.

## *J. Changing Advisors*

A change in advisor-student relationship may be requested by either the student or the faculty member. Changing this relationship, while possible, may create numerous difficulties for the student as well as for the advisor. The department may be unable to provide alternative financial support for students previously supported by their faculty advisor or unable to find another faculty member willing to act as their faculty advisor. In addition, the faculty member may be unable to fulfill his research obligations. As a result, changes in advisor are not taken lightly and cannot be automatically approved.

Should a difficulty arise in the advisor-student relationship which cannot be resolved privately, the Director of Graduate Studies and the department Chair may be able to assist the parties in reaching a mutually acceptable agreement. If the problem cannot be resolved after consultation with the Director of Graduate Studies and the department Chair, then a change of advisor may be formally requested by one or both parties. A change of advisor must be approved by the student, the student's advisor and the department Chair. In the event that either the student or the former advisor refuses approval, a departmental faculty meeting will be held to discuss the change. The approval of the department faculty is required before the change of advisor is approved. In either case, the student can petition the department (by writing a letter to the department chair requesting to present their case at the departmental faculty meeting).

A change of advisor may be permitted only when the following conditions have been met:

- A change in advisor is in the best interests of the student, the faculty advisor and the department.
- The department Chair has been consulted.
- The student is able to find a new faculty advisor in the department or has taken steps to transfer out of the department. Generally, a change of advisor will require the student to change research projects.
- A change of advisor will not be permitted if a M.S. candidate has less than one full semester remaining in his program. A Ph.D. candidate must have at least three full semesters remaining before completing degree requirements.
- The student and/or faculty advisor should submit his/her request for change of advisor, in writing, to the Chair, giving their reasons for making this request. The Chair will bring this request to the department faculty for their approval before the request is approved.

## *K. Intellectual Property*

#### 1. Academic Freedom

The freedom to express new and divergent ideas and to challenge existing "truths" is essential to the vitality of the University. Consistent with this principle, the department encourages students to propose new theories and techniques in the course of their research. Furthermore, students are encouraged to express their ideas in a responsible and scholarly fashion.

It is not an infringement of a student's academic freedom to have the purposes, methods, results and conclusions expressed in the thesis or dissertation challenged for their scholarly merit or to demand that they meet the scrutiny of intense examination and the generally accepted standards of the academic community. In addition, the acceptance of the thesis as meeting the requirements for the degree is solely the function of the examining committee and the Graduate College and academic freedom is not at issue during the final examination.

### 2. Copyright

University regulations state that the M.S. Thesis or Ph.D. Dissertation is the property of the student and may be copyrighted by the student. It should be noted that a copyright does not imply ownership of the ideas, theories, methods, or conclusions expressed in the thesis or dissertation by the author. Rather, a copyright merely protects the specific form of the expression (i.e., the document itself). The student has the right to copyright his/her thesis or dissertation and can do so by following the procedures established by the Graduate College.

Furthermore, although the written document is the intellectual property of the student, and while novel ideas, concepts, theories, methods, results, and conclusions may also be the student's property, it can also be the property of persons other than the student. In such cases, these ideas, concepts, theories, methods, results and conclusions are the intellectual property of the person(s) who first conceived of them. The student must comply with the requests and demands of the owner(s) of the intellectual property contained in their thesis or dissertation unless the intellectual property in question is available in publicly accessible publications. This provision is not intended to prevent the full publication of the thesis or dissertation.

### 3. Intellectual Property and Patent Rights

Except as provided for in the following paragraphs, textbooks and other products of teaching, research, scholarship, and artistic endeavors belong to the faculty or staff member (graduate student) when the product is not the result of a specific assignment or commission and where there is not substantial University contribution or support beyond the salary, developmental assignment, services, and facilities (including libraries and laboratories) customarily provided to faculty (or graduate students) in the respective discipline and University unit.

The University has an interest in and reserves the right to review, negotiate, and sign agreements for the use or sale, outside the immediate instructional setting, of the following educational materials: (1) Materials specifically commissioned by the University; (2) Materials to which the University has made a substantial contribution (one which is significant in the context of the situation and the practices in particular disciplines, schools, departments, or other units of the University); and (3) Materials developed with the assistance of outside funding where terms of the grant or contract are binding on the author or the University.

Rights in inventions are administered by the University Patent Committee and the University of Iowa Research Foundation pursuant to the official University Patent Policy adopted by the Board of Regents and set forth in the University Operations Manual, volume 1, section 3, pages 31-35. Questions regarding these policies should be addressed to the Office of the Vice-President of Research.

## VIII. DEPARTMENTAL POLICIES

The department office is located in 4133 Seamans Center and is open from 8:00 a.m. to Noon and 12:30 to 4:30 p.m. Monday through Friday.

### *A. Smoking Policy*

UI policy states smoking is prohibited on the University of Iowa campus within 25 feet of all buildings, including parking ramps, enclosed parking facilities and athletics facilities. With respect to the Department of Chemical and Biochemical Engineering, smoking is strictly prohibited in all laboratories, corridors, stairways, non-private and private offices. All smoking must be in accordance with UI policies and procedures.

### *B. Assignment of Office/Lab*

Each semester the department Chair will assign office and laboratory space to graduate students. Priority for office and laboratory space will be given to students performing thesis research, to teaching assistantships who must meet with students, and full time graduate students. Due to space limitations, office space cannot be guaranteed to all graduate students. However, office space may be available to graduate students in the University's Main Library. Students are responsible for exploring this possibility themselves.

### *C. Keys and Departmental Security*

Keys to student offices, laboratories, common areas and entrances may be obtained from the department secretary. Students will only be issued keys for which they are specifically authorized. The keys must be returned when requested by the department or when the student no longer requires access. In any case, all keys issued to the student must be returned when all degree requirements are completed.

Each student and faculty member is responsible for all keys issued to him/her. The student must leave a $5.00 deposit for each key, which will be reimbursed when the keys are returned.

Since departmental security depends on key control, it is necessary to re-key all affected locks and issue new keys when a key is lost, stolen or not returned. This is a very expensive process costing up to several hundred dollars for some locks. Do not lend your keys out or leave them unattended. Return keys you no longer need as soon as possible. Graduation applications, registration and other paperwork may be canceled for failure to pay outstanding bills to the department.

The theft of laboratory and personal items is common. Do not keep valuables in your desk. Keep your keys with you at all times. Lock your doors and windows when leaving your laboratory. Do not block open locked doors. Do not let unauthorized persons into the building after hours. Anyone who belongs in the building after hours should have a key.

### *D. Mail Boxes*

Mailboxes for students with offices in the Chemistry Building (CB) or IATL are located in the hallway of 123 CB. Mailboxes for students with offices in Seamans Center are located in 4133 SC. If a student office is located in a building other than these, then arrangements can be made with the department to have mail delivered to that building. Please check your mailbox frequently for mail, messages and memos.

### *E. Computing*

As a graduate student in the department you also have access to all CSS (Computer Systems and Support) resources. Students must use computing resources ethically and legally. It is a violation of University policy to access, read, copy or use the computer programs, files, tapes or other material without the knowledge and consent of the owner. Violation of this policy is considered the equivalent of theft. In addition, students must observe the copyright protection afforded commercial software and are not permitted to make illegal (or "bootleg") copies of copyrighted software. Access to super computers, parallel processors and other high speed computing resources is available. Your faculty advisor or the department Chair can assist you in obtaining time on these machines.

## *F. Shops*

There are a number of shops on campus available to repair and construct graduate research apparatus. These shops charge users for labor and materials. A university requisition is required and must be requested prior to obtaining services from the following shops.

### 1. College of Engineering Shops

The College of Engineering has a mechanical shop (G471 SC) and an electronics shop (2018 SC) which can assist graduate students in the construction of research apparatus. Projects are charged for labor and materials.

### 2. Physics Shop

The Physics Department has a shop (116 VAN) which is capable of constructing unusual or high precision apparatus, specializing in extreme condition projects. The physics shop charges projects for both labor and materials.

### 3. Glass Shop

The Chemistry Department has a glass shop (161 CB) with a certified scientific glassblower. The glassblower is available to repair broken glassware and to construct special experimental apparatus. The glassblower also has the capability of installing and constructing glass apparatus directly on laboratory racks. The glass shop charges projects for both labor and materials.

### 4. Medical Instrument Shop

The Medical Laboratories have a shop (8 ML) which is capable of constructing unusual or high precision projects, but specializing in biological projects. The medical instrument shop charges projects for both labor and materials.

## *G. Purchasing Supplies and Services*

Bar code cards can be obtained in the Departmental Office for purchases from Chemistry Stores and Biochemistry Stores. Purchasing supplies through other University services such as General Stores, Shops or the Memorial Union requires a university requisition. Students may obtain a requisition request form from the department office or from a supply above the graduate student mailboxes (123 CB). The requisition request form must be approved by the faculty advisor and have the account number filled in before it will be processed. All requisitions must be signed by the Chair or his/her designate. All purchases must be made with the properly authorized forms. The department may not reimburse individuals who make purchases using personal funds.

Major equipment costing more than $5,000 must be bid out by the University Purchasing Office. You must provide the Purchasing Office with the specifications which must be met by the equipment or instrument. They will then secure confidential bids from possible vendors. You may ask the Purchasing Office to secure bids from specific vendors. The Purchasing Office will generally select the lowest bid which meets your bid specifications. You and your advisor may ask the Purchasing Office not to award the bid to the lowest bidder; however, written justification is required. Once the bid price is known, a University requisition is sent to the Purchasing Office and the bid is awarded. This process is very time consuming and usually takes several months to complete. Students should plan their research accordingly.

## *H. Library*

The University of Iowa has a decentralized library system. Most of the chemistry and chemical engineering literature is accessible on the web. Engineering and some chemical engineering literature is housed in the Engineering Library (2100 SC). Mathematics and computing literature is in the

Mathematics Library (125 MLA). Most of the biochemistry, biochemical engineering and biotechnology literature is located in the Health Sciences Library. The other libraries on campus are: Main Library, Art Library (AB), Biology Library (301 BB), Business Administration Library (C320 PBS), Chemistry Library (main library, 2nd floor), Curriculum (Education) Library (N140 LC), Geology Library (136 TH), Law Library (326 BLAB), Music Library (2000 MB), Physics Library (350 VAN), and Psychology Library (W202 CI). Loan policies vary by library; however, graduate students typically may check out books for one semester. All material is subject to recall. Journals in the Chemistry Library may be checked out for one week. Journals in the Health Sciences Library may only be checked out overnight and must be returned the next morning.

### *I. Secretarial Assistance/Copy Machine/Laser Printer*

Secretarial assistance is limited to that needed to discharge the responsibilities of an assistantship or other appointment. T.A.'s are encouraged to type their own lecture material using a personal computer. Personal typing such as thesis, class material, homework, etc. is the responsibility of the student.

Use of the department copy machine is limited to that needed to discharge the responsibilities of a teaching or research assistantship.

### *J. Use of Teaching Equipment for Graduate Research*

In general, it is the policy of this department that teaching equipment may not be used for graduate study. In particular, use of the Unit Operations Laboratory glassware, instruments and other small equipment (e.g., stirrers, heaters, recorders, timers, thermometers, pumps, etc.) for graduate research is not permitted. However, the UV-visible spectrophotometer, the FIR spectrophotometer, the cone and plate viscometer, the BIOStat M fermentor, and polymer extruder in the Unit Operations Laboratory may be used for graduate research with the permission of the Director of Undergraduate Laboratories. The instruments must be used in the U.O. laboratory. Such usage must not interfere with the instructional use of the instruments. The research advisor must certify in writing that use of the equipment is essential to the research project and that the advisor and student will be responsible for repairing any damage to the instruments that arise from their use. The research advisor must also agree to pay for supplies and incidental items used by his students while using U.O. laboratory equipment. This is necessary to cover the cost of such items as chart paper, pens, syringes, cuvettes, etc. Arrangements for repairs must be made immediately from non-departmental funds. The users must be trained to use the equipment properly and safely. For use of the instruments after hours, a key may be checked out with the written permission of the Director of Undergraduate Laboratories. Any violation of these policies may result in the loss of U.O. instrument use privileges.

In extraordinary circumstances, teaching equipment may be loaned to faculty advisors for research purposes for a limited time (four weeks or less). A written request must be submitted to the Director of Undergraduate Laboratories. Approval will be granted only if undergraduate teaching will not be impaired and the faculty advisor has taken steps to purchase the needed equipment. In no case will teaching equipment be loaned for more than one semester.

### *K. Gas and Gas Cylinders*

Gas for experiments may be purchased through General Stores. The gas cylinders will be delivered to the laboratory. The gas is purchased; however, the gas cylinders are rented. Projects will be charged a monthly rental fee for each cylinder ordered until the cylinder is returned to General Stores. These fees can add up quickly and students are requested to return cylinders as soon as they are no longer needed. Label cylinders and place them on the loading dock for pickup by General Stores. All gas cylinders should be stored upright and secured safely to a bench or wall at all times. Flammable gases should be

kept far away from all sources of heat or sparks. When being stored without regulators, the gas cylinder valve should be closed and the protective cap replaced. Contact the Health Protection Office should you have questions regarding the safe use and storage of gases and gas cylinders.

### *L. Hazardous Materials*

All chemicals in the laboratory should be considered potentially hazardous. Material Safety Data Sheets (MSDS) are available online for most of the chemicals used in your laboratory. The MSDS contains information regarding the potential chemical, physiological, mechanical and other hazards associated with the chemical. Check with your faculty advisor, the department office or the Health Protection Office in order to see the MSDS of interest to you. Laboratory instructors are responsible for providing MSDS on all chemicals used in the course to the graduate T.A.'s. The T.A.'s are then responsible for making them available to the laboratory students before they start the lab.

Federal and state regulations require that all hazardous chemicals be disposed of in a certified facility. It is unlawful to dispose of hazardous chemicals down the drain and will likely damage the pipes. Collect chemical wastes in as pure of a form as possible. Do not mix chemical wastes during storage. Label all waste containers with the waste chemical name(s), their approximate concentration and the date. Dispose of outdated or unneeded chemicals. Students must always store flammable chemicals in an approved flammable storage cabinet. Do not store incompatible chemicals close to one another in the laboratory. Organic solvents should be stored in a different location than acids and bases. Chemicals cannot be stored in hallways, stairwells or other common areas.

The Health Protection Office will pick up and dispose of laboratory chemicals. The waste chemicals must be in safe, labeled containers. The containers must be clean and dry. Someone must be in the laboratory at the time of pick-up. The Health Protection Office has the following procedures for chemical wastes:

1. **Chemical Waste**
   Solid and liquid chemicals and wastes contaminated with chemicals.
   Examples:
   a. Chemical reagents no longer in use
   b. Outdated and excess chemicals
   c. Acids and bases
   d. Antineoplastic drugs
   e. Waste solvents
   f. Chemicals and contaminated materials from spills
   g. Liquid media containing toxic/carcinogenic materials
   h. Chemical wastes that contain biohazardous material
2. **Packaging Guidelines**
   For Waste Flammable Solvents.
   a. Use container and closure compatible with waste.
   b. Commingle organic solvents only within the six groups listed below:
      - Halogenated F, Cl, Br, I
      - Contain only C, H, O
      - Contain N
      - Contain S
      - Reactive
      - Oils
   c. Complete hazardous waste label #2 listing each major solvent.

d. Attach to container.

3. **Chemicals in Original Container**
   a. If original label is legible and tightly affixed, then complete hazardous waste label #1.
   b. Attach to container but not over original label.
   c. If original label is illegible and/or loose, then complete hazardous waste label #2.
   d. Attach to container.
4. **Chemicals not in Original Container**
   a. If container was previously used to package chemicals, efface the original label by marking XX through the original label.
   b. Complete hazardous waste label #2.
   c. Attach a container.
5. **Non-Radioactive Liquid Media Containing Toxic/Carcinogenic Materials**
   a. Collect in a suitable container.
   b. Add a sufficient amount of an appropriate disinfectant to prevent the growth of microorganisms.
   c. Complete hazardous waste label #2.
   d. Attach a container.
6. **Non-Radioactive Waste Resulting from Clean-up of Chemical Spills/Weighing of Solid Toxic Material**
   a. Double bagged and boxed--use plastic lined cardboard box or other suitable container.
   b. After filling, tie plastic bag.
   c. Seal box with tape.
   d. Complete hazardous waste label #2 and attach to container. Identify chemical and approximate quantity of any other contents such as gloves, plastic, paper, and so forth.
7. **Non-Radioactive Chemical Waste Containing Biohazardous Material**
   a. Collect in a suitable container.
   b. Add a sufficient amount of an appropriate disinfectant to decontaminate the biohazardous material.
   c. Complete hazardous waste label #2.
   d. Attach to container.

## IX. EMERGENCY PROCEDURES

In the event of fire or chemical hazard, you should leave the building and call for help. Fire extinguishers, fire alarms, eyewash fountains and emergency showers are in all laboratory areas. Note the location of these devices near your office or laboratory. For all emergency situations where immediate assistance (police, fire or ambulance) is required call 9-911. You should state your location, the nature of the trouble and the assistance you are requesting. In the event of a serious building problem such as loss of electricity, a leak in gas, steam or water lines or other problem which requires immediate attention, you should contact the Facilities Services Group office (5-5071). After working hours, call the Facility Services Group emergency number, 335-5063, or Public Safety, 335-5022. To report a theft or other crime, contact Public Safety, 335-5022. Finally, you should report all problems and emergency situations to your faculty advisor or the department Chair as soon as possible.

## X. APPENDIX

### *A. AIChE Code of Ethics*

In August of 1980, the Council of the Institute adopted the following as its own Code of Ethics, to which it expects the professional conduct of its members to conform and to which every applicant attests by the signing of his or her application.

#### 1. Fundamental Principles

Engineers shall uphold and advance the integrity, honor, and dignity of the engineering profession by:

- Using their knowledge and skill for the enhancement of human welfare.
- Being honest and impartial and serving with fidelity the public, their employers, and clients.
- Striving to increase the competence and prestige of the engineering profession.

#### 2. Fundamental Canons

- Engineers shall hold paramount the safety, health, and welfare of the public in the performance of their professional duties.
- Engineers shall perform services only in the areas of their competence.
- Engineers shall issue public statements only in an objective and truthful manner.
- Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
- Engineers shall build their professional reputations on the merits of their service.
- Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of their professional development.
- Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

# TA EVALUATION FORM

TA: _____

Instructor: _____

Course: _____

Semester Course Offered: _____

Rate overall performance:

___ Outstanding

___ Good

___ Satisfactory

___ Below Standards

___ Unacceptable - (Do not allow this person to be a TA again)

Comments Supporting Evaluation:

Instructor Signature _____ Date: _____

TA Signature _____ Date: _____

# ANNUAL RESEARCH PROGRESS REPORT

Student Name: _____

Advisor: _____

Research Project Title: _____

_____

Major Goals of Project:

Work Accomplished in Past Year:

Advisor's Assessment: ___ Satisfactory
___ Unsatisfactory

Written Comments:

Advisor's Signature: _____ Date: _____

Student's Signature: _____ Date: _____

# Ph.D. COMPREHENSIVE PROPOSAL FORMAT

1. **Cover Sheet.** Includes distinct project title (maximum of 80 characters), name, etc.
2. **Project Summary.** Maximum of 250 words. This should be page 1 of the proposal, with this and each succeeding page number centered at the bottom of the page.
3. **Table of Contents.**
4. **Research Plan.** This section is a maximum of 25 pages. It can be single spaced, but must have 1" margins on all sides and a font size of at least 12 (Times New Roman preferred). This limit includes all figures and tables, but not the "Literature Cited" section. The research plan should answer the following questions. What do you intend to do? Why is the work important? What has already been done? How are you going to do the work? This plan should be hypothesis-driven. This section should contain the following subsections:
   a. ***Specific Aims.*** Should have 2 to 3 specific aims. It is recommended that this section be limited to ~1 page.
   b. ***Background and Significance.*** Review of relevant literature and justification of research (i.e., why is the work important?).
   c. ***Preliminary Results.***
   d. ***Research Design and Methods.*** This section should be related back to the specific aims, i.e., the first 4 subsections given below should be written for each specific aim.
      - Experimental Design. This should briefly discuss the strategy behind the experiments that will be conducted to address the specific aim in question.
      - Expected Results. What results do you expect to obtain?
      - Potential Problems. What potential problems could arise by following the proposed plan, i.e., what could go wrong? Should briefly discuss alternative approaches for those cases where potential problems could arise.
      - Methods. This section includes the methods that will be used, written in a format similar to the methods section of journal articles. For established methods you should give a brief overview of the methods and cite literature references that can be consulted for additional details.
      - Proposed Time Table (i.e., “Gantt Chart”).
      - Literature Cited. This should include complete references (including journal article titles) and be given alphabetically based on the first author's last name.
5. **Biographical Sketch.** A biographical sketch is required and should be completed as follows (2-page limit):
   a. Complete Contact Information.
   b. Education and Training. List all of your post-secondary educational and training experiences.
   c. Professional Experience. List positions (including co-ops and internships) directly relevant to research.
   d. Publications. List your publications that are relevant to the proposed project.
   e. Presentations. Provide information about your conference presentations that are relevant to the proposed project.
   f. Honors and Awards. List all of your relevant honors and awards.